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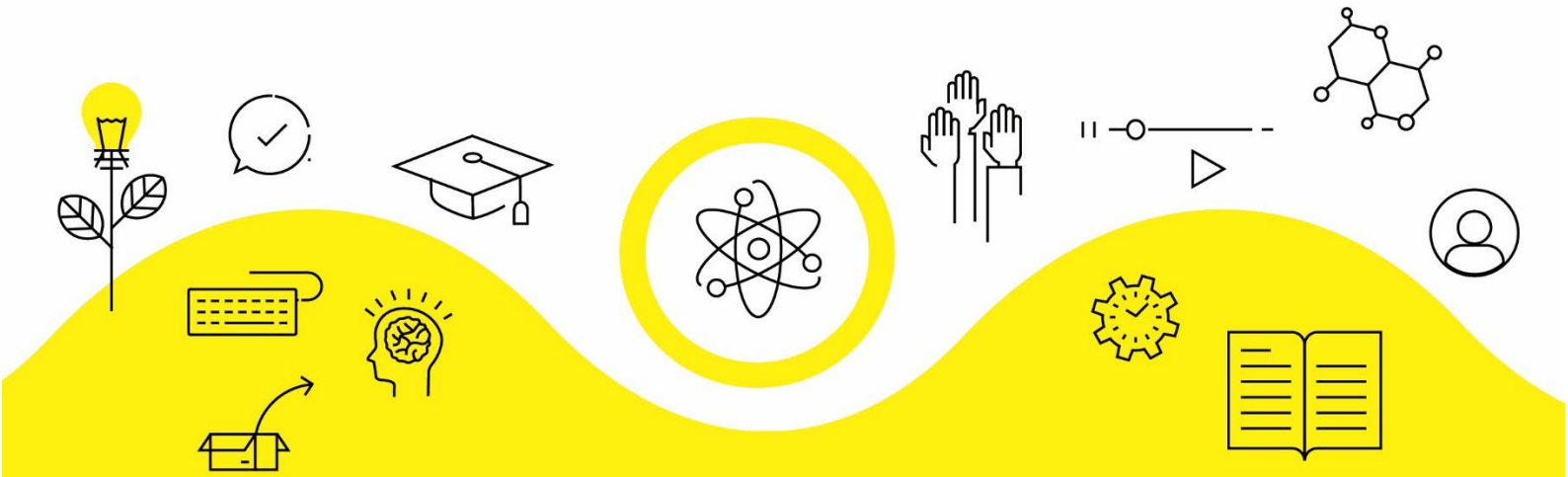
ESG - RISK MANAGEMENT OR NEW SUSTAINABILITY?

VIII. BUEB International Sustainability Student Conference

Proceedings - Budapest University of Economics and Business



2025

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Contents

Corporate Sustainability in the Energy Sector: Exxonmobil's SDG Alignment from 2017 to 2022

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Abstract

Over the past decade, sustainability has transitioned from a marginal concept to a core strategic objective for companies, particularly in sectors with significant environmental impact. This paper examines the changing role of sustainability in the oil and gas sector focusing on ExxonMobil as a case study. By examining the publicly released ExxonMobil 2017, 2019, and 2022 sustainability reports, this study examines how the company ExxonMobil has integrated sustainability into its company story and strategic communication. Particular focus is placed on the frequency and development of the United Nations Sustainable Development Goals mentioned throughout the reports. The analysis records fluctuations in trends in the number of Sustainable Development Goals reported over time, in changes in thematic focus areas, and in a rising approach towards reporting Environmental, Social, Governance-oriented activities. Monitoring these changes over a five-year period the article provides insights into the management of sustainability transitions by a large energy source and into the extent to which these mirror global development models. ExxonMobil's decision to focus on three Sustainable Development Goals instead of eight indicates a move from the broad "Sustainable Development Goals – washing" risk towards a more focused, materiality-oriented approach to sustainability. The company's dedication to directing resources, governance efforts and performance indicators to the global objectives is reflected in more focused targeting.

Keywords: Sustainable Development Goals (SDGs), Corporate Reporting, Oil and Gas Industry, Corporate Sustainability Strategies, ESG

JEL Classification: Q01, Q56, M14, L71, Q44

Introduction

Oil and gas processing is a central part of global energy, yet it still faces deep-rooted sustainability, corporate responsibility, and ethical governance challenges. While sustainability challenges, increased regulatory scrutiny, and shifting social norms have contributed to mounting pressure on industry companies to redirect their working and strategic agendas, there remains some distance to travel to reshape them. Over the last decade, sustainability has moved from a niche idea to an integral part of business strategy, particularly for companies with large environmental footprints.

This paper describes how sustainability practices have changed over time in the energy industry with reference to ExxonMobil. Based on content analysis of publicly accessible ExxonMobil's 2017, 2019, and 2022 sustainability reports, this study assesses to what extent ExxonMobil has integrated its strategic communication with respect to the United Nations Sustainable Development Goals (SDGs). The research tests for trends in the frequency and thematic orientation of SDG mentions quoted, tracks changes in Environmental, Social, and Governance (ESG) reporting, and examines these changes as indicators of global sustainability trends. Through the study of a five-year period, the paper hopes to provide some idea regarding

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how a large energy company traverses challenging landscapes of transitions for sustainability and how closely its policy matches international blueprints for growth.

Methodology

This research applies qualitative content analysis to explore the ways in which ExxonMobil has incorporated sustainability and the United Nations SDGs into its company strategy and reporting framework from 2017 to 2022. The research is informed by two major elements: (1) conceptual framework on sustainability in the energy sector drawn from academic literature content released in recent years and (2) content analysis of primary sources – ExxonMobil's official 2017, 2018, 2019, and 2022 sustainability reports. The chosen sustainability reports, accessed through ExxonMobil's official website, serve as the main data source. The reports are read in an organized manner to determine the frequency, extent, and thematic alignment of SDG mentions, and changes in ESG language across the five-year period. Focus is given to the choice of words, development of strategic priorities, and saliency of particular SDGs across the reports. Reporting trends and discontinuities are tracked to assess the level of conformity with global sustainability norms.

Empirical examination is supplemented by theoretical synthesis of seminal academic literature on oil and gas industry sustainability. Ground-breaking research like Mojarad, Atashbari, & Tantau (2018), Spence (2011), and Aziza, Uzougbo, & Ugwu (2023) offer context regarding the systemic sustainability issues confronting the industry. Best practices and case-study-based knowledge by Emeka-Okoli et al. (2024) and Epere (2025) also guide benchmarking of ExxonMobil's practices against wider industry best practices.

Sustainability in the energy sector – oil and gas industry

The refining of oil and gas and the energy sector at large continue to be one of the most socially, environmentally, and ethically challenging industries in the global economy. As much as it is the anchor industry for powering modern societies, the industry has been criticized for having too large an environmental impact and socio-economic disturbances. In the face of increasing global pressure towards sustainable development, oil and gas operators are increasingly under pressure to rethink their operations according to sustainability values and United Nations SDGs. This chapter takes stock of the most pressing sustainability issues confronting the industry, including environmental degradation, Corporate Social Responsibility (CSR) obligations, and increasing complexity of conformity to regulation.

Environmental Sustainability Challenges

Refining of oil is also a significant producer of carbon and is thus among the most environmentally significant industries. Refining also emits CO_2, methane, and nitrogen oxides responsible for global warming. The path to substituting for sustainability, namely Carbon Capture and Storage (CCS), is expensive and underdeveloped. (Mojarad, Atashbari, & Tantau, 2018) The refineries use enormous quantities of water to process and cool, leading to local water depletion. Also, wastewater disposal with harmful chemicals is harmful to aquatic life. (Mojarad, Atashbari, & Tantau, 2018) Refineries generate solid and toxic waste, such as sludge, catalysts, and spent chemicals. They can pollute land and water resources if they are disposed of improperly. Oil spills, caused by leaks or transportation malfunction, also add to environmental destruction. (Mojarad, Atashbari, & Tantau, 2018)

Corporate social responsibility challenges

Oil refining is also accompanied by unsafe working conditions, usually where labour laws are weak. Protecting workers and compensating them fairly is always difficult, especially in developing nations. (Spence, 2011) Refinery activities by the oil industry tend to dislocate human beings and affect the host community. The ethical concerns include indigenous rights, expropriation of land, and fair economic benefits. (Spence, 2011)

Regulatory and compliance challenges

Governments across the globe are imposing tighter restrictions on carbon emissions, waste handling, and air pollution. Compliance, though mandatory, will likely translate into higher operating expenses for refiners. (Aziza, Uzougbo, & Ugwu, 2023) There is significant risk of corruption in oil-producing countries, where bribery and poor governance influence regulatory enforcement. Anti-corruption and governance ethical best practices will be required to mitigate these risks (Aziza, Uzougbo, & Ugwu, 2023).

Good practices and sustainability measures in the oil and gas refining industry

Although the oil and gas refining industry strongly influence the environment, many companies are embracing new strategies to become more sustainable. Some of the most important steps in this regard are increasing energy efficiency by techniques such as heat integration and process optimization, which lower greenhouse gas emissions. Refineries are also incorporating renewable energy sources like green hydrogen, biofuels, solar power, and wind power to minimize fossil fuel consumption. (Emeka-Okoli, Nwankwo, Otonnah, & Nwankwo, 2024)
Water conservation is being accomplished through improved wastewater treatment and recycling practices, and circular economy practices like chemical reuse and flare gas capture assist in waste reduction. In addition to reducing the industry's environmental impact, such measures also make the operation more efficient. Ongoing innovation and enabling regulations continue to be key to maintaining such improvement (Epere, 2025).

Introduction of ExxonMobil

ExxonMobil is a leading publicly traded energy company of the world with its roots dating back to the year 1882. It was established in 1999 after the Exxon and Mobil merger. The company is listed on the stock symbol 'XOM'. It has since emerged as the leading player in the oil and gas industry with business interests ranging from commercial services, finance, and IT to having a Global Business Centre in Hungary in the year 2004.

ExxonMobil has expanded its attention in recent times to deal with climate change and sustainability. In 2021, it began ExxonMobil Low Carbon Solutions with an emphasis on carbon capture and storage for facilitating net-zero emission objectives in line with the Paris Agreement. Most recently, in 2024, it acquired Pioneer Natural Resources, continuing to cement its leadership in the energy sector. This acquisition demonstrates ExxonMobil's strategic move to adapt to global energy changes while sustaining industry leadership.

ExxonMobil's sustainability framework

ExxonMobil's sustainability framework is based on four closely linked pillars – integrating Sustainability, Leadership, Application, and Performance – and is supported by demanding standards, governance systems, and stakeholder engagement processes. (ExxonMobil, Integrating sustainability into what we do, 2025)

1. Integrating Sustainability

ExxonMobil integrates sustainability into its very mission: "creating energy and sustainable solutions that improve quality of life and meet society's evolving needs." For its integrity, each director, officer, and employee is committed to following the company's Standards of Business Conduct, a framework of foundation policies for environmental protection, human rights, labour, anti-corruption, etc. These policies are managed by the Board of Directors, cannot be waived, and are enforced by mandatory annual training and open-door reporting process for any suspected violations. (ExxonMobil, Integrating sustainability into what we do, 2025)

2. Leadership

The company fosters a "We are ExxonMobil" culture model that establishes core values – most importantly, integrity – and leadership expectations. With companies like the University of Michigan, ExxonMobil provides leadership development to align its people with strategic objectives and ethical standards. Performance measures, classroom instruction, and in-the-job experience provide executives at every level with an opportunity to demonstrate responsible decision-making. (ExxonMobil, Integrating sustainability into what we do, 2025)

3. Application

ExxonMobil implements its sustainability approach through 14 Sustainability Focus Areas (Figure 1.) established using a data-driven topic-sourcing methodology based on Ipieca and other reporting needs. The focus areas direct the company's examination of environmental and social effects, business strategy formulation, and communication with stakeholder concerns. Strong management systems – like Operations Integrity Management System (OIMS), Environmental Aspects Guide, and Global Energy Management System – offer processes, metrics monitoring, and ongoing improvement tools to minimize risk and drive sustainability goals. (ExxonMobil, Integrating sustainability into what we do, 2025)

Figure 1: *14 Sustainability Focus Areas*
Source: ExxonMobil, Integrating sustainability into what we do (2025)

4. Performance

A rigid system of control guarantees conformity between field implementation and company strategy. The Board Audit Committee is provided with quarterly reports of incidents of policy breaches, while internal audits and self-monitoring guarantee consistency with norms. ExxonMobil's environmental-data systems, impact-assessment procedures, and project-management systems guarantee transparent reporting and responsibility. The company addresses shareholders, communities, regulators, suppliers, and Non-Governmental Organizations (NGOs) through meetings, e-communications, and formal feedback channels to guarantee two-way communication. (ExxonMobil, Integrating sustainability into what we do, 2025)

Together, all these factors paint a picture of how ExxonMobil integrates sustainability into every element of its business – everything from establishing non-negotiable codes of behaviour to employing sophisticated governance and management systems – so as to bring together societal expectations, environmental stewardship and profitability.

Analysis of SDG reports

Sustainable Reports available on ExxonMobil's website present the years of 2017, 2018, 2019, 2021. In the chapter, the 17 SDG Goals examined as to which ones the company applies.

Since 2017, ExxonMobil's Sustainability Reports have continually reaffirmed the company's contributions to all 17 United Nations Sustainable Development Goals but decided to emphasize a subset of goals where it thinks its operations can make the most significant impact. The firm emphasized its eight SDGs in 2017-2019; and in its 2022 report, its emphasized goals were narrowed down to three. (Figure 2.)

In each of the 2017, 2018, and 2019 Sustainability Reports, ExxonMobil identified the following eight SDGs as its priorities:

- Goal 1: No Poverty – Supporting economic development and energy access in underserved communities.
- Goal 3: Good Health and Well-Being – Protecting worker health and funding global health initiatives such as anti-malarial programs.
- Goal 4: Quality Education – Investing in Science – Technology – Engineering – Mathematics (STEM) education and teacher training worldwide.
- Goal 5: Gender Equality – Empowering women through leadership programmes, entrepreneurship grants, and workplace equity policies.
- Goal 7: Affordable and Clean Energy – Expanding natural gas access and investing in lower-emission technologies, including algae biofuels and carbon capture.
- Goal 8: Decent Work and Economic Growth – Creating jobs, sourcing locally, and fostering sustainable economic expansion.
- Goal 12: Responsible Consumption and Production – Improving manufacturing efficiency, reducing waste, and developing advanced materials that lower emissions in end use.
- Goal 13: Climate Action – Mitigating greenhouse gas emissions, supporting carbon-pricing mechanisms, and reducing routine flaring.

(ExxonMobil, 2017 Sustainability Report Highlights, 2018), (ExxonMobil, 2018 SUSTAINABILITY REPORT HIGHLIGHTS, 2019), (ExxonMobil, Sustainability Report Highlights, 2021)

By repeating this same list of eight goals in three consecutive reports, ExxonMobil offered a definite, comparable framework for tracking progress across domains that span from poverty alleviation to health, education, gender equity, energy revolution, economic development, resource management, and climate protection.

In the 2022 Sustainability Report, ExxonMobil adjusted its focus to emphasize just three SDGs (Figure 2.):

- Goal 7: Affordable and Clean Energy – Continuing investments in natural gas, biofuels, hydrogen, and emerging clean-energy technologies.
- Goal 12: Responsible Consumption and Production – Scaling circular-economy initiatives such as chemical recycling and flare-gas recovery to reduce waste and methane emissions.
- Goal 13: Climate Action – Advancing carbon capture, supporting Paris-aligned emission reduction roadmaps, and pursuing net-zero ambitions for operated assets. (ExxonMobil, Sustainability Report, 2022)

This streamlined set of priorities is one way of representing ExxonMobil's reprioritization towards those objectives, which is most strongly linked to its core business and low-carbon technology investment as it aligns with international climate objectives.

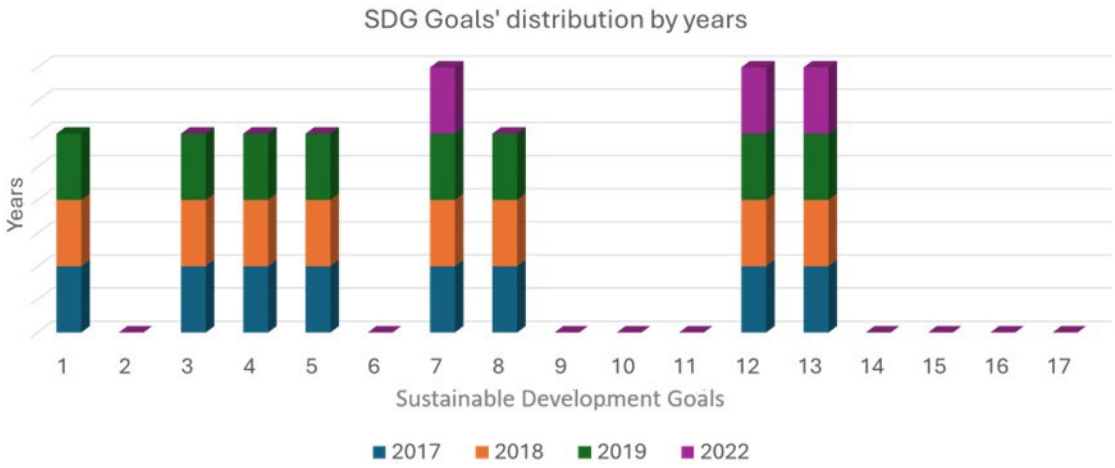

Figure 2: *SDG Goals' Distribution by Years*
Source: *Own work*

Conclusion – Why the drop from eight to three SDGs?

From 2017-2019, ExxonMobil regularly 'featured' eight Sustainable Development Goals in its annual report-highlighting any industry where the company had significant activity. In 2022, the company spotlighted only three SDGs. This change is a conscious move toward a more stringent, materiality-based model of sustainability reporting.

Formerly, ExxonMobil's highlighted SDGs were selected from a wide spectrum of its operations: all its goals that it addressed through community investments, operational enhancements, or innovations created were mentioned. This year, fourteen Sustainability Focus Areas based on environment and social impacts are included in the 2022 report's framing, which emerged through official stakeholder interactions and a detailed analysis of environment and social impacts. Instead of merely "highlighting" every goal with some degree of attention, the report is now mapping these material Focus Areas to the corresponding SDGs. This is to make company disclosures on actual strategic priorities and not a generic listing of all potentially material goals.

The three retained SDGs in the 2022 report are: SDG 7: Affordable and Clean Energy; SDG 12: Responsible Consumption and Production; SDG 13: Climate Action.

These are the most closely tied to ExxonMobil's core businesses and largest capital investments through 2027. Goal 7 is aligned with the company's sustained investment in natural gas, hydrogen, biofuels, and other lower-emission energy alternatives. Goal 12 is aligned with emerging circular-economy initiatives such as chemical recycling and flare-gas recovery. Goal 13 is aligned with sustained carbon-capture activities and Paris-aligned emission-reduction targets. By targeting these three, ExxonMobil sees where it can both drive – and credibly report – meaningful progress.

ExxonMobil's shift from targeting eight SDGs to targeting three is a step back from broad "SDG-washing" risk to a more concentrated, materiality-oriented approach to sustainability. More concentrated targeting represents the company's commitment to putting resources, governance effort, and performance metrics behind those international goals on which it can make the most and most visible difference.

Limitations and further research directions

The findings of the study are constrained by a small cross-sectional sample and relying on existing documents and interviews, possibly underrepresenting certain stakeholder views and limiting causal statements. Future development would include conducting comparative analysis

with other industry firms to place the focal firm more firmly in the context of the energy industry's sustainability.

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The significance of corporate social responsibility in family businesses

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Abstract

Family businesses play a pivotal role in the global economy, characterized by a unique blend of familial values, long-term orientation, and entrepreneurial spirit. One area where family businesses are increasingly making an impact is in the realm of Corporate Social Responsibility. Unlike their non-family counterparts, family businesses often embed their social and ethical values deeply into their operations, which may lead to a more holistic approach to sustainability. This paper explores the relationship between family business dynamics and Corporate Social Responsibility, and investigates how family control influences Corporate Social Responsibility strategies, decision-making processes, and stakeholder engagement. By drawing on an extensive theoretical background, this study aims to provide a deeper understanding of the motivations behind sustainability initiatives in family-owned firms, particularly in the context of sustainability and community involvement. We argue that the non-financial, family-related priorities, coupled with a generational focus, provide a distinct advantage in balancing profitability with societal impact. This research contributes to the literature by offering new perspectives on how family businesses can leverage their unique attributes to enhance their public spirit efforts, fostering long-term value creation for both the business and the wider community.

Keywords: family business, corporate social responsibility, sustainability, stakeholder engagement, generational influence.

JEL Classification: M14, L26, L21, Q01

Introduction

In the 21st century, the topic of sustainability and Corporate Social Responsibility (CSR) are inevitable. The longstanding operation of firms depends on how they can cope with the challenges of the modern world, and how they can ensure the careful and conscious usage of resources in the long term. Therefore, each and every organisation needs to take sustainability into consideration besides profitability.

As family businesses (FBs) are not only the oldest types of business organizations but are also highly important to the economy due to their high prevalence and significance in employment, their attitudes towards sustainability and CSR need to be researched.

This paper aims to offer an overview of the importance of CSR practices of family firms. Drawing on the existing academic literature, the following presents the nature of family businesses and how their distinctive characteristics foster the practical adaptation of CRS practices in order to widen our understanding of how the distinct advantages of family firms balance profitability with societal impact, and why this is so important in the case of long-term persistence.

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Family businesses

Family firms are not just one of the oldest types of business organisations (Sharma and Sharma 2011), but they also have a significant impact on the global economy thanks to their high representation and their dominant role in employment. Although family businesses are considered as SMEs, they may vary in size and can be seen in various industries around the world. In fact, different surveys have published different proportions of family businesses in relation to total businesses. For instance, Huszák et al. (2021) estimate the global share of family businesses at 65-80 per cent, while Csákné (2012a) estimates it at between 75-95 per cent.

Thus, before the examination of the role of sustainability and corporate social responsibility, it is important to see why and how family businesses are different from their non-family counterparts. The most important distinguishing features come from management and ownership structure. In this type of organizations, the dominant role of the family (or families) can be perceived both from the leadership, management and operational side, and also from the side of ownership (Mandl 2008, Csákné 2012b). This means much more than the personal representation and a higher ratio of family members in the management and among colleagues. Therefore, most definitions are based on the presence of the family. However, a general, widely accepted and usable definition was needed so that statistical approaches and conceptual frameworks can be used and researched universally (Di Toma and Montanari, 2010). An exclusive list of attributions was needed to define family businesses. Hereinafter, the definition of Kása et al. (2019) will be used. According to this definition, a family business can be identified based on some key attributes in terms of ownership, management and family involvement. By definition, family businesses are those firms that consider themselves to be family businesses, or where at least 51 percent of the company is owned by a family, and the family participates in the management of the business, or family members are employed in the operation of the business, or management and ownership are transferred in whole or in part within the family (Kása et al. 2019). This definition helps to understand the obvious features of family businesses. However, family values and norms shape the organizations from top to bottom in every field, which results in the appearance of the distinctive familiness as the main characteristic of all family businesses and the family-related priorities with all their benefits and limitations.

The Three Circle Model

Family business research is an emerging field also in Hungary. However, international studies have a several-decade history (Benedict 1968, Dyer 1989, Aronoff 1998) and the topic is still current and popular (Kállay, Szabó 2023). Thanks to careful observation, theoretical models can be used to get a deeper understanding in the functioning of family businesses, which can help to highlight the points where distinctive familiness appears. For instance, the Three Circle Model (Figure 1) of Renato Tagiuri and John Davis (1996) identify the key stakeholders in the life of FBs, with whom interactions and relationships affect decision-making, operations and performance. The three main elements, which shape family businesses, are the Family, the Enterprise, and the Ownership (Tagiuri and Davis 1996). This is so even if it is a small day-to-day operational question or even if it is a more serious issue with higher importance. The dominant role of the family appears here, which can lead to decision-making prioritising non-financial goals of family businesses like transgenerational persistence or sustainability.

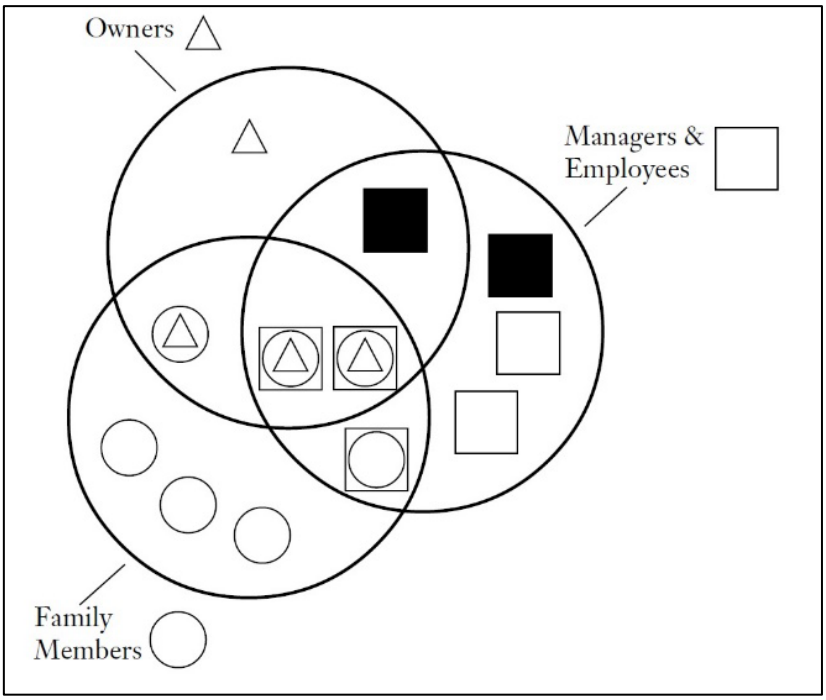

Figure 1: *Overlap of Family, Ownership, and Management Groups*
Source: *Tagiuri and Davis (1996)*

Distinctive familiness and socioemotional wealth (SEW)

FBs are special as they uniquely blend entrepreneurism and familiness (Csákné 2012a). This distinctive familiness is the exclusive characteristic of family businesses, which refers to the constant interaction between the family, family members and the firm (Chrisman, Chua, Steier 2005), which shapes the picture of family businesses. As a result, this type of firms have a significant and similarly important aims besides financial goals: family-related priorities. These non-financial objectives can be harder to comprehend. To define this additional asset and to reveal this extra value the first definition of the Socioemotional Wealth (SEW) concept was described in 2007 by Gómez Meija et al. According to the definition, SEW is the value of the enterprise that cannot be explained in financial terms and objectively (Zellweger, Astrachan 2008). These socioemotional assets are an emotional endowment that is an integral part of the family business, which can influence the performance of the family business (Cruz et al. 2012) and differentiate family firms from other organisations (Gómez-Mejía, Cruz, Berrone, De Castro 2011). To conceptualize the main elements of the SEW the FIBER scale was formulated by Berrone et al. in 2012. The FIBER model distinguishes between five different aspects of the SEW utilities the family shares as they benefit from the management and ownership of family business. The FIBER scale divides the elements of SEW according to the following factors: F – family control and influence, I – identification of family members with the firm, B – bonding social ties, E – emotional attachment of family members, R – renewal of family bonds (dynasty).

Sustainability

Sustainability is a concept of considering the intersecting circles of society, environment and economy in decision-making and production in order to be able to continue operations at present and in the future. According to the three-pillar concept, sustainability is built on these three basic elements of social, environmental and economic factors. (Figure 2)

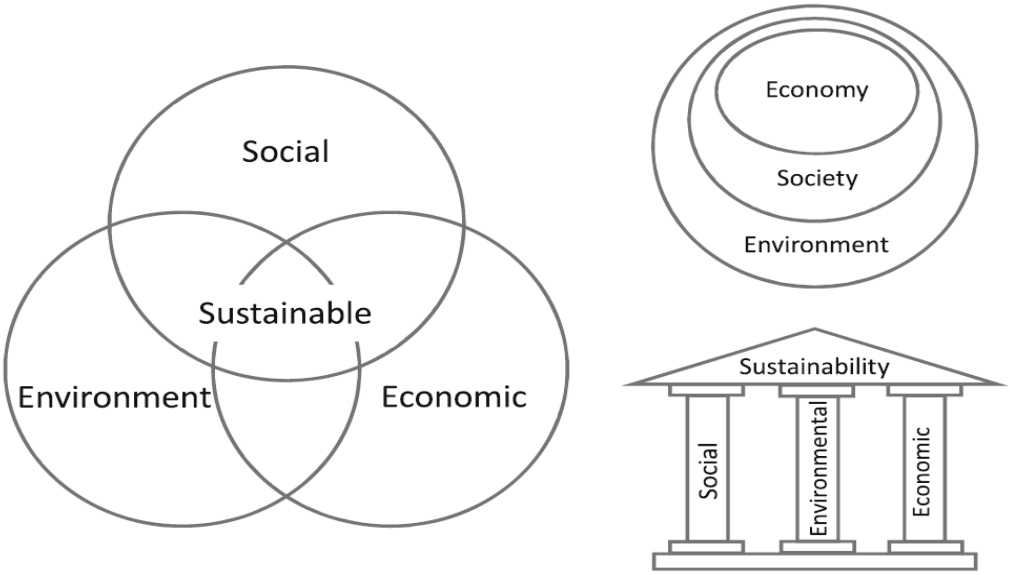

Figure 2: *Left, typical representation of sustainability as three intersecting circles Right, alternative depictions: literal 'pillars' and a concentric circles approach*
Source: *Purvis et al. (2019)*

Social responsibility and sustainability are equally important for long-term survival. As the main essence of the definition of sustainability is the quality of being able to continue over a period of time. The idea is that goods and services should be produced in ways that do not use resources that cannot be replaced and in a way does not damage the environment. (Cambridge University Press n.d.)

Being sustainable requires the integration of environmental responsibility, social equity, and economic efficiency into operations and strategy to be sustainable. Furthermore, it is also required to reduce ecological impact, improve community well-being, and ensure long-term profitability. Focusing on the triple bottom line – people, planet, and profit – a sustainable business is able to achieve competitive advantage and higher performance. (Zaman et al. 2025)

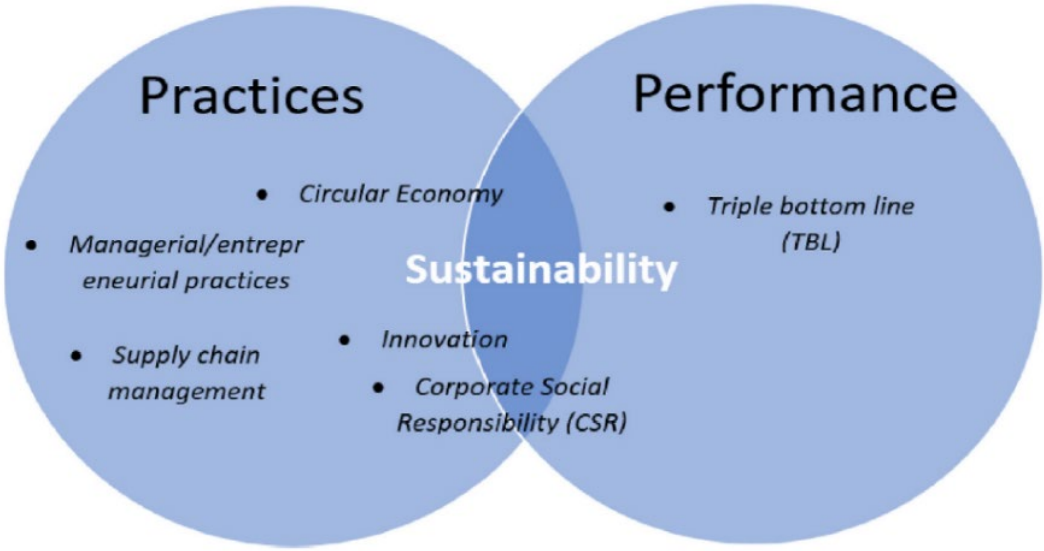

Figure 3: *Mapping key themes on to a 'practice-performance' linkage Framework.*
Source: *Zaman et al. (2025)*

According to Zaman et al. (2025), sustainability in practice is built on the synthesis of two main dimensions: 'sustainability practices' and 'sustainability performance outcomes'. Following this logic, sustainability practices represent the inputs, and sustainability performance represents the outcomes. These two intersecting circles, shown in the Venn diagram (Figure 3), incorporate the six key sustainability themes, which provide a more holistic view of the concept of sustainability.
Within the 'practice-performance' linkage system, the intersection area of the Venn diagram represents 'sustainability', which unites sustainability practices and performance outcomes.

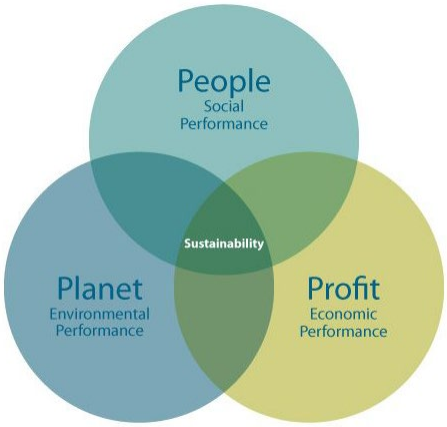

Figure 4: *Triple Bottom Line (TBL)*
Source: *Elkington (1994)*

On the one hand, in practice, supply chain management based on its relative relevance to each aspect belongs to 'sustainability practices'. On the other hand, Triple Bottom Line (Figure 4) belongs to performance outcomes. However, the circular economy, especially innovation and CSR, are located closer to the intersection, as they are a mixture of the two concepts.

Corporate social responsibility

The reason behind the increasing importance of CSR activities is the necessity to balance long-term higher-level corporate goals with short-term profit requirements in order to ensure not only the financially successful operations of companies but also to be able to protect the society, the key resources and the global environment within which the company operates. These factors are all essential to all organisations for long-term survival. In addition, environmental concerns are more widespread and there is urgency for companies to adjust their production and services in line with the demands for corporate responsibility. (Jolink, and Niesten 2015) As Carroll (1983) wrote "corporate social responsibility involves the conduct of a business so that it is economically profitable, law-abiding, ethical and socially supportive. To be socially responsible then means that profitability and obedience to the law are foremost conditions when discussing the firm's ethics and the extent to which it supports the society in which it exists with contributions of money, time and talent". According to Kitzmueller and Shimshack (2012), corporate social responsibility (CSR) refers to "corporate social or environmental behaviour that goes beyond the legal or regulatory requirements." Because CSR activities represent a higher intent for organisations to act not only with the minimum required level of compliance, but also a step further: to take less and to give back and do more both to the society and to the environment in order to be able to use the global resources and the local possibilities for longer time period. This means not exploiting the present opportunities, being moderate in consumption, and being conscious in daily operation and long-term decision-making. Furthermore, CSR is characterized as voluntary behaviour: "as actions that appear to further

some social good, beyond the interests of the firm and that which is required by law." (McWilliams and Siegel 2001)

CSR's role in FBs

Family businesses are increasingly recognized for their distinctive approach to corporate social responsibility, often driven by long-term orientation, legacy concerns, and embedded social values. Empirical studies have shown that family firms tend to exhibit stronger CSR commitments than non-family firms, particularly in relation to local community engagement and environmental stewardship (Dyer and Whetten 2006, Block and Wagner 2014). Stakeholder engagement plays a central role in shaping these strategies, as family owners often maintain close, trust-based relationships with employees, customers, and community members, which enhances responsiveness to stakeholder expectations (Mitchell et al. 1997). Moreover, the sustainability agenda in family firms is frequently intertwined with the desire to preserve the business for future generations, resulting in investments in eco-innovation, resource efficiency, and ethical supply chains (Berrone et al. 2012). However, the intensity of CSR practices in family firms can vary significantly depending on generational stage and governance structures, with later-generation firms generally exhibiting more formalized and strategic CSR approaches (Campopiano and De Massis 2015). These findings suggest that social responsibility in family firms is not only a function of ethical values but also a dynamic response to evolving stakeholder relationships and long-term sustainability goals.

Implementation and public perception of CSR practices in FBs

When one is searching for the roots of CSR activities in the case of family businesses, the Pyramid of Corporate Social Responsibility by Carroll (1991) can help (Figure 5). A connection between long-term family-related priorities originated from distinctive familiness of FBs, and CSR levels can be explored.

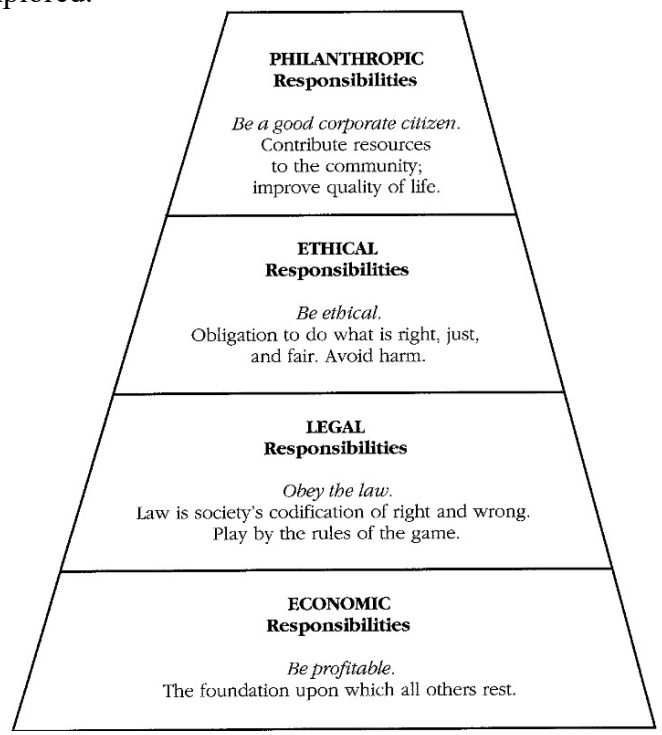

Figure 5: *The Pyramid of Corporate Social Responsibility*
Source: *Carroll (1991)*

In the case of family businesses, the importance of family-related priorities and long-term family goals are essential factors that define both day-to-day operations and strategic decision-making. They are principals beyond financial targets and legal requirements, which are the common features of CSR approaches.

The reason why CSR is important for FBs rooted in the following three factors. For family businesses, social and ethical values are deeply integrated into the operations, a higher stakeholder engagement and community involvement characterising FBs, also long-term value creation is a principle for FBs combined with transgenerational value creation and dynastic attempts. These characteristics and principles help FBs to naturally implement CSR practices into their operations without any extra effort required.

However, FBs may vary in size: most of them are small and medium size enterprises. That is why it is important that it should be researched that the implementation of CSR in organizational practices is not a direct function of company size. While firm size does not, by definition, determine the CSR implementation approach: size implies a range of organizational characteristics, some of which are more, others are less advantageous for implementing CSR. (Baumann-Pauly et al. 2013) Although, public perceptions do not accurately capture the status of CSR in large and small firms, smaller firms are not necessarily less advanced in organizing CSR than large firms. The implementation of CSR is not directly a function of company size. On the one hand, small firms possess several organizational characteristics that are favourable for promoting the internal implementation of CSR-related practices in core business functions, but constrain external communication and reporting about CSR. On the other hand, large firms possess several characteristics that are favourable for promoting external communication and reporting about CSR but constrain internal implementation.

Stakeholder engagement

Moreover, stakeholder engagement also plays a critical role in the sustainability and success of family businesses, which are often characterised by unique dynamics involving both emotional and economic dimensions. Unlike non-family firms, family businesses must navigate complex relationships between internal stakeholders – such as family members, employees, and owners – and external ones, including customers, suppliers, and the broader community (Mitchell et al. 1997). Effective stakeholder engagement facilitates trust, enhances reputation, and ensures alignment between business goals and stakeholder expectations, which is particularly vital for family firms aiming for transgenerational continuity (Cennamo et al. 2012). Furthermore, engaging stakeholders helps mitigate potential conflicts arising from overlapping family and business interests by promoting transparency and inclusivity in decision-making processes (Sharma, and Irving 2005). Consequently, family firms that actively involve stakeholders are better equipped to adapt to environmental changes, maintain legitimacy, and foster long-term relationships that support business performance, family legacy and corporate social responsibility practices.

Limitations

While this paper provides a focused theoretical examination of the selected topic, several limitations must be acknowledged. First, the scope of the analysis is necessarily constrained by the theoretical framework employed, which may not capture the full complexity or variability of the phenomena under investigation. Additionally, the paper adopts a limited contextual or sectoral focus, which restricts the generalizability of its findings to broader settings. Due to these constraints, certain dimensions – such as longitudinal effects, cross-cultural variations, or deeper stakeholder perspectives – remain underexplored. These limitations do not undermine the relevance of the significance of social responsibility in family businesses, but rather

highlight the need for a more comprehensive approach. Therefore, the exploration of these overlooked aspects and the validation of the present conclusions across a wider empirical and theoretical landscape will be the task of future research. Expanding the inquiry in subsequent studies will contribute to a more nuanced and holistic understanding and deeper empirical research of the topic.

Conclusion

As we know, family businesses play a pivotal role in the global economy. Also, sustainability is essential factor for organisational survival. The unique blend of familial values, long-term orientation, and entrepreneurial spirit of FBs should be examined from the point of CSR approaches. Family businesses are increasingly making an impact in the realm of Corporate Social Responsibility (CSR) as family businesses often embed their social and ethical values deeply into their operations, which may lead to a more holistic approach to social responsibility. The relationship between family business dynamics and sustainability is a unique blend which helps FBs to outperform their non-family counterparts in the implementation of sustainability practices.

With the help of the SEW concept, we can have a deeper understanding of the motivations behind CSR initiatives in family-owned firms, especially in the context of sustainability, philanthropy, and community involvement. Moreover, trans-generational focus provides a distinct advantage in balancing profitability with societal impact, which shows new perspectives on how family businesses can leverage their unique attributes to enhance their CSR efforts thus fostering long-term value creation for both the business and the wider community. As Carroll (1991) formulated "social responsibility can only become reality if more managers become moral instead of amoral or immoral" (p. 39).

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Understanding Gen Z's fashion preferences and the role of communication in sustainability

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Abstract

The aim of the study is to explore Generation Z's consumer behaviour towards sustainable fashion, the key influencing factors, and the characteristics of sustainable fashion communication and marketing. Three focus group interviews were conducted with Gen Z university students in March 2025 to explore their clothing purchasing habits, perceptions of sustainability and attitudes towards fashion. The results indicate that sustainable fashion receives little attention, and consumers have limited access to information on sustainable fashion. The majority of young adults still prefer fast-fashion stores even if they lack knowledge of garment sustainability and product availability. The findings highlight that more effective communication is essential for promoting sustainable fashion by increasing consumer awareness and for guiding Gen Z towards informed purchasing decisions. Our findings can be of crucial relevance to marketing and communications professionals.

Keywords: sustainability, fashion, sustainable fashion, second-hand, marketing, communication

JEL Classification: M31, D38

Introduction

The topic of sustainable fashion is no longer a niche concern limited to environmental activists (Back, 2017). Instead, it has become a pressing global issue with profound social (Mukherjee, 2015), economic (Liu et al., 2021), and ecological implications (Singh-Bansal, 2024). Given the textile industry's significant contribution to pollution (Bhatia-Devraj, 2017), waste (Sarwar-Khan, 2022), and unethical labour practices (Gupta et al., 2015; Hanzer, 2022), it is crucial to understand how young consumers (Brand et al., 2022), particularly Generation Z (Palomo-Domínguez et al., 2023; Copeland, 2024), perceive and respond to the idea of sustainability in fashion (Liu-Hei, 2021). The choice to focus on sustainable fashion in this research stems from its increasing relevance both globally (Tódor, 2024) and within the local Hungarian context (Nagy, 2024). Sustainability is a rapidly evolving discourse (Győri et al., 2024; Kolnhofer-Derecskei et al., 2024), and the fashion industry represents one of the most visible and relatable domains where individuals, especially young people, can make environmentally conscious choices (McNeill- Venter, 2019). The members of Gen Z are not only the most active consumers of fashion (Stachowiak-Krzyżan, 2021) but also the generation expected to bring about meaningful change (Máté et al., 2023; Fodor et al., 2024).

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Understanding the factors that influence young people's clothing purchases is essential for several reasons. First, it allows for the identification of value systems, lifestyle preferences, and constraints – be they economic, cultural, or psychological – that guide everyday decisions (Sidorchuk et al., 2016). Second, the composition of young people's wardrobes reflects their consumption patterns, material priorities, and environmental attitudes (Kovács, 2021). The analysis of these patterns provides insights into how much of their clothing is sustainable, second-hand, or underused, and what this means in terms of waste and overproduction (Hietala, 2024). Moreover, investigating the perceptions and attitudes of young consumers towards sustainable fashion offers a window into their readiness to transition towards more ethical consumption (Liu-Hei, 2021). Attitudes shape behaviour, and without a clear understanding of what sustainability means to this demographic, it is difficult to design interventions, campaigns, or educational efforts that truly resonate. Whether sustainable fashion is seen as desirable, accessible, or merely aspirational has a direct impact on its adoption.

Sustainable fashion requires innovative business models that combine economic, environmental, and social values (Győri-Ócsai, 2014). The question is how a given company can incorporate the concept of sustainability into the firm's business model. However, the success of green fashion also depends on consumers, the theoretical framework for which is provided by slow fashion and the circular economy (Domingos et al., 2022). Considering that success depends on consumer behaviour, attitudes and decisions, discourse on sustainability and related education are essential among students (Tódor, 2024). This study specifically focuses on Hungarian Generation Z, a group that remains underrepresented in international sustainability research. While many studies explore youth attitudes in Western Europe, Hungarian Gen Z faces unique economic conditions, cultural influences (Kovács et al., 2024), and levels of access to sustainable options (Kovács, 2021). Understanding how these local factors intersect with global sustainability narratives is key to developing context-sensitive insights and recommendations. The aim of the research is to contribute to a deeper understanding of how Hungarian university students relate to the concept of sustainable fashion, how their clothing reflects this commitment, and what opportunities and barriers exist to promote more sustainable consumer behaviour among this influential age group.

Literature review

Generation Z's wardrobe composition

Understanding the wardrobe composition of Generation Z is a vital aspect of examining this generation's broader fashion consumption habits. Research by Klepp and Bjerck (2014) highlights that a wardrobe is more than a storage unit: it reflects complex social practices, values, and personal identity. The authors argue that the wardrobe is a "site of everyday life," where decisions regarding what to keep, discard, or purchase are deeply tied to individual values and cultural narratives. Self-expression is important for young adults (Máté et al., 2023), especially university students (Szegedi et al., 2024), also fashion and clothing are one of the ways they express themselves (Nunes, 2023). Clothing in one's young stage of life is simply a functional product, but also an identity-forming tool, and the choice of second-hand clothing often becomes a value-based decision (Palomo-Domínguez et al. 2023). Hungarian consumers have become increasingly open to alternative forms of fashion consumption (Balogh-Harangozó, 2025) including the purchase of second-hand clothing (Vizi, 2023). Buying second-hand clothes is a very conscious way to update your wardrobe, as consumers pay much lower prices than they would for new clothes, and the environmental impact is negligible, as no new clothes need to be manufactured (Vizi, 2023). Buying second-hand clothes is a mainstream phenomenon among Generation Z, with young people typically having several second-hand items in their wardrobes (Liu et al., 2024). Gen Z consumers, particularly university students,

are increasingly conscious of space management and tend to organize and downsize their wardrobes regularly. This is consistent with the concept of wardrobe curation, where consumers deliberately maintain a smaller number of high-utility items rather than accumulate large quantities of clothing (Klepp & Bjerck, 2014). This practice is also in alignment with Chang's (2014) findings, which suggest that young consumers are moving away from overconsumption towards meaningful ownership, students are more likely to evaluate garments based on longevity, versatility, and personal fit rather than on impulse or trend alignment. In an average person's closet there are about 148 individual items, 36% of Gen Z buys new clothing at least monthly (Wunderlabel, (2025). According to Kim and Lim (2001), fashion orientation significantly influences consumer segmentation, with more fashion-involved consumers likely to own larger wardrobes and participate in trend-driven consumption. Most consumers are interested in personalizing products and are prepared to pay more for this, and the desire for individualized colour and customized clothing is particularly high (Wunderlabel, 2025).

Clothing purchasing behaviour of young adults

Younger citizens with higher levels of education tend to exhibit more environmentally friendly consumer behaviour and have a stronger intention to purchase sustainable clothing products (Dangelico et al., 2022). The purchasing behaviour of young adults, particularly those in Gen Z, is increasingly shaped by a tension between aspirational sustainability and entrenched fast fashion habits (Edberg & Köhnlein, 2025). Gen Z consumers often experience what Harris et al. (2016) term a "moral ambivalence," where they are aware of sustainability challenges but continue to purchase fast fashion due to convenience, accessibility, and style predictability. Furthermore, Kim and Lim's (2001) research on shopping orientation found that hedonic motivations such as enjoyment and novelty-seeking are strong among younger consumers, and drive impulsive purchasing behaviours even in the context of sustainability awareness. This explains the continued appeal of fast fashion chains such as Zara and H&M, where trend alignment and visual merchandising reinforce purchasing urges.

Price sensitivity remains a critical barrier to sustainable purchasing. Chang (2014) found that sustainability must align with economic realities so that consumer behaviour can be influenced. Thus, while Gen Z is conceptually aligned with ethical values, price and style often outweigh environmental concerns in real-world purchasing decisions. Buying second-hand clothes in shops is a step towards sustainability, as it gives a second life to items of clothing that their previous owners have grown tired of (Vizi 2023). Second-hand clothing stores are widely available in Hungary: the largest chains, such as Háda, have more than 80 stores nationwide, including not only the capital but also smaller rural towns (Háda 2025). These shops are often located in shopping centres or busy city centres (Várnai 2018), which is convenient for young consumers. There is also growing evidence that digital platforms play a pivotal role in shaping these perceptions. The rise of second-hand marketplaces such as Vinted has normalized sustainable shopping, making it more convenient and socially accepted. Harris et al. (2016) note that ethical products must be embedded in familiar, enjoyable consumption experiences to gain traction among young people.

Attitudes and perceptions of young consumers towards sustainable clothing

The concept of sustainable clothing is multifaceted for Generation Z. According to Klepp and Bjerck (2014), sustainability in clothing is perceived not only through ecological impact but also through ethical sourcing, durability, and lifecycle value. Chang (2014) emphasizes that for sustainability to resonate with young consumers, it must be personally meaningful. Gen Z, therefore, evaluates sustainable fashion not only in terms of planetary benefit but also based on

how it aligns with personal identity and social image. Sustainable fashion, when perceived as "cool," "unique," or "expressive," is more likely to be adopted.

Attitudinally, Generation Z expresses strong support for sustainable fashion but faces considerable obstacles in translating these beliefs into consistent behaviour. Harris et al. (2016) point out that attitudinal alignment with sustainability often fails to result in behavioural change without systemic support and incentives. Klepp and Bjerck (2014) argue that consumers' daily routines and clothing habits must be considered in designing sustainable interventions. For instance, ease of access to sustainable options and visually appealing retail environments are critical in shifting day-to-day purchasing patterns.

Social influence plays a critical role in shaping sustainable attitudes. Chang (2014) found that peer behaviours, social media content, and the presence of sustainability in pop culture can enhance positive attitudes and normalize ethical consumption. Therefore, communication strategies that leverage influencers and user-generated content can be powerful in nudging Gen Z towards sustainability. Importantly, Kim and Lim (2001) identified "value consciousness" as a defining feature of some young consumers. Those who score high in this domain are more likely to integrate sustainability into their decision-making, especially when messaging emphasizes long-term savings, garment durability, and emotional value.

Based on the literature review, the following research questions were identified:

1. What characterises Generation Z' wardrobe composition?
2. What factors determine the clothing purchasing behaviour of young adults?
3. What does sustainable clothing mean to Gen Z?
4. What are the attitudes of young consumers towards sustainable clothing?

Research methodology

The aim of the study is to explore Generation Z's consumer behaviour towards sustainable fashion, the key influencing factors, and the characteristics of sustainable fashion communication and marketing. A qualitative research method has been chosen, as it has been used by Harris et al. (2016), Liu-Hei (2021), also Kovács (2021) to investigate this topic. The focus groups method was chosen because the formation of opinions and meanings observed in social reality often takes place through interactions in a social context (Kitzinger, 1994). In addition, the focus group allows the study of social influences and norms through the emergence of group dynamics and collective narratives (Vicsek, 2006). Focus group interviews are understood as group discussions led by a moderator and focused around a research topic (Vicsek, 2017). The qualitative data analysis was conducted using traditional content analysis with Nvivo 14 software, using open coding as recommended by Ghauri and Grønhaug (2016), as well as Sántha and Tódor (2022).

Three focus group interviews were conducted with Gen Z university students in March 2025 to explore their clothing purchasing habits, perceptions of sustainability and attitudes towards fashion. The interviews were conducted on the recommendations of Kitzinger (2006), lasted between 60 and 90 minutes and were preceded by a pilot survey. The focus groups were composed of Hungarian university students aged between 18 and 25, representing a diverse mix of genders and geographical backgrounds. In total, three focus groups were conducted with 35 participants altogether, of whom 13 were men and 22 were women, which clearly reflects the predominance of female respondents. The average age of the participants was between 21 and 22, so we can talk about young adults of Generation Z. Group 1 consisted of 9 individuals (4 males and 5 females), Group 2 included 15 participants (6 males and 9 females), and Group 3 included 11 participants (3 males and 8 females). Participants were recruited from both urban (primarily Budapest) and rural areas, ensuring a balanced representation of regional perspectives. All focus group members shared a common characteristic of being actively engaged in higher education and belonging to Generation Z, thus offering relevant insights into

youth attitudes and behaviours regarding fashion consumption. The sample consists of university students, many of whom also work alongside their studies. This means that the participants are able to make their own decisions about their shopping habits not only as consumers but also as young adults with an income. The distribution by place of residence also shows a varied picture: Budapest residents dominate the second focus group, while in the first and third groups, the distribution between rural and urban participants is more balanced. This geographical diversity is an important dimension, as access to sustainable clothing (e.g., second-hand stores, Háda, Humana) can vary geographically, which influences consumer attitudes. The three focus groups in the sample consisted of young people from diverse backgrounds but with common generational characteristics, whose opinions provide a reliable picture of the diversity of attitudes and perceptions towards second-hand clothing.

Results

Generation Z' wardrobe composition

The composition of Generation Z's wardrobes reflects the diverse lifestyles, values, and purchasing behaviours of today's young adults. Based on the focus group interviews, Hungarian university students aged 18–25 possess wardrobes that range from highly curated and minimalist to large and trend-oriented. This diversity illustrates the complexity of Gen Z's relationship with fashion, where sustainability, style, and space-consciousness intersect in varying degrees. The average wardrobe size varies significantly, with some respondents possessing about 100-150 items. Our respondents tend to either have a large proportion (around 50%) or a very small proportion (less than 5%) of second-hand items.
Young people are becoming more aware of their surroundings and of making the most of their space. Many participants said they regularly sort their clothes so that their wardrobe is not cluttered and chaotic.

Despite variations in size, most participants stated that they use more than half of the items in their wardrobe on a regular basis. Some students emphasized that they strive to actively rotate their outfits and avoid unnecessary accumulation. These consumers tend to maintain smaller wardrobes and focus on versatile, timeless pieces that can be worn across seasons. However, another group admitted that a significant portion of their clothes goes unworn. Among frequent shoppers, many garments are purchased impulsively or because they align with short-lived trends. As one participant noted: *"Sometimes I buy something and wear it once or twice, then I forget about it."* The respondents often view clothing as disposable, and the wardrobe becomes a storage space for outdated or disfavoured items. A sense of guilt or awareness occasionally accompanied these admissions, indicating an internal conflict between values and behaviour.

An interesting dimension of wardrobe management relates to borrowing and renting clothing, which were found to be relatively rare practices among participants. Most students stated that they do not generally borrow clothes from others, except in casual or familial contexts (e.g., siblings or close friends). Even less common is the use of formal clothing rental services. Where rental did occur, it was limited to special occasions such as weddings, graduation or other ceremonial events. These rentals were typically for formal dresses or suits, and even then some participants preferred to buy inexpensive new items from fast fashion retailers rather than rent: *"I rented a dress once for a wedding, but usually I just buy something cheap from H&M."* Most students had never rented a garment, and some expressed doubts about hygiene or convenience. This suggests that while the concept of shared clothing resonates at the personal level, the institutionalized practice of fashion rental is not yet embedded in the Gen Z fashion culture in Hungary.

Clothing purchasing behaviour of young adults

Participants' attitudes towards clothing purchases ranged from highly conscious and critical to neutral or even impulsive. This heterogeneity reflects the multifaceted nature of youth consumer culture, shaped by economic conditions, peer influence, digital platforms, and growing environmental awareness. In terms of purchase frequency, most participants reported buying clothes once every 1–2 months, although this varied depending on personal needs, seasonal changes, and emotional triggers. As one participant stated: *"If I'm having a bad day, I go and buy something small for myself - it cheers me up."* This illustrates how clothing consumption occasionally serves a psychological function, acting as a reward or coping mechanism. When asked about monthly spending on clothing, most participants estimated they spend between 10,000 -25,000 HUF.

However, spending was typically higher during seasonal transitions (e.g., winter to spring) or promotional periods (e.g., Black Friday, Glamour Days), which indicates that discount-based shopping is prevalent and often planned in advance.

The results also highlighted several key characteristics of clothing purchasing behaviour. In general, the participants were deeply influenced by peer examples and online trends, particularly via platforms like Instagram and TikTok. While sustainability was a recurring theme in the interviews, it was often secondary to price, aesthetic appeal, and availability. Several respondents admitted that although they are aware of environmental impacts, they still favour fast fashion brands due to their affordability and accessibility: *"I try to avoid fast fashion, but when there's a big sale, I go for it - it's cheap and looks good."* Clothing purchases were often driven by impulse rather than necessity. Some participants described situations in which they bought items they did not actually need simply because it felt good at the moment or the price was too attractive to pass up. This reflects broader patterns of consumption motivated by instant gratification, a trait commonly associated with Generation Z. The interviews revealed that identity expression plays a central role in clothing choices. Many participants view their clothing as a reflection of their personal style, values, or subcultural belonging. While some prioritize comfort and functionality, others are more concerned with uniqueness and how their outfits are perceived by peers. One participant shared: *"Clothing defines me. How I dress tells others who I am."*

Perception of sustainable clothing among Gen Z

For most participants, the concept of sustainable fashion is linked primarily with second-hand shopping, recycling, and prolonging the lifespan of garments (Figure 1). This understanding is rooted in practicality and everyday experiences rather than in abstract definitions or technical sustainability frameworks. The associated word cloud generated from participant input provides a concise visual summary of what first comes to mind when they hear the term "sustainable clothing." Commonly mentioned terms included *"recycling," "environment-friendly," "second-hand," "waste-reduction,"* and *"Vinted"* alongside more emotive or practical words like *"ethical," "durability," and "unique."* This indicates that sustainable fashion is not merely an environmental concern but a multi-dimensional construct. When discussing the extent to which the participants own sustainable clothing, most participants estimated that sustainable or second-hand items constitute a modest but growing portion of their wardrobes. Most of them indicated that around 5% or less of their clothes come from second-hand sources or are considered sustainable. This aligns with the nowadays increasing visibility and acceptance of second-hand platforms such as Vinted, which many participants actively use.

Figure 1: *What does sustainable clothing mean for consumers?*
Source: *Own work*

Participants also discussed the meaning of sustainable clothing in relation to material quality and longevity. There was a shared perception that sustainable clothes should be durable and made from organic or biodegradable materials. One comment summarized this idea well: *"It should be made of natural fabrics - no plastic feel."*

Nonetheless, many admitted that they were not always sure what makes a garment sustainable. There was limited awareness of certifications or transparent production chains, and participants expressed a desire for clearer labelling and more accessible information about what constitutes truly sustainable fashion.

Interestingly, sustainability was frequently associated with personal values rather than just environmental concerns. Wearing second-hand clothing, for instance, was seen by some as a form of rebellion against consumerism or fast fashion culture. One participant remarked, *"Thrifting has become cool. It's a way to stand out and not follow the mainstream."* This sentiment illustrates that for Gen Z sustainable fashion carries symbolic weight as well: it allows for identity expression, resistance to mass culture, and alignment with ethical values.

Attitudes of young consumers towards sustainable clothing

Most participants expressed a generally positive disposition towards sustainable fashion, particularly in relation to second-hand clothing. They associated it with environmental consciousness, waste reduction, and individuality. However, their actions often lag behind these values due to convenience, cost, and style considerations. For example, although many acknowledged that fast fashion has negative environmental and ethical implications, they still

frequented these stores due to ease of access, familiarity, and predictable sizing: *"I try to avoid fast fashion, but when I need something specific, I go to Zara - it's just easier."* This highlights a prevalent theme: young consumers are not inherently opposed to sustainable fashion, but multiple constraints complicate their ability to prioritize sustainable fashion in practice. Additionally, sustainable purchasing was described more as an occasional practice than a lifestyle commitment. Most participants reported that they sometimes buy second-hand clothes or occasionally check sustainable brands, but they do not make it a consistent habit. Fast fashion remains the default, particularly for last-minute needs, formal wear, or when trend-following is a priority.

Interestingly, several participants discussed their emotional connection to second-hand shopping. They described it as *"treasure hunting"* or as a way to find unique pieces that no one else has. This suggests that sustainable fashion can be emotionally rewarding and even exciting when framed in the right way. However, this emotional appeal was mostly limited to second-hand or vintage shopping, rather than new garments from certified sustainable brands.

Another noteworthy aspect is the moral framing of purchase decisions. Some participants expressed guilt or discomfort about buying from fast-fashion retailers, particularly when reminded of the ethical or environmental costs: *"I know it's bad, but sometimes I don't feel like I have a choice."* This ambivalence reveals cognitive dissonance: participants are aware of the issues surrounding fast fashion but feel disempowered or constrained by financial, social, or logistical limitations. Therefore, education alone may not be enough; systemic changes in pricing, access, and communication are needed to shift behaviour at scale. However, it should be noted that access to sustainable fashion options, whether second-hand stores or eco-conscious brands, is limited, especially in rural areas or smaller towns. Buying second-hand clothing, especially in physical stores, has proven to be time-consuming and often frustrating. Several participants noted that sizes are limited and that it takes a lot of energy to sort through piles of unorganized clothes. Some still associate second-hand clothes with poor cleanliness or low-quality materials, despite others having the opposite experience.

The discussions revealed that communication plays a pivotal role in influencing young consumers' attitudes and behaviours. Participants emphasized the need for educational content and more engaging, visual storytelling from companies: *"I think brands should explain more - not just say 'we're green', but show how and why."* Several respondents suggested that platforms like Vinted, Háda, or Humana could increase their impact by integrating sustainability content into their digital and in-store communications. Informative posts on Instagram, TikTok videos explaining environmental benefits, and point-of-sale messages were all proposed as potential methods to raise awareness.

Conclusions

Young Hungarian university students demonstrate environmentally friendly consumer behaviour and show a strong intention to purchase sustainable clothing products, which is consistent with the results of Dangelico et al. (2022). Young adults' clothing purchasing behaviour is highly context-dependent, and blend economic rationality with emotional and social drivers. Harris et al.'s (2016) findings are supported by our focus group data showing that while participants acknowledged the environmental impact of fast fashion, they still prefer it for its time efficiency and consistent sizing. Their consumption patterns are characterized by a delicate balance between trend-following and ethical intention, with financial limitations and convenience often tipping the scale in favour of fast fashion. Our findings are consistent with the results of Harris et al. (2016), who found that ethical consumption remains a secondary priority for many consumers unless it is accompanied by tangible personal benefits such as affordability or convenience. While there is growing openness to sustainable choices, these must be accompanied by competitive pricing, modern design, and availability to become

mainstream options. The respondents identified buying second-hand clothes as a form of sustainable fashion. Young Hungarians enjoy shopping in second-hand clothing stores, which is consistent with Vizi's (2023) findings. Online second-hand clothing platforms (Vinted, Facebook groups) are also very popular and easily accessible.

The findings of Klepp and Bjerck (2014) are consistent with the focus group data, where participants described sustainable clothing in terms of durability, secondary use, and reduced ecological footprint. Generation Z values sustainable fashion not only for its environmental benefits, but also for how well it aligns with their personal identity and social image. Sustainable fashion is more likely to become mainstream if it is perceived as *"cool," "unique," or "expressive."* Nevertheless, significant perception barriers remain. Misinformation, greenwashing, and a limited understanding of the concept of clothing sustainability can hinder informed decision-making. Educational interventions and supply chain transparency are therefore essential to deepen Gen Z's commitment to sustainable fashion practices.

The size of Hungarian Generation Z students' wardrobes varies greatly: while some maintain minimalist wardrobes, others have 100-150 items, and this is influenced by factors such as socioeconomic status, interest in fashion, and shopping frequency. Young people are interested in customizing clothes, which confirm international findings (Wunderlabel, 2025). University students in Hungary do not really use borrowed clothes or rented products, they regularly sort their clothes so that their wardrobe is not cluttered and chaotic. The low prevalence of rental clothing suggests that cultural norms, lack of infrastructure, or limited awareness may be barriers to its adoption among Hungarian Gen Z. Moreover, concerns about hygiene, sizing, and return logistics also contribute to hesitation. In contrast, formal clothing rental services were largely unfamiliar or unused among participants.

Purchasing behaviour towards sustainable clothing is shaped by a combination of ideals, constraints, and compromises. Their intentions are frequently aligned with sustainability, but these intentions are diluted by external pressures such as cost, time, access, and social expectations. Understanding this nuanced landscape is essential for designing interventions – whether through policy, branding, or education – that resonate with this generation's values and lived realities.

Among the limitations of the research, we would like to emphasize that the study was based on qualitative methodology, so the results cannot be generalized, the sample was small (three focus groups, a total of 35 people) and consisted exclusively of university students in Hungary, so the cultural and social context may have strongly influenced the results. As a future research direction, we plan to conduct a quantitative consumer survey, which will allow for statistical conclusions and international comparisons. In addition, it may be worthwhile to conduct a longitudinal study to map changing consumer habits or to examine target groups, such as older consumers or those not enrolled in higher education, to gain a more complete picture of the research topic.

In conclusion, young consumers show a growing openness towards sustainable clothing, but this is tempered by real and perceived obstacles. Addressing these challenges through affordability, accessibility, and targeted communication can help align values with behaviours. Sustainable fashion will gain greater traction among Gen Z if it is positioned not only as an ethical choice but also as an accessible, stylish, and socially relevant one. Communication must focus not only on raising awareness but also on inspiring trust and simplifying decision-making. Young consumers want to do the right thing but they need help in understanding what that is, and how it fits into their lifestyle and budget. Based on our research findings, we recommend the following to make the communication of sustainable clothing companies more effective: practical sustainability tips on social media, explanations of textile recycling and donation processes. We also recommend collaborating with influencers or brand ambassadors who present sustainable fashion in an accessible way.

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Globalisation in Fashion: Opportunities and challenges to bring about sustainable change

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Abstract

This study advances theoretical understanding by integrating globalization dynamics and Environmental, Social, and Governance (ESG) considerations into the Integrated ESG-Circular-Consumer Framework (IECF), which systematically links ESG governance, circular economy practices, and consumer behaviour within global fashion supply chains. By revealing previously overlooked interdependencies between circular strategies, corporate governance, and consumer decision-making, the IECF expands descriptive insights into a theory-building perspective. In practical terms, the findings guide corporate leaders and policymakers to strengthen transparent ESG strategies, foster circular innovations, and implement robust supply chain reforms, thereby mitigating sustainability risks and promoting systemic transformation in the fashion industry.

Keywords: fashion, ESG, globalisation, sustainability, greenwashing, circular economy, systematic literature review

JEL Classification: Q56

Introduction

The issue of sustainability has become one of the central themes of the fashion industry over the past decade particularly due to the growing visibility of the environmental and social impacts of the textile and clothing sector (Niinimäki et al., 2020). The global apparel market currently sits at $1.7 trillion (Insider POV), maintaining growth at 4.1% compound annual growth rate through 2030 (Insider POV). Fashion's scale becomes apparent when considering that manufacturers produce over 100 billion garments annually (Insider POV) – enough for every person on Earth to receive 12.5 new clothing items each year. Employing over 300 million people globally, the sector faces mounting scrutiny for environmental degradation (e.g., 6.94 million tonnes of EU textile waste in 2022; ETC/CE, 2024) and social inequities (e.g., Rana Plaza collapse). While globalization enabled cost-efficient outsourcing post-WTO China accession (2001) and CEE liberalization (Losoncz, 2022), recent disruptions – COVID-19, Russia-Ukraine war, US-China tariffs – exposed supply chain vulnerabilities (Tokatli et al., 2008).

Globalisation was one of the most defining economic and social processes of the late 20th century, with a significant impact on the international division of labour, the emergence of global value chains, and the economic structure of nation states (Losoncz, 2022). The relative stability of the global economy further strengthened these processes. At the same time, the COVID-19 pandemic and the Russian-Ukrainian war have fundamentally shaken the previous logic of globalisation, exacerbating its risks and structural inequalities (Losoncz, 2022).

In the fashion industry, globalisation has had a dual impact: on the one hand, it has stimulated the growth of the industry, promoted outsourcing and the development of international supply chains; on the other hand, it has increased environmental pressures, social inequalities and

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unethical employment practices (Tokatli et al., 2008; Bhutia, 2020; Gazzola et al., 2020). The efficiency gains brought about by globalisation have increasingly been accompanied by negative externalities such as environmental degradation, exploitation and cultural homogenisation.

The realignment of international trade relations, or the United States of America-China trade war, is also significantly affecting the fashion business. Increased tariffs are compelling businesses to recast their manufacturing plans, diverting production to other markets. With increasing expenses, businesses are certain to continue transferring the burden to consumers, perhaps impacting all corners of the market, such as ultra and fast fashion, premium, affordable luxury, and luxury segments.

The purpose of this research is to examine the impact of globalisation on the fashion industry, specifically on issues of sustainability. The research deals with Environmental, Social, Governance (ESG) strategies, which can counteract the adverse consequences of globalisation and encourage sustainable development of the fashion sector.

Methodology: Literature review approach

This study employed a systematic literature review (SLR) following the PRISMA 2020 guidelines to synthesize evidence on the tensions between globalization and sustainability in the fashion industry. We searched Scopus, Web of Science and Google Scholar using the following search string: (“fashion” OR “apparel”) AND (“globalization” OR “supply chain*”) AND (“sustainability” OR “ESG” OR “circular economy”), thereby restricting results to the period 2008–2024 and to English-language publications.

The initial database search yielded 1,247 records. After removing 312 duplicates, 935 records remained for title- and abstract-level screening. At this stage, we excluded clearly irrelevant items, and included studies unrelated to the fashion or apparel sector, papers dealing exclusively with technical textile engineering without a sustainability component, and works focusing on sustainability in other industries, such as automotive or electronics, which resulted in 94 records retained for full-text assessment.

During full-text screening, we applied three inclusion criteria: (1) an explicit empirical or conceptual focus on fashion and apparel value chains; (2) a clear discussion of sustainability, ESG, circular economy or transparency; and (3) a demonstrable link to globalization, global sourcing or international supply chains. Exclusion criteria covered non-peer-reviewed opinion pieces without methodological transparency, studies in which fashion appeared only tangentially, and papers addressing consumer psychology without any connection to supply chains or ESG governance.

The application of these criteria led to the exclusion of 67 full-text articles for reasons such as insufficient methodological rigour, the lack of an explicit sustainability dimension, or a lack of connection to fashion. The final sample comprised 27 sources: 22 peer-reviewed journal articles, 3 industry reports (e.g., Ellen MacArthur Foundation, Fashion Revolution), and 2 European Union policy documents related to textiles and the circular economy. These 27 documents were imported into NVivo and coded thematically along five dimensions derived from prior SLR guidance: globalization impacts, ESG integration, circular economy models, consumer behaviour, and transparency and accountability strategies.

The iterative coding process combined deductive codes, based on existing frameworks for sustainable supply chain management, with inductive codes emerging from the material, enabling a move beyond descriptive aggregation towards critical interpretation and theory building. The cross-comparison of themes across document types (academic, policy, industry) informed the design of the Integrated ESG-Circular-Consumer Framework (IECF), which was subsequently formalised into testable propositions.

The study systematically organises the analysed sources along five thematic dimensions:

- Globalisation impacts and challenges in the fashion industry – with a special focus on international supply chains, outsourcing and geopolitical tensions (Tokatli et al., 2008; Losoncz, 2022).
- ESG integration at the corporate level – the theoretical basis and practical applicability of the ESG framework for different market players (Gazzola et al., 2020).
- Circular economy models – developing sustainable production and consumption systems as an alternative to the linear model (Niinimäki et al., 2020).
- Consumer attitudes and communication – changes in consumer behaviour and the impact of corporate sustainability narratives on consumer decisions (Bhutia, 2020).
- Corporate transparency and strategic responses – the role of transparency and ethical accountability in the ESG adaptation practices of global brands (Gazzola et al., 2020).

The strength of the methodological approach is that it not only systematises the scientific results to date in a descriptive manner but also seeks to uncover new connections by comparing and critically interpreting them. This allows the study to contribute to the theoretical and practical discourse on the sustainability transformation of the global fashion industry.

Integrated ESG-Circular-Consumer Framework (IECF)

To address the fragmented nature of prior work on fashion sustainability, this study develops the Integrated ESG-Circular-Consumer Framework (IECF), which links ESG governance, circular economy practices and consumer behaviour within the context of globalized fashion supply chains. The framework conceptualises sustainability transformation as the joint outcome of three core pillars operating under globalization pressures, regulatory constraints and structural power asymmetries.

In the IECF, the ESG Governance Pillar serves as the governance anchor, which encompasses environmental (emissions, waste, resource use), social (labour conditions, wages, worker voice) and governance dimensions (disclosure, anti-greenwashing safeguards, oversight). Stronger ESG governance is posited to enable and incentivise the Circular Economy Pillar, which represents the operational core, including circular design, closed-loop material flows, extended producer responsibility, and investment in recycling, repair, rental and resale models. The Consumer Behaviour Pillar functions as the demand driver, and captures how attitudes, trust, perceived greenwashing and the availability of transparency tools (e.g. QR codes, blockchain traceability) shape purchasing decisions and the uptake of circular offerings.

Globalization pressures (trade liberalisation, outsourcing to low-cost regions, cost and lead-time competition, and geopolitical shocks) exert influence on all three pillars, shaping the strategic space in which ESG policies, circular initiatives and consumer markets evolve. At the same time, the regulatory environment – most notably the EU Corporate Sustainability Reporting Directive, the EU textile strategy and emerging due diligence legislation – can amplify or constrain the integration of ESG and circular practices by imposing disclosure requirements, double materiality assessments and measurable reduction targets. Structural power asymmetries between Tier-1 global brands and Global South SME suppliers act as a context-specific moderator, potentially weakening the translation of ESG and circular commitments into improved environmental and social outcomes along the supply chain.

The IECF incorporates explicit feedback loops: consumer demand for credible sustainability and transparency can feed back into ESG governance, pushing firms to strengthen disclosure, third-party verification and anti-greenwashing measures, while successful circular

offerings can – over time – reshape consumer expectations and norms. When governance, operations and demand are aligned, the three pillars jointly contribute to improved sustainability outcomes such as reduced emissions and waste, enhanced labour conditions and more resilient supply chains.

Empirical findings highlight that environmental and social costs are spatially and organizationally disconnected from consumption, which weakens accountability. In the IECF's interpretation, this supports the view that without strong ESG governance, circular and consumer initiatives have limited impact at the systemic level.

On this basis, the framework advances three testable propositions:

P1. ESG transparency positively influences the adoption of circular economy practices in fashion firms, and this relationship is mediated by consumer trust in corporate sustainability claims and moderated by consumers' sustainability bias. Higher levels of ESG transparency (e.g. audited ESG reports, third-party labels, blockchain-based traceability) increase consumer trust that a brand's environmental and social claims are credible, which in turn facilitates the market acceptance of circular products and services. However, when sustainability bias is high and consumers already overestimate the sustainability of fashion, the marginal effect of additional transparency on trust, and consequently on circular adoption, is attenuated.

P2. The effectiveness of the IECF in driving circular transformation is stronger in ultra and fast-fashion segments when firms operate under stringent EU regulatory alignment, which moderates the relationship between ESG governance and circular economy outcomes. In regulatory contexts characterised by clear standards, robust enforcement and credible sanctions, ultra and fast-fashion companies are more likely to translate ESG policies into substantive circular investments rather than symbolic initiatives, because environmental and social costs are at least partially internalised. By contrast, in weak or fragmented regulatory environments, even advanced ESG frameworks may remain largely decoupled from core business models, this way limiting the transformative potential of the IECF.

P3. Power asymmetries between Tier-1 global brands and Global South SME suppliers negatively moderate the relationship between ESG-circular integration and sustainability outcomes, while blockchain-enabled traceability can act as a partial mediator between ESG commitments and on-the-ground practices. When dominant buyers impose strong cost pressure and short lead times, suppliers have limited capacity to invest in improved labour conditions or circular infrastructure, which weakens the link between brand-level commitments and actual environmental and social performance. Implementing blockchain-based traceability and similar digital tools can partially mediate this relationship by rendering supplier-level practices visible and verifiable across tiers, thereby realigning incentives and redistributing accountability along the chain, provided that such tools are embedded in enforceable regulatory and contractual arrangements.

The IECF highlights power imbalances: Tier-1 suppliers (e.g., Inditex, H&M) exert dominance over SMEs in Global South, enforcing cost pressures that undermine ESG-circular adoption. Rana Plaza-type scandals reveal governance failures where Northern brands shift environmental/social costs southward (Seuring & Müller, 2008).

The structural effects of globalisation on the fashion industry

Globalisation has become one of the main drivers of structural change in the fashion industry in recent decades. The outsourcing of production to countries with lower wages and less stringent environmental regulations has enabled production costs to be reduced, but has also contributed to the emergence of opaque supply chains, exploitative working conditions and increased environmental pollution (Tokatli, 2008; Niinimäki et al., 2020). The spread of fast and ultra-fast fashion models has resulted in extreme overproduction, the management of which remains an unresolved challenge (Hejlova et al., 2025).

At the same time, globalisation has also enabled increased competitiveness: e-commerce, digital marketing, and global market entry have become available to even smaller players at an unprecedented speed. However, as competition has intensified, price competition and profit margins have declined often relegating ethical and environmental considerations to a secondary position (Battisti, 2024).

Sustainability challenges: Ecological and social dimensions

Few industries have received as much negative attention as the fashion industry, with its sustainability failings being exposed on social media platforms. Several negative examples have even become scandals (Rana Plaza, Nike, Levi Strauss, Benetton, Adidas, and C&A) due to inhumane working conditions or environmental pollution caused by the production of clothing (Seuring and Muller, 2008). These factors have compelled companies to confront the challenges of sustainability and rectify problems.

In 2022, approximately 6.94 million tonnes of textile waste were generated in the EU27 Member States, a significant proportion of which came from products discarded after household consumption (ETC CE, 2024., Figure 1). Post-consumer textile waste from households, i.e., textiles discarded by citizens after consumption and use (excluding textiles intended for recycling), is the main source of textile waste generation (ETC CE, 2024.).

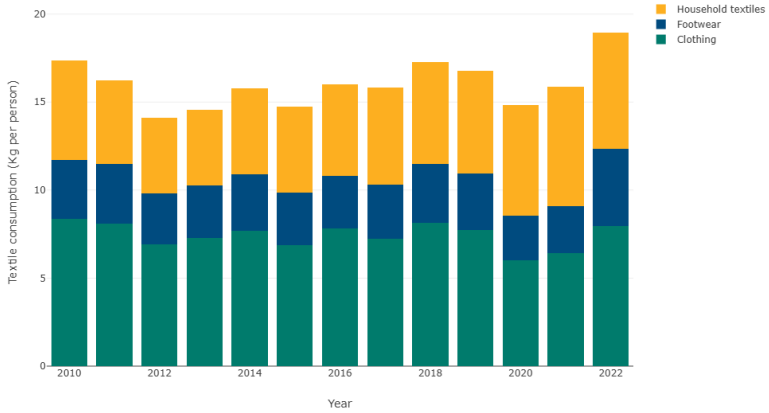

Figure 1. *Consumption of clothing, footwear and household textiles per capita, EU27, 2010-2022*
Source: *European Environment Agency*

Various studies have produced different textile consumption figures, ranging from 12 to 25 kg per capita (ETC/WMGE, 2019) (EC JRC, 2021) (ETC/CE, 2022). Based on Eurostat production and trade data, excluding industrial/technical textiles and carpets, apparent consumption (production – imports + exports) in 2022 is estimated at 19 kg per capita in the EU, consisting, on average, of around 8 kg of clothing, 4.4 kg of footwear, and 7.6 kg of household textiles. This represents a total apparent household consumption of around 8.5 million tonnes of textile products (excluding carpets and other textile products) in Europe.

Although consumption volumes declined in 2020, they rebounded in 2021 and 2022, continuing and even exceeding pre-COVID-19 trends (+13% compared to 2019). This growth is mainly driven by increased consumption of footwear (+38% compared to 2019) and, to a lesser extent, changes in consumption patterns for clothing (+3% compared to 2019).

The climate impact of textile products is also significant: the total CO2 emissions of the EU supply chain amounted to 159 million tonnes in 2022, 70% of which was generated outside Europe (Figure 2). The relocation of production to regions with low wages and low

environmental standards, mainly in the global South (e.g., Bangladesh, Vietnam), not only exacerbates environmental injustices but also social injustices (Claudio, 2007).

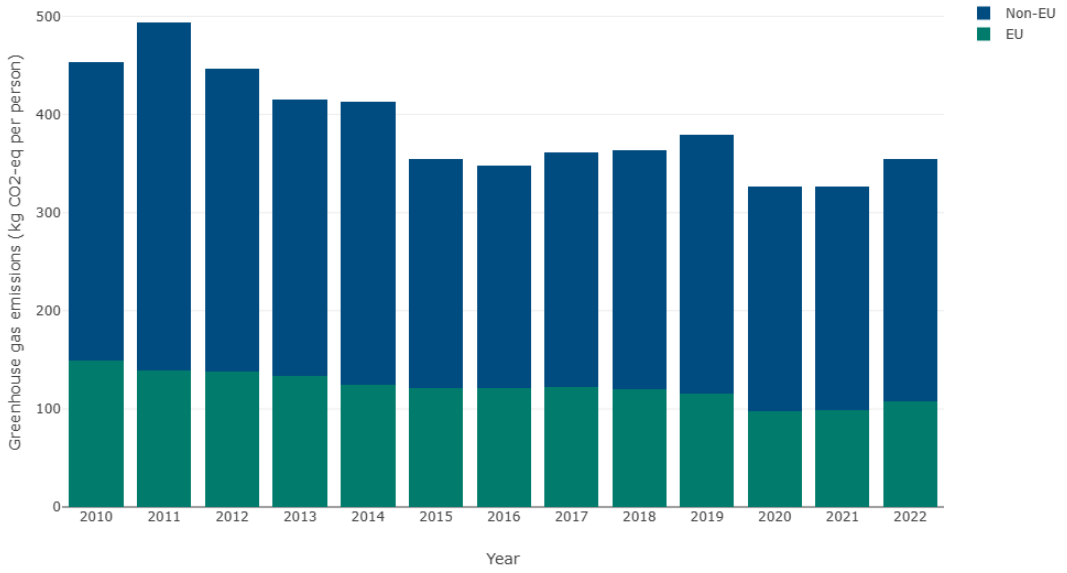

Figure 2. *Greenhouse gas emissions from EU's textiles consumption, EU27, 2010-2022*
Source: *European Environment Agency*

Due to the global scale of the fashion industry, products must be transported from countries with low labour costs to European and American consumers (Abecassis-Moedas, 2006), which has environmental impacts associated with transport (Borghesi and Vercelli, 2003). Fashion companies are increasingly relying on external partners for the manufacture of their products (Jacobs, 2006), often using raw materials (e.g., fibres and leather) sourced from distant locations and outsourcing various manufacturing activities (e.g., grinding, dyeing, weaving, finishing, cutting and sewing) to subcontractors located in different parts of the world.

Numerous negative scandals have highlighted the risks associated with outsourcing and production in low-wage regions. Child labour, lack of worker protection, and the emergence of an underpaid and unprotected class of workers make it particularly important to strengthen the social pillar of ESG.

ESG integration: Challenges and opportunities

The application of the ESG model in the fashion industry is increasingly global but real implementation issues and the greenwashing phenomenon challenge genuine moves forward. While some companies (e.g., LVMH, Hermès, Inditex, Patagonia, Nike, Puma) have incorporated ESG at a strategic level (Franzè et al., 2024), others have done so with reputational intentions, reducing ESG to a mere PR exercise (Gazzola et al., 2020).

ESG performance often correlates positively with macroeconomic and stock market indicators (Tobin's Q) (Alareeni & Hamdan, 2020), but its impact on operational performance (e.g., ROA, ROE) is not always clear. In addition, the impact of ESG integration is not clear: while it has a positive effect on market value (Tobin's Q) and investor perception (Alareeni & Hamdan, 2020), it does not always have a favourable impact on short-term financial performance (Return on Equity, Return on Assets, ROE, ROA). This is particularly true due to the cost implications of environmental and social obligations. This is also related to the heterogeneity of ESG practices and their often reputational nature, which is disconnected from

operational decision-making. In the IECF, this reinforces the central role of the ESG governance pillar as a prerequisite for the circular transition.

Circular economy: Opportunities for structural change

The circular economy has become a key topic in the textile industry, especially since 2020. (Sarker et al. 2023). The number of publications has skyrocketed since 2020.

One of the greatest things about making the fashion industry a more sustainable one is for it to become a circular economy system. This includes extending the life cycle of products, promoting recycling and usage-based models (e.g., rental, exchange) (Palm et al., 2021), as well as reducing the use of environmentally harmful dyes, chemicals and packaging materials and energy waste. There are companies such as Inditex, H&M and Puma that have successfully integrated the 'double materiality' principle into their ESG indicator system (Bogdan et al., 2025). Thanks to the double materiality principle, mainly because of EU regulations, companies assess the impact of their activities from two perspectives. Based on financial materiality, companies seek answers to the question of how environmental and social environment (e.g., climate change, resource scarcity, social expectations) affects their financial performance. Environmental and social materiality seeks answers to the question of how the company's operations affect the environment and society. Corporate Sustainability Reporting Directive (CSRD) is put into effect to mandate fashion businesses to come up with a report where they would have to prove how sustainability affects their business and how the business affects the environment and society. This is illustrated, for example, by Inditex, which assesses the financial risk of its carbon footprint and the social/environmental impact of its emissions separately. Another good example is Patagonia, which distinguishes in detail in its reports between the impact of its own operations (manufacturing) and the impact of its suppliers. These models can provide the foundation for ESG approaches and the birth of responsible product design and circular models.

The challenge of combining social and environmental goals with financial goals has led to a lack of social responsibility in the fashion industry (Thorisdottir and Johannsdottir, 2020). An increasing number of large fashion companies are obtaining Certified B Corps certification, which helps to combine financial goals with social responsibility. The certification is a new type of CSR and business management method that combines sustainability and the financial needs of companies (Mion and Loza Adaui, 2020). To become B Corp certified, businesses are able to communicate their social responsibility to stakeholders and achieve greater financial success.

In the long term, integrating the impacts of their entire life cycle into their business decisions – i.e., companies also having to price natural resources and social costs (e.g. CO_2 price, cost of labour abuses) financially – can provide a solution for companies. This results in a new financial approach for managers, stakeholders and investors alike. The transition to a circular economy will require a high level of commitment from managers. In addition, corporate culture, leadership commitment and community relations will play a key role in the sustainable transition. (Caniato et. al 2012).

According to the analysis, circular models can only be scaled up if they are linked to governance and regulatory frameworks rather than appearing solely as technological innovations. In the IECF, the circular economy is the operational pillar, which cannot achieve systemic impact without alignment with the other two pillars.

Communication and consumer behaviour

As a result of globalisation, markets have become increasingly competitive and consumers are increasingly taking moral and ethical considerations into account before making purchases, which has led to growing demand for sustainable products and services (Gazzola, 2012a). Consumers are increasingly willing to pay higher prices for eco-fashion products and sustainable goods (Choi et al. 2012), which has an impact on companies' financial performance. According to a study by Colasante (2021), consumers are receptive towards the bio-based and circular economy, but there are also barriers (price, accessibility, hygiene). The research shows the "sustainability bias" effect: customers think fashion is sustainable, but this does not necessarily translate into purchasing behaviour on their part. One significant policy suggestion to policymakers and companies is that in order to promote sustainable consumption, information, availability, and accessibility must be enhanced.

According to a study by Chan et al. (2020), consumers expect ethical labour management, environmentally friendly production and animal welfare. Ultra and fast fashion and functional brand consumers need more transparency, while luxury brand consumers are less concerned about the environment but becoming increasingly interested. Consumers are sensitive to transparency, but the phenomenon of greenwashing undermines their trust (Yang et al., 2024). ESG communication has a key role to play in rebuilding this trust, and digital tools (Quick Response, QR codes, blockchain-based traceability) are therefore becoming increasingly important (Ahmed et al., 2024) in the fashion industry.

It is critical that companies incorporate customer expectations into their CSR initiatives. However, adherence to a strategy is not a formulaic path and depends on the type of brand and price positioning. Only by this way can a firm come up with a beneficial CSR plan to be sustainable. Luxury brands must perform a greater degree of CSR, like utilizing blockchain to guarantee ethical supply chain and sourcing.

Companies would also benefit from developing tools that consumers can use to help them make sustainable decisions. In recent years, free apps (Goodonyou) have been developed for consumers that communicate specifically with consumers and help them make decisions based on public criteria, i.e., choose sustainable brands. Sustainable development does not only pose a question of technology or regulation but also of social and cultural change. Value changes, consumption modes and patterns of fashion are needed.

The chapter confirms the persistent gap between consumer attitudes and purchasing decisions, particularly through the phenomenon of "sustainability bias." In the IECF, the consumer side appears as an ambivalent driving force that can both stabilize and transform existing business models.

Discussion

This study set out to move beyond descriptive accounts of fashion sustainability by integrating diverse insights on globalization, ESG, circular economy and consumer behaviour into the Integrated ESG-Circular-Consumer Framework (IECF). The framework shows that sustainability transformation in fashion is not driven by isolated initiatives, but by the interaction of governance, operational and demand-side mechanisms embedded in global value chains

First, the IECF reframes greenwashing as a structural governance failure rather than a mere communication problem. The SLR demonstrates that when ESG commitments are not backed by enforceable governance mechanisms, power asymmetries and cost pressures allow brands to externalise environmental and social costs to Global South suppliers, as illustrated by recurring Rana Plaza-type scandals. Proposition P3 captures this dynamic by showing how buyer–supplier power imbalances negatively moderate the relationship between ESG–circular

integration and sustainability outcomes, unless counterbalanced by robust traceability and accountability tools.

Second, the framework highlights that consumer-side dynamics can both stabilise and disrupt ultra and fast fashion. While prior studies emphasise the rise of ethical consumers, the evidence on "sustainability bias" suggests that many customers overestimate the greenness of fashion and thus tolerate incremental improvements without changing purchasing patterns. P1 formalises this by positing consumer trust as a mediator between ESG transparency and circular adoption, and sustainability bias as a moderator that can dampen the effectiveness of even high-quality transparency efforts. This helps explain why firms can report extensive ESG metrics yet see limited uptake of circular business models.

Third, the IECF nuances the role of regulation as a double-edged catalyst. EU instruments such as the CSRD and the textile strategy can strengthen the link between ESG governance and circular outcomes by mandating double materiality assessments and detailed disclosure, particularly in fast-fashion segments. P2 captures this moderating role of "regulatory alignment": where standards are clear and enforcement credible, fast-fashion firms are more likely to internalise environmental and social costs and invest in circular infrastructure, whereas weak or diluted regulation risks producing only formal compliance and reporting-driven strategies.

Fourth, the framework contributes to sustainable supply chain management theory by explicitly incorporating digital traceability as a mediating governance mechanism. Blockchain-enabled transparency is not treated as a technological fix, but as a potential mediator that can connect brand-level ESG commitments with supplier-level practices, contingent on contractual and regulatory enforcement. This responds to calls in the SSCM literature to move from high-level principles towards mechanisms that reconfigure incentives and information flows along global value chains.

Finally, the IECF opens avenues for empirical testing across market segments. The propositions suggest that measurable constructs – ESG transparency, consumer trust, sustainability bias, regulatory alignment and power asymmetry – can be operationalised in survey-based, experimental and multi-tier supply chain studies. Such empirical work would allow researchers to assess under which institutional and competitive conditions the three pillars of the framework jointly deliver substantive reductions in emissions, waste and social harm, rather than symbolic "green" repositioning.

The analysis confirms that power asymmetries in global value chains weaken the actual outcomes of ESG and circular integration. In the IECF, these act as structural moderators that can only be counterbalanced by binding regulations and accountability mechanisms.

Practical implications

The findings of this study have several implications for managers in the fashion industry. First, the IECF suggests that ESG strategies should be designed as governance mechanisms that reallocate responsibility and risk along the supply chain rather than as standalone communication tools. This implies that brands need to integrate ESG criteria into purchasing contracts, supplier selection and incentive systems. Second, managers should couple investments in circular business models (repair, rental, resale, recycling) with targeted transparency initiatives that build consumer trust and explicitly address sustainability bias, for example through third-party verification, clear impact metrics and user-friendly traceability tools such as QR codes and blockchain-based product passport.

For policymakers, the framework underlines the importance of regulatory alignment and enforcement capacity. EU-level instruments such as CSRD, the textile strategy and due diligence directives can only realise their transformative potential if they are implemented with sufficient stringency to internalise environmental and social costs and to limit regulatory

arbitrage across jurisdictions. Moreover, the negative moderating role of power asymmetries in global value chains points to the need for support schemes and capacity-building programmes for SMEs in the Global South, thus enabling them to comply with ESG requirements without bearing disproportionate financial burdens.

Civil society organisations and consumer advocates can use the IECF to better target their interventions. By focusing on the mediating role of consumer trust and the risks of sustainability bias, NGOs and watchdogs can design campaigns that both expose greenwashing and empower consumers to interpret ESG and circular claims more critically. In parallel, collaborations between brands, regulators and civil society around interoperable traceability systems may help turn blockchain and digital product passports from marketing tools into credible accountability infrastructures.

Conclusions

This article has examined how globalization shapes sustainability challenges and responses in the fashion industry by conducting a systematic literature review and developing the Integrated ESG-Circular-Consumer Framework (IECF). The framework shows that meaningful sustainability transformation emerges from the interaction of ESG governance, circular operations and consumer behaviour, situated within global value chains characterised by regulatory constraints and power asymmetries.

The study contributes to the literature in three main ways. First, it reconceptualises greenwashing as a structural governance problem linked to asymmetric buyer–supplier relations and weak enforcement, rather than a marginal communication issue. Second, it explains why consumer-side factors – trust, transparency and sustainability bias – can simultaneously support and stabilise fast fashion, clarifying under which conditions ESG transparency translates into greater uptake of circular models. Third, it positions regulation and digital traceability as key moderating and mediating mechanisms that can either enable or constrain the effectiveness of ESG–circular integration.

For practice, the IECF implies that global fashion brands need to move from symbolic ESG reporting towards integrated governance systems that link purchasing strategies, supplier incentives, circular design and consumer engagement. Policymakers, in turn, should design and enforce regulatory frameworks that reduce arbitrage opportunities, protect vulnerable suppliers, and encourage investments in circular infrastructure, while civil society can play a pivotal role in monitoring, standard-setting, and consumer education.

The study is limited by its reliance on secondary sources and its focus on conceptual development. Future research should empirically test the proposed propositions across different segments (ultra-fast, fast fashion, premium, affordable luxury, luxury) and institutional contexts, employing longitudinal and multi-tier designs to capture how ESG governance, circular practices and consumer behaviour co-evolve over time. Such work would help to refine the IECF, identify boundary conditions and provide more granular guidance for managers and policymakers seeking to align globalization with environmental and social sustainability in the fashion industry.

Limitations and future research

The SLR approach limits causal inference; future mixed-methods studies should test IECF propositions across segments (ultra-fast vs. luxury). Longitudinal analysis of power asymmetries (Tier-1 vs. SME suppliers) and consumer behaviour experiments warrant investigation. This critical synthesis elevates the study from literature summary to theory-building, offering testable propositions for transformative change in globalized fashion supply chains.

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Princess impact: Diversity, equity, and inclusion as a pillar of sustainability in the global entertainment industry – A case study of the Walt Disney Company

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Abstract

Social aspects of sustainability are crucial in the 21st century, which is a time characterised by multiple challenges and crises. Diversity, equity, inclusion, and accessibility as values and strategic areas are integrated into sustainability frameworks of global enterprises since the early 2000s.

The entertainment industry has shown remarkable growth over the past few decades and, therefore, plays a unique role in shaping the global mindset on sustainability issues. The study introduces a review of the academic literature on sustainability-related issues within the field, as well as patterns of Corporate Social Responsibility in the sector, especially concerning Sustainable Development Goals 5 and 10, which deal with gender equality and reducing inequality. To demonstrate the entertainment industry's impact and power, we have chosen the case study of the leading entertainment provider, The Walt Disney Corporation. Our research question tries to uncover whether Disney's *'inclusive storytelling'* represents symbolic gestures or significant systemic change, especially regarding the princess franchise. We demonstrate through the analysis of how the princess characters evolved from passive, Eurocentric role model to protagonists to become autonomous and culturally diverse.

We also interpret the practices and difficulties of Disney in converting narrative diversity into company policies and actions. The study concludes that storytelling can be a tool for forming social norms, especially among young children, and the paper draws attention to the challenges of sustainability in the world of children's cinema, cartoons and entertainment experiences, and finds a balance between narratives on the screen and responsible company policies.

Keywords: Diversity, Equity and Inclusion (DEI), sustainability, entertainment industry, Corporate Social Responsibility (CSR), gender representation, Sustainable Development Goals, cultural sustainability

JEL Classification: L82, M14, J16

Introduction

By 2025, both researchers and policymakers have become aware that we face an era of *polycrisis* (Losoncz, 2023). Besides environmental sustainability issues, attention is increasing towards the social dimensions and aspects of sustainability, particularly diversity, equality, inclusion and accessibility (DEIA) in global industries (United Nations, 2015). The entertainment industry, with its worldwide reach and influence on culture, also plays a key role in shaping public opinion, reinforcing norms or limiting or eliminating long-standing inequalities.

The entertainment branch developed its sustainability guidelines and standards, firstly focusing on climate-related sustainability initiatives using the ALBERT Media Production Carbon Neutrality Framework (also called ALBERT Initiative) (BAFTA, 2023). In the early

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phases of sustainability-related policymaking, the social aspects of sustainability remain underrepresented in the sector's strategies. This can also be observed in the whole creative industry regarding the implementation of Sustainable Development Goals (SDGs) 5 (gender equality) and 10 (reducing inequalities) (Sorensen&Nooan, 2022).

This paper focuses on DEIA as a strategic and ethical component of sustainability in the global film, cartoon and entertainment industry. Using a case study approach, we examine how one of the most influential players, The Walt Disney Company integrates DEIA principles into its corporate practices, and we will give an overview of the company's development path related to idols and role models depicted on the screen. The company's recent approach of inclusive storytelling and casting is recognised and criticised at the same time. For some of the audience, it is too performance-oriented or commercial rather than focused on meaningful societal transformation (Elsawy, 2024; Jiménez-Morales & Lopera-Mármol, 2022).

In the first chapter, we provide the historical evolution of Sustainability Frameworks and reporting standards. We particularly focus on the introduction of the movie and entertainment industry, where reporting and measuring standards mean a challenge even nowadays due to the specialities of the industry. In the second part, we aim to assess how sustainability narratives are interrelated with the real-world activities of the entertainment industry. The third part explains the case study of The Walt Disney Company, focusing on the evolution of princess characters, known as the princess franchise or princess impact. In its conclusions, the study aims to critically assess whether DEIA is a core business principle at Disney aligned with sustainability goals.

Theoretical background

From environmentalism to environmental, social, governance (ESG): The evolution of sustainability frameworks

The origins of sustainability are rooted in shifting the corporate mindset from a purely profit-oriented approach to a responsible conduct of business in terms of environmental harms and social impact from the early 1960s. Therefore, we focus on the introduction of milestones and key papers related to the sustainability of the entertainment industry.

While research and reports in the 1960s and 1970s were more focused on environmental issues or did not combine social and environmental responsibilities of corporations, the Brundtland Report, published in 1987 (World Commission on Environment and Development, 1987), created the idea of global sustainability. The Commission, led by Brundtland, under the umbrella of the United Nations, declared that only sustainable development can meet today's requirements without taking away the chance of the next generations of a healthy and prosperous future. This definition created the foundation for a complex understanding of sustainability, including all three dimensions of the current ESG framework: environmental, social, and governance. These criteria are now reflected in stakeholder assessments and corporate responsibility indicators (Ferlito & Faraci, 2022).

Building on the Brundtland Report's achievements, the United Nations introduced the Sustainable Development Goals (SDGs) with 17 global priorities in 2015. The SDGs consist of 169 further targets and 303 indicators. This globally accepted and recognised system of goals and actions is reflected in the reporting, assessment, and in measurement systems of different actors in society and the economy worldwide. The study focuses on social dimensions, particularly two global goals: SDG 5 and SDG 10.

Figure 1: *Sustainable Development Goals*
Source: *https://sdgs.un.org/goals*

For decades, the creative and entertainment industries tried to avoid expectations of responsibility directed at the sector's players, like manufacturing costs and high transportation burdens. Film production generates substantial carbon footprints due to location shooting, international logistics, and energy-intensive post-production processes (Vaughan & Kääpä, 2022).

Social sustainability is equally challenging. Despite some good examples and progress, studies draw attention to gender and racial disparities in leading roles, pay gaps among actors and backstage employees based on race and gender, as well as gender gaps in decision-making positions within the industry. Sustainability in entertainment must do much more than carbon audits even beyond the scenes (Kräft et al., 2024; Regev, 2021).

DEIA in the sustainability agenda of the entertainment industry

In the early stages of the film industry, gender or racial minorities were not handled equally in the production industry. Black or Latino actors have been marginalised even in front and behind the scenes (Rodrigez, 2007). The first significant steps towards acknowledging the equal value-creating force of different genders and races started in the late 1970s, with the foundation of Studio D in Canada, the first feminist film studio. In 1979, the Women's Steering Committee of Directors Guild of America was founded, which fought and advocated against the underrepresentation of women in directorial roles (Rodrigez, 2007). These initiatives led to an increased recognition of DEIA strategies even in the film industry. By the first decade of the 2000s, the film industry developed its internal guidelines and best practices for DEIA policies and measures. Another important field of social responsibility has been developed through depicting role models, demonstrating gender equality issues and promoting inclusion in movies, films and other entertainment productions. The two fields of action, corporate policies and actions behind the scenes, and narratives through idols, actors, are parallel activities of leading companies nowadays (Elsawy, 2024; Ferlito & Faraci, 2022).

Companies like Netflix, Sony, Universal Studios and The Walt Disney Company are ranked among the top ESG performers (Grand View Research, 2022). In the entertainment category of the Standard and Poor'sGlobal Sustainability Yearbook (2024), companies nowadays include DEIA performance in their annual CSR reporting. Initiatives include pay

transparency, inclusive casting, education programmes, and equitable hiring practices. Walt Disney's sustainability report covers the following action areas regarding SDGs 5 and 10. Workforce Diversity and Inclusion covers actions and policies to attract a diverse workforce to the company and operate the Employee Resource Groups, which are employee-led groups formed around shared identities and interests. Community Engagement and Philanthropy covers initiatives like Charitable Giving: in the fiscal year 2023 Disney directed over 145 M US Dollars (USD), 46% of its charitable contributions to support programmes for Asian American and Pacific Islander communities, Black communities, Hispanic and Latinx communities, Native and Indigenous communities, LGBTQ+ communities (lesbian, gay, bisexual, transgender, queer/questioning and other sexual and gender minorities), veterans, women and girls, and people with disabilities. Finally, the Leadership and Governance pillar of the programme aims to reach an equal representation of minorities and genders in boards and other institutions. In 2023, five out of ten members of Disney's Board of Directors represented diverse gender and/or ethnic backgrounds, which also reflects the company's commitment to inclusive leadership (The Walt Disney Company, 2023).

Based on the developments of the last decades, sustainability in the film industry has two different layers. Therefore, the entertainment industry is not only a "film factory" releasing creative products to the market, but it is a cultural infrastructure with social responsibility, as through its cultural impact it is able to shape social norms (Vaughan & Kääpä, 2022). These two layers are, according to Vaughan & Kääpä:

- Operational sustainability: Production facilities, infrastructure and its carbon footprint, including waste management, recycling, reducing transport and travel-related costs, energy saving solutions.
- Narrative sustainability: The values displayed and messaged through the cultural content–role models, idols, heroes and the stories they transmit, or the message they tell.

DEIA is part of the Narrative Sustainability layer. Quoting Jiménez-Morales and Lopera-Mármol (2022), *"green production is not enough without green messaging".*

The ALBERT initiative and the BAFTA Certification Model

The ALBERT Initiative was launched by BAFTA in the United Kingdom in 2011 and has grown into the primary standard for sustainable screen content internationally. Originally a carbon calculator for productions, ALBERT now offers a complete certification framework that covers pre-production planning, crew training, sustainable transport and waste reduction (Sørensen & Noonan, 2022; Vaughan & Kääpä, 2022). ALBERT certification is a requirement for BBC and Channel 4 productions, these producing companies have over 500 projects certified (BAFTA, 2023). BAFTA plays an important role in educating film industry experts on sustainability and provides a knowledge base and best practice sharing for the industry players.

ALBERT has also developed the "Editorial Sustainability" space, where they share editorial content (blogs, articles, commentaries). This site raises awareness about climate issues and inclusive values (wearealbert.org, 2024). However, based on analysis of publications, articles and news, the ALBERT Initiative needs to improve regarding measurement protocols of social pillars and metrics related to DEIA, as it promotes storytelling but it does not provide a formal audit for gender or racial representation (Jiménez-Morales & Lopera-Mármol, 2022). The BAFTA Awards now include sustainability performance as part of their eligibility criteria, which also motivates film studios to adopt greener practices, introduce and measure their sustainability performance. In conclusion, the ALBERT Initiative is a best practice in the film industry, yet its social metrics can be further developed in the future.

Methodology

In this study, we employ a qualitative-type case study methodology, introducing The Walt Disney Company as a leading player in the global entertainment sector. The research aim is to explore how DEIA practices are embedded within the company's sustainability strategy. We analysed whether the company's actions align with the Sustainable Development Goals, particularly SDG 5 on gender equality and SDG 10 on reduced inequalities (United Nations, 2015).

The main data source for the case study analysis is the official CSR and Sustainability Report for the year 2023 (The Walt Disney Company, 2023), which provides a detailed dataset on the firm's internal and external initiatives and actions related to DEIA. Furthermore, we concentrate on the narrative sustainability-related actions and programmes, e.g. storytelling, workplace representation, and public engagement through culturally significant programmes such as the Buy Black Challenge, Pride Nite, and heritage month celebrations.

The methodology enabled us to analyse and interpret other reports and texts as well as academic research literature related to the evolution of Disney's social responsibility. Our content analysis focused especially on the evolution of Disney's princess characters as interesting markers of changes in representational policy and interpretation of gender roles, and then on inclusivity towards different racial and gender groups.

We will demonstrate how these characters transformed from the passive, Eurocentric figures of the early 20th century to culturally diverse and independent protagonists in recent decades. This Princess Paradigm has a long-term, wide-ranging impact not only in educating young girls but also in challenging and breaking taboos in public narratives (Noseworthy-Roberts, 2016).

Case study: The Princess Paradigm and the evolution of DEIA in practice

The Walt Disney Company's princess franchise targets young girls and has been more than a profitable merchandise over the last few decades. We have chosen to introduce its compelling cultural case to demonstrate how DEIA principles can be applied in practice in the entertainment industry. As demonstrated below, the portrayal of princess characters not only shows the changing gender norms and cultural representation but is a well-aligned, professional corporate strategy, where the storytelling is aligned with social values represented by the company.

The transformation of Disney princesses over the past almost a hundred years illustrates how the company has become open towards issues of diversity and equity and started to display these values in its creative content. Later, a broader shift in both market demand and socio-political consciousness occurred. Several empirical studies assessed the impact of princess role models on young girls, mainly in educational, social and psychological segments. As this study concentrates on sustainability issues, we illustrate the brief history of princess characters in the context of SDGs 5 and 10.

The classic era of Disney cartoons, starting from *Snow White* (1937) to *The Little Mermaid* (1989), was characterised by feminine passivity and Eurocentrism. These characters, such as Cinderella and Aurora, Sleeping Beauty and the classic fairy tale characters, reflected ideals of beauty, virtue, and silence. They were reinforcing a narrow vision of womanhood that did not incorporate any racial and narrative diversity. These early portrayals, as Noseworthy-Roberts (2016) notes, reflected the expectations of a mid-twentieth-century patriarchal society. They positioned female protagonists primarily as objects of rescue and desire. Racial homogeneity was the norm, putting the white Western gaze into focus (Regev, 2021; Rodrigez, 2007).

These stereotypes were first amended by the productions of *Pocahontas* (1995) and *Mulan* (1998), where the princesses had non-Western identities. A criticism of this era is that these characters have been portrayed through the lens of stereotypes, and they have been romanticised with an obvious historical inaccuracy. *Mulan* remained burdened by orientalist framing, and *Pocahontas* was criticised for sanitising colonial history (Noseworthy-Roberts, 2016). These films marked a transitional phase in which representation began to emerge as a strategic concern but had not yet been incorporated into the ethical framework of The Walt Disney Company, and there has not been any impact measurement related to the role models or idols.

Between the late 1990s and 2009, we witnessed a gap in princess stories related to the release of Disney's animated productions. Analysing the overall market situation, it became clear that in that era The Walt Disney Company lost market share compared to Pixar, which introduced its new 3D computer-generated imagery (CGI) technique, with such iconic productions like *Toy Story, A Bug's Life, Monsters, Cars, Ratatouille* and *Finding Nemo.* In this period, Disney underperformed compared to Pixar. In 2006, Disney acquired Pixar, bringing the creative leadership of Pixar to The Walt Disney Company and starting a revitalisation process at Disney's animated films branch (Eloranta & Patching, 2020).

After that, a phase of intentional redefinition started at Disney. *The Princess and the Frog* (2009) introduced Tiana, Disney's first Black princess, whose character is clearly defined by ambition, leadership skills, and authority. Subsequent productions such as *Moana* (2016), *Raya and the Last Dragon* (2021), and *Encanto* (2021) enlarged the scope of DEIA narrative with topics of ethnicity, geography, complex personal traits, and family relations. These narratives offer the audience protagonists rooted in Pacific Islander, Southeast Asian, and Afro-Latin cultural contexts. These characters not only challenge the gender conventions of earlier decades but also actively promote female autonomy, generational differences and learning from elder generations, and a positive approach towards leadership on a community level. These representations are not just generalised messages on diversity; they demonstrate deeper issues of advocacy. Their strategic goal is to transmit a different natural approach to social identities in media content for children (Noseworthy-Roberts, 2016; Elsawy, 2024).

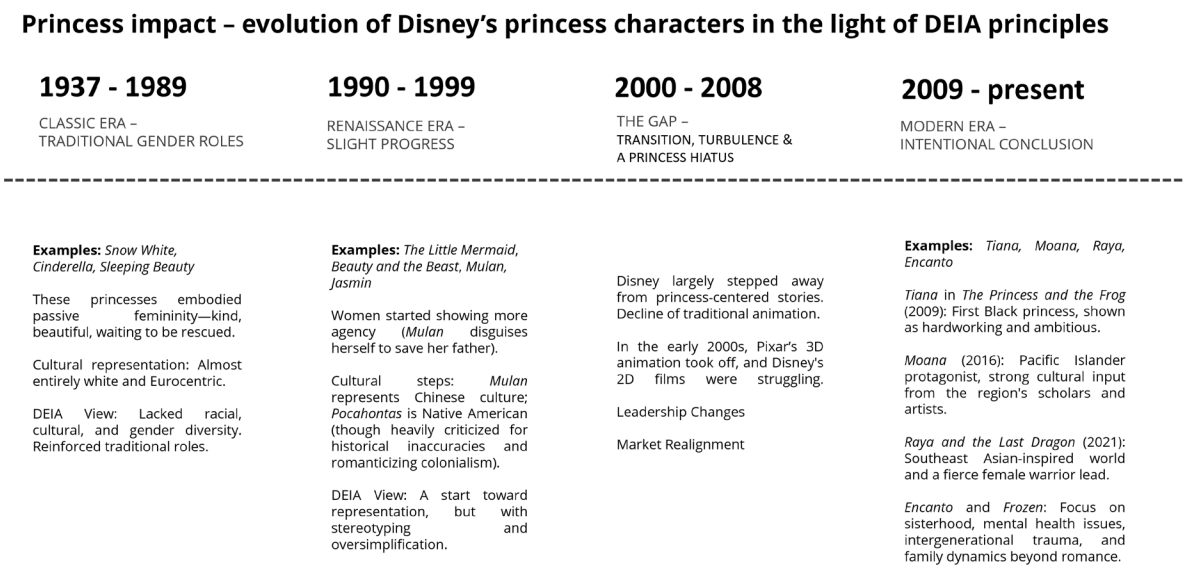

Figure 2: *Evolution of Disney's princess characters in the light of DEIA principles*
Source: *Compiled by the authors (based on Noseworthy-Roberts, 2016)*

In summary, the evolution of Disney's princess franchise demonstrates a slow but strategically planned and realised alignment with DEIA objectives. It is a good example of both the potential and the limitations of mass media corporations in ethical storytelling. Through the eyes of these characters, we can follow how corporate strategy can be harmonised with cultural responsibility, confirming that the narrative itself is a vital but not enough infrastructure for sustainable development.

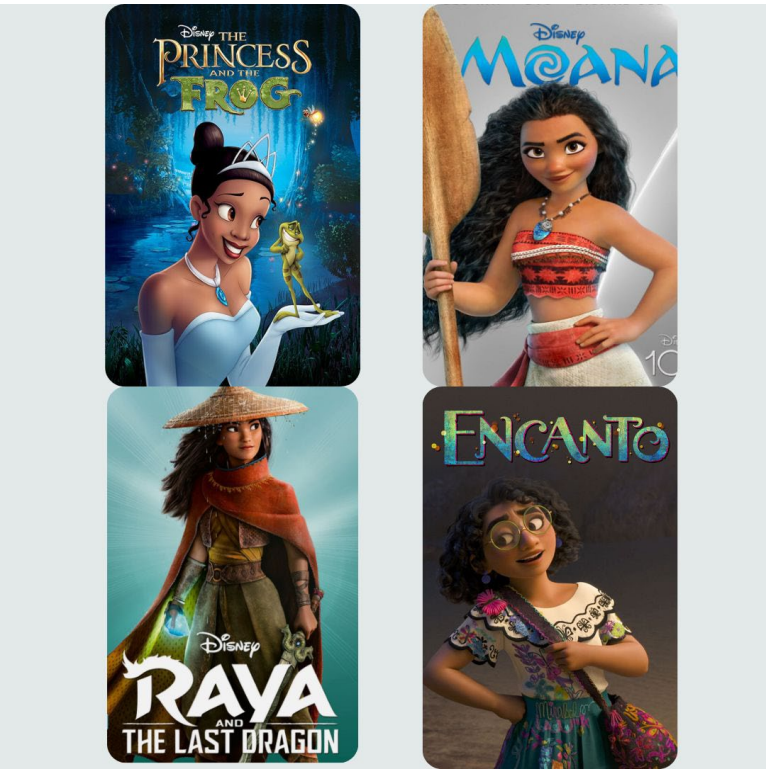

Figure 3: *The New Characters of Disney Princesses since 2009*
Source: *Compiled by the authors, based on https://disneyprincess.fandom.com/wiki/List_of_Disney_Princess_Designs*

Discussion

Based on the above case study's conclusions, this section collects the potential conflict areas that arise when socially conscious branding is used in business.

DEIA has evolved from a social ethical issue to an important strategic and reputational asset not just in the film and entertainment industry. To analyse The Walt Disney Company's approach towards DEIA goals in its sustainability strategies, it is worth assessing how frequently The Walt Disney Company mentions SDG alignment in its sustainability reports especially concerning Goals 5 and 10. The SDG report 2023 shows that the company wants to present social inclusion as a key component of its global responsibility program. This is in line with general trends in corporate sustainability, and with the general structure of sustainability reports. After indicators measuring the environmental pillar of sustainability, social indicators like diversity of the staff, inclusive leadership, and representational fairness are increasingly included in ESG narratives (Ferlito & Faraci, 2022; Sørensen & Noonan, 2022).

Despite the spectacular reports, conflicts usually stem from the fact that the reality of corporate decision-making behind the scenes is less transparent. Disney's princesses' symbolic inclusion does not always reflect in fair systems inside creative leadership, executive decision-making, or production equity. As Noseworthy-Roberts (2016) states, industries driven by branding and consumer perception always carry an increasing risk of *"performative diversity,"*

in which case consumers judge based on the visible diversity performance and not on the real, structural inclusion at the company.

This ambivalence of DEIA as an ethical imperative and marketing tool is called *"equity-washing,"* whereby companies report progressive values without a real change in the internal hierarchies. Although the stories developed through characters like Moana or Encanto show real attempts to interact with disadvantaged voices, their success in sustainability depends on whether they are backed by long-term investments of The Walt Disney Company, e.g. in inclusive talent management, or governance-related sustainability measures. Progressive storytelling must be paired with progressive measures if the company would like to take sustainability seriously as a corporate value (Elsawy, 2024; Ferlito & Faraci, 2022; Jiménez-Morales & Lopera-Mármol, 2022).

Moreover, we must consider that the worldwide broadcasting of these stories and their acceptance may be very different in several cultures. Operating as a worldwide, dominant provider of children's media, The Walt Disney Company's decisions on character identification, thematic focus, and even language translation have a large impact. The standardising of inclusive narratives has the risk that it contributes to the creation of exportable clichés. Instead of contributing to a better understanding and acceptance of cultural diversity, it flattens cultural differences. Here the role of global initiatives related to DEIA is also important as it can help to find the balance between universal human rights frameworks and culturally specific understandings of identity, gender, and equity.

In summary, there has been a major shift in the types of role models inspiring young people around the world, including the Disney princess's transformation from passive and Eurocentric beauty *(waiting to be rescued)* to a culturally diverse, self-determining everyday hero *(fighting for others)*. In addition, we can witness a growing pressure on businesses to reflect their values in ways which are both narratively compelling and visible. For media experts and scholars, sustainability in the entertainment industry can be viewed from both an operational infrastructural point and the narrative responsibility perspective (Vaughan & Kääpä, 2022). In this context, storytelling is a powerful tool which can shape public opinion or even openness towards DEIA issues.

Conclusion

In this study, we focused on the development of The Walt Disney Company's princess character brand, especially how Diversity, Equity, Inclusion, and Accessibility (DEIA) is implemented within the global entertainment company. The results show that DEIA has evolved to a key component of sustainability activities. The main drivers are consumers, who provide feedback on the shows, and, secondly, stakeholders, who demand more ethical behaviour from businesses in both their operations and the stories they tell the audience.

From their early portrayals to their culturally diverse, independent heroines, The Walt Disney Company made a long journey in social responsibility issues. However, until the 2010s, this evolution has been mostly narrative, with little systemic change in terms of production equity, leadership diversity, or institutional practices. The study drew attention to the danger of equity-washing, which – similarly to greenwashing – occurs when consumers are shown the image of a responsible and inclusive corporation without real changes in internal power structures or the adoption of inclusive leadership practices.

We also pointed out that inclusive narratives must be handled carefully as they become more worldwide. In the case of The Walt Disney Company, where the content reaches billions of viewers globally, a careful balance must be maintained between stories that are accessible to all, reflect the diversity and inclusivity of our cultures, without risking cultural reductionism or stereotyping. In the future, it will become more and more important to recognise the social impact of media representational innovations. Global leaders of the film and entertainment

industry shall combine their inclusive storytelling with sustained investment in equitable governance and impactful DEIA actions. Combining these can be an effective strategy for achieving the SDG 5 and SDG 10 goals. The entertainment sector has the unique ability and duty to serve as a role model for inclusive futures.

DEIA must be established in both the content and the methods – as well as in the people – of production for this approach to be believable and long-lasting. Stakeholder interviews or cross-studio comparisons could be added to this inquiry in future research to further assess institutional commitment and systemic change.

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Research on the impact of financial inclusion on the profitability of commercial banks in China

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Abstract

As an important financial tool for promoting economic growth and social equity, inclusive finance has a profound impact on the profitability of commercial banks. Taking Chinese commercial banks as the research object, this paper empirically analyses the mechanism underlying the impact of the proportion of inclusive financial loans on bank profitability, and its dynamic change characteristics, based on relevant data from 2018 to 2023. It is found that the increase in the proportion of inclusive financial loans has a significant negative effect on the return on equity. This finding suggests that inclusive finance remains at a stage characterised by "high input, low return." In addition, the study reveals the moderating roles of variables such as Loan-to-Deposit Ratio, Provision Coverage Ratio, and Asset-Liability Ratio in the relationship between financial inclusion and profitability, further enriching the theoretical connotations and practical significance of financial inclusion. The paper concludes that commercial banks should optimise their credit structure, enhance their risk management capability, improve financial inclusion product innovation, and balance the relationship between financial inclusion and profitability objectives to ensure the sustainable improvement of profitability while practising social responsibility.

Keywords: Inclusive Finance; Inclusive Loan; Profitability; Commercial Banks; Sustainable Development

JEL Classification: G21, O16, E44

Introduction

Against the backdrop of the "International Year of Microcredit" in 2005, the United Nations systematically incorporated the concept of "financial inclusion" into the global development agenda for the first time, emphasising that building an inclusive financial system is crucial for eradicating extreme poverty and hunger and promoting sustainable economic growth. This concept quickly gained widespread attention and recognition from the international community (UNESCAP, 2006). Building on this foundation, international organisations began to further promote the development of related theories and policy practices. In 2006, the World Bank refined the concept of financial inclusion by proposing the provision of diversified, differentiated financial services through various channels to low-income groups traditionally excluded from the formal financial system, thereby enabling them to enjoy equal access to financial services and products (World Bank, 2008). The outbreak of the global financial crisis in 2008 triggered deep reflections in many countries on the inclusiveness of their financial systems, elevating financial inclusion to a higher policy priority. Consequently, many developing countries established alliances to promote financial inclusion and relevant institutional frameworks. In 2011, the Global Partnership for Financial Inclusion (GPFI, 2011) further deepened the concept by explicitly defining "effective access" to financial services for the first time, namely, enabling people with low income to obtain financial products and services that match their needs in a convenient, compliant, and affordable manner. As the

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concept of financial inclusion continued to spread, the World Bank led multi-level global discussions to promote the construction of inclusive financial systems and the exchange of international best practices.

In recent years, financial inclusion has gradually become a key priority in China's financial policy agenda and is regarded as an essential tool for addressing social inequalities and promoting equitable development. Against this backdrop, the Chinese government has continuously strengthened policy support and actively promoted the development of inclusive finance across institutions, resource allocation, and technology, accelerating its implementation nationwide. Notably, the accessibility and coverage of financial services for micro and small enterprises (MSEs), the agricultural sector, and low-income groups have been steadily improving. Regulatory authorities such as the People's Bank of China (PBoC) have introduced a series of policies to guide commercial banks in expanding credit support for inclusive finance, resulting in sustained growth in inclusive loan portfolios. By the end of the fourth quarter of 2024, the outstanding balance of inclusive loans to MSEs issued by Chinese commercial banks had increased by more than 20% year-on-year (NFRA, 2025). Meanwhile, the rapid development of financial technology (FinTech) and digital financial inclusion has enabled commercial banks to adopt more efficient service channels and risk-control tools, significantly enhancing the reach and operational efficiency of inclusive finance services (Liu et al., 2024).

Although the continued advancement of financial inclusion has improved financial service coverage, its impact on commercial banks' profitability remains a subject of academic debate. On one hand, some studies suggest that inclusive finance can expand the customer base and enhance bank revenues, particularly by leveraging digital technologies to reduce service costs and mitigate risk exposure (Zhu & Guo, 2024). On the other hand, other literature points out that inclusive finance faces challenges in its early stages, such as incomplete credit information of clients, small loan sizes, and high administrative costs, which may compress profit margins—an effect that is especially pronounced among small and medium-sized banks (Morgan & Pontines, 2018). Against the backdrop of a continuously narrowing net interest margin and deepening interest rate liberalisation, how banks can maintain profitability while fulfilling their social responsibilities has become a pressing and practical issue.

In light of the aforementioned context, this study adopts a micro-level analytical framework, taking Chinese commercial banks as the research sample. By employing the proportion of inclusive loans as the core explanatory variable, the paper investigates the mechanism through which financial inclusion influences the profitability of commercial banks.

Literature review

Inclusive finance, as a model aimed at providing equitable and accessible financial services to low-income groups, MSEs, and other segments traditionally underserved by the formal financial system, holds significant implications not only for socioeconomic development but also for the profitability patterns and long-term sustainability of commercial banks. A substantial body of theoretical and empirical literature has been developed by international scholars in this field. Beck et al. (2007) suggest that the expansion of inclusive financial services can generate new sources of deposits for banks, reduce funding costs, and enhance long-term profitability. Similarly, Cull et al. (2014) find that microcredit services demonstrate considerable market potential in developing countries and can effectively fill the gap left by traditional large-scale lending. However, Morduch (1999) argues that, despite the large client base associated with microcredit, the small loan sizes and additional costs related to client education and risk management result in relatively high operating expenses, which may adversely affect banks' short-term profitability. In a related view, Ledgerwood (2013) contends that although inclusive finance may not yield high returns in the short term, with initial

investments often leading to low input-output ratios, its profitability tends to improve over time as customer bases expand and operational familiarity increases.

With the deepening of research on financial inclusion in China, particularly regarding its impact on the profitability of commercial banks, the topic has attracted increasing academic attention. However, scholarly opinions remain divided, and a clear consensus has yet to emerge. Tang (2021) finds a positive relationship between financial inclusion development and bank profitability by incorporating a digital financial inclusion index and conducting a basic regression analysis. Guo et al. (2022) argue that financial inclusion contributes to the stable operation of commercial banks and can be enhanced through digitalisation and intelligent technologies, thereby improving operational efficiency, reducing risk exposure, and enhancing profitability. Zhu et al. (2023) review the progress of inclusive finance in China and examine its innovative practices, concluding that inclusive finance helps expand the service scope of commercial banks and positively impacts their profitability. In contrast, Hui Zhongjie (2017), using grey relational analysis to assess the development of financial inclusion in China's five major state-owned banks between 2011 and 2015, finds that although inclusive finance developed rapidly in the sampled regions, it did not contribute to bank profitability. Similarly, Sun Yuxin (2020), using data from 2014 to 2018, empirically demonstrates a significant negative correlation between lending to MSEs and the agricultural sector, and the profit levels of major state-owned banks. Dong Xiaolin et al. (2021) further suggest that financial inclusion may conflict with the profit-maximising objectives of rural commercial banks, as its development increases operating expenses and thereby reduces profitability.

Although existing studies have explored the impact of financial inclusion on banking performance, most have focused on the macroeconomic level or the effects of specific policies, with relatively limited attention paid to the relationship between the share of inclusive finance operations and bank-level profitability. To address this gap, the present study adopts a micro-level approach, using the proportion of inclusive loans in commercial banks as the core explanatory variable and conducting an empirical analysis of how the development of inclusive finance affects bank profitability. This research aims to contribute to the literature by providing a more granular understanding of the profitability implications of inclusive finance at the institutional level.

The current situation of inclusive finance development in China

The development process of inclusive finance in China

The development of financial inclusion in China emerged during a period of rapid economic and social transformation, with the aim of addressing the traditional financial system's inadequate coverage of low-income groups, MSEs, and rural areas. As economic growth continued and urban–rural income disparities widened, the inequality in access to financial services became increasingly pronounced. In this context, the concept of financial inclusion emphasises the universality and accessibility of financial services, enabling all members of society to participate equally in economic activities and supporting their livelihood, employment, and business financing needs. Financial inclusion has thus gradually become a critical instrument for promoting social equity, optimising resource allocation and fostering inclusive economic growth. In particular, under the influence of deepening global discourse on financial inclusion, China’s understanding of the concept has continued to evolve, with its system becoming increasingly comprehensive, its forms more innovative, and the degree of inclusiveness significantly enhanced.

The development of financial inclusion in China has undergone three stages: initial exploration, policy guidance, and deepening implementation. In the initial stage, the scope of

financial services was limited, with basic services primarily provided by policy-based financial institutions and rural credit cooperatives. As economic system reforms advanced, commercial banks gradually became involved, promoting the implementation of micro- and small-enterprise loans and rural household loans through pilot programs. In the policy guidance stage, the Third Plenary Session of the 18th Central Committee of the Communist Party of China in 2013 explicitly proposed developing financial inclusion, thereby marking its incorporation into the national strategic agenda. In 2015, the State Council issued the "Plan for Promoting the Development of Financial Inclusion (2016-2020)," which outlined the development goals, key areas, and implementation pathways for financial inclusion. During this period, various financial institutions explored innovative models, including establishing dedicated financial inclusion agencies and expanding online service channels. Additionally, fiscal and monetary policies were harmonised, with measures such as the establishment of relending and rediscounting tools, tax reductions, and fee cuts to support financial institutions in increasing their allocation of resources to the inclusive finance sector. At the stage of deepening implementation, the widespread adoption of FinTech, including big data, cloud computing, and artificial intelligence, has advanced financial inclusion, enhancing the coverage and efficiency of financial services. Furthermore, local governments, based on regional characteristics, have promoted financial inclusion pilot projects, developing innovative models tailored to local needs and effectively fostering the differentiated development of financial inclusion.

The development of inclusive finance of commercial banks in China

In recent years, financial inclusion has received significant attention at the national level. The State Council's "Government Work Report" has repeatedly issued clear directives and instructions regarding the role of commercial banks in promoting financial inclusion, while regulatory authorities have strengthened their evaluation of commercial banks, effectively guiding them to deepen their outreach and enhance inclusiveness. Since financial inclusion has been elevated to a national policy priority, the share of inclusive micro and small-enterprise loans in China has steadily increased. According to data from the People's Bank of China's "Monetary Policy Implementation Report," the balance of inclusive micro and small enterprise loans for the years 2020–2024 stood at 15.1 trillion yuan, 19.2 trillion yuan, 23.8 trillion yuan, 29.4 trillion yuan, and 32.9 trillion yuan, reflecting year-on-year growth rates of 30.3%, 27.3%, 23.8%, 23.5%, and 14.6%, respectively. In 2024, the growth rate of inclusive micro and small enterprise loans outpaced the overall loan growth rate by 7 percentage points. Furthermore, the number of recipients of inclusive micro and small enterprise loans has also increased annually, rising from 32.28 million households in 2020 to 60.99 million households in 2024.

According to data from the National Financial Regulatory Administration (NFRA), by the end of 2024, the balance of inclusive micro and small enterprise loans in state-owned banks reached 14.26 trillion yuan, marking a year-on-year growth of 18.79%, accounting for 42.77% of the total inclusive MSE loans held by banking financial institutions. National joint-stock commercial banks have increased their credit allocation to the financial inclusion sector, with the balance of their inclusive micro and small enterprise loans reaching 5.01 trillion yuan, reflecting a year-on-year growth of 6.9%, and accounting for 15.03% of the total inclusive micro and small enterprise loans in the banking sector. Due to regional and scale limitations, city commercial banks have smaller loan volumes for micro- and small enterprises compared to large and medium-sized banks, with the balance of their inclusive micro and small enterprise loans standing at 4.37 trillion yuan, representing a year-on-year growth of 9.61%. Rural financial institutions reported a balance of 8.96 trillion yuan in inclusive micro- and small enterprise loans by the end of 2024, reflecting a year-on-year increase of 8.93%.

Table 1: *The situation of inclusive loans to small and medium enterprises (SMEs) by Financial Institutions in 2024 (Quarterly)*
Source: *National Financial Regulatory Administration*

Unit: 100 million RMB

	Q1	Q2	Q3	Q4
Total	313815	320443	325768	334414
State-owned banks	131455	134723	137990	142608
Joint-stock banks	48167	48724	49102	50110
Urban commercial banks	41251	42096	42606	43709
Rural commercial banks	85927	87545	88559	89597

Commercial banks innovate inclusive financial credit products

Chinese commercial banks have actively promoted the innovation of inclusive financial credit products, continually expanding the depth and breadth of their services. By leveraging advanced technologies such as big data, artificial intelligence, and blockchain, they have launched a variety of credit products designed to serve key inclusive finance groups, including micro and small enterprises, farmers, and individual businesses. Among these innovations, the "Cloud Tax Loan" introduced by China Construction Bank and the "Quick Loan Access" launched by Bank of Communications have become exemplary models. These products, by integrating tax data, provide unsecured credit loans to well-performing businesses. This not only enhances loan approval efficiency but also reduces financing thresholds and costs, garnering widespread popularity.

Commercial banks, such as the Agricultural Bank of China, have introduced products like the "Agri-benefit e-Loan" in the agricultural sector that address farmers' seasonal funding needs and offer flexible repayment schedules and limits. These products provide strong financial support for agricultural production, agricultural product processing, and rural infrastructure development, contributing to the implementation of the rural revitalisation strategy. In addition, supply chain finance products have rapidly developed, integrating the credit resources of core enterprises within the supply chain to offer financing services to micro and small enterprises in both upstream and downstream sectors. These products alleviate the financial pressures caused by extended payment terms and ensure the stable operation of the industrial chain.

In addition, to further enhance the convenience and accessibility of financial inclusion, commercial banks have strengthened collaboration with local governments and technology enterprises. By leveraging online service platforms, they have enabled a "one-stop application and one-click approval" process for credit products, significantly reducing the time to finance. Through these innovative measures, commercial banks have played a crucial role in supporting the development of the real economy and advancing the goals of financial inclusion. These efforts have not only improved the availability and efficiency of capital but also promoted the equitable allocation of financial resources and inclusive economic growth. A detailed list of inclusive financial credit products offered by certain commercial banks is provided in Table 2.

Table 2: *Inclusive financial credit products of commercial banks*
Source: *Compiled based on information disclosed on the official website of the Bank of China*

Bank Name	**Inclusive Finance Featured Loan Products**
Industrial and Commercial Bank of China (ICBC)	ICBC “e-Mortgage Quick Loan”, ICBC “Tax Loan”

Agricultural Bank of China (ABC)	ABC “Agri-benefit e-Loan”, ABC “Data-based Online Loan”
Bank of China (BOC)	BOC “SME e-Loan”, BOC “Tech Innovation Loan”
China Construction Bank (CCB)	CCB “Cloud Tax Loan”, CCB “Government Procurement Loan”
Bank of Communications (BoCom)	BoCom “Quick Loan Access”, BoCom “Tax-Financing Loan”
China Merchants Bank (CMB)	CMB “Small Business e-Home”, CMB “Chain Link Loan”
Industrial Bank	Industrial “SME Quick Loan”, Industrial “Green Finance Loan”
China CITIC Bank	CITIC “Commercial Draft e-Loan”, CITIC “SME Tax Loan”
Bank of Shanghai	Shanghai “SME Growth Loan”, Shanghai “Cross-border Easy Loan”

An empirical analysis of the impact of inclusive finance on the profitability of commercial banks in China

Source of sample data

Based on data availability and accessibility, this study selects relevant data from 20 A-share listed commercial banks for the period 2018-2023, including five large state-owned banks: Industrial and Commercial Bank of China, Agricultural Bank of China, Bank of China, China Construction Bank, and Bank of Communications; four joint-stock commercial banks: Huaxia Bank, China Minsheng Bank, Zhejiang Commercial Bank, and CITIC Bank; and eleven city commercial banks: Bank of Beijing, Bank of Shanghai, Bank of Jiangsu, Bank of Nanjing, Bank of Hangzhou, Bank of Changsha, Bank of Xi'an, Bank of Zhengzhou, Bank of Guiyang, Xiamen Bank, and Qingdao Bank. The data for these banks primarily comes from the Wind database, and missing values are supplemented using annual reports. Finally, panel data is constructed and processed using RStudio software.

Variable selection

This study uses Return on Equity (ROE) as the dependent variable to measure the profitability of commercial banks. ROE not only reflects the bank's profitability but also indicates the effectiveness of its capital structure and leverage. For Chinese commercial banks, which rely on leverage to expand asset size under capital constraints, ROE offers greater representativeness and explanatory power. The core independent variable is the proportion of inclusive finance loans with a lag of one period (lagAIF), which is the ratio of inclusive finance loan balances to total bank loan balances. This variable reflects the degree to which a bank allocates resources to the inclusive finance sector, demonstrating its actual effectiveness in fulfilling social responsibilities and serving vulnerable groups such as micro and small enterprises and farmers. To control for other factors that may influence ROE, this study incorporates four dimensions of control variables: profitability indicators, capital adequacy ratio indicators, asset quality indicators, and operational efficiency indicators (see Table 3).

Table 3: *Interpretation of relevant variables*
Source: *Compiled based on information disclosed on the official website of the Bank of China*

Variate	Name	Symbol

Explained variable		Return on equity	ROE
Explanatory variable		The proportion of inclusive finance loans (lag)	lagAIF
Control variable	Profitability indicators	Net interest margin (lag)	lagNIM
		Net Interest Spread (lag)	lagNIS
	Capital adequacy ratio indicators	Capital adequacy ratio (lag)	lagCAR
	Asset quality indicators	Non-performing loan ratio (lag)	lagNPL
		Provision coverage ratio (lag)	lagPCR
	Operational efficiency indicators	Cost-income ratio (lag)	lagCIR
		Loan-to-deposit ratio (lag)	lagLTD
	Other indicators	Asset-liability ratio (lag)	lagTDR
		Non-interest income ratio (lag)	lagNIIR

Empirical analysis

Descriptive statistics of variables

Descriptive statistics were conducted on the balance panel data for 20 listed commercial banks in China over the six-year period from 2018 to 2023, and the results are shown in Table 4.

Table 4: *Result of descriptive statistics*[2]
Source: *Own work, RStudio*

Vars	Obs	Mean	Std. Dev.	Median	Min	Max
ROE	120	11.39	2.51	11.36	3.29	18.88
lagAIF	120	10.90	7.27	8.99	0.18	36.50
lagLTD	120	83.97	12.74	83.25	54.50	116.24
lagNPL	120	1.39	0.30	1.38	0.76	2.47
lagPCR	120	245.58	92.05	216.66	134.05	567.71
lagNIM	120	1.97	0.31	1.96	1.28	2.59
lagNIS	120	1.93	0.34	1.94	1.14	2.69
lagCAR	120	14.24	1.75	13.62	11.49	19.26
lagCIR	120	28.03	3.56	28.05	18.93	39.65
lagTDR	120	92.26	0.90	92.18	89.67	94.00
lagNIIR	120	25.57	8.08	25.47	0.68	51.09

The weighted average ROE is 11.39%, which is slightly higher than the median of 11.36%, indicating that Chinese commercial banks generally exhibit a relatively high level of profitability. The minimum ROE is 3.29%, and the maximum reaches 18.88%, suggesting a certain degree of variation in asset profitability among different banks. The proportion of inclusive finance loans (lagAIF) is 10.90%, with a minimum of 0.18% and a maximum of

[2] Abbreviations: Vars = Variables; Obs = Number of Observations; Std. Dev. = Standard Deviation; Min = Minimum Value; Max = Maximum Value

36.50%, reflecting that although China has been actively promoting inclusive finance, there are considerable differences in resource allocation among banks in this area. The lagLTD is 83.97%, indicating that most banks have a high loan-to-deposit ratio; the minimum and maximum values are 54.5% and 116.24%, respectively, indicating that some banks operate with relatively higher loan utilisation. The lagNPL, as well as its minimum and maximum values, is all below the 5% ceiling set by the "Core Indicators for Commercial Bank Risk Supervision", suggesting that Chinese commercial banks generally maintain good asset quality and operate in a stable manner. The lagPCR is 245.58, ranging from 134.05 to 567.71, indicating significant differences in the degree of conservatism across banks regarding provisions for non-performing loans. The lagNIM is 1.966, with a minimum of 1.28 and a maximum of 2.59, indicating relatively small variations among banks in this regard. The lagNIS is 1.929, with a standard error of 0.3402, suggesting that most banks maintain a relatively balanced interest income and expense structure. The lagCAR is 14.24%, ranging from 11.49% to 19.26%, showing that the sample banks generally maintain a high level of capital adequacy. The lagCIR is 28.03%, with a standard error of 3.5586%, a minimum of 18.93% and a maximum of 39.65%, indicating some differences in operational efficiency across banks. The lagTDR is 92.26%, with a standard error of 0.9033%, showing that most banks maintain stable deposit-absorbing capabilities. The lagNIIR is 25.57%, with a standard error of 8.0846%, ranging from 0.68% to 51.09%, indicating significant variation in the composition of non-interest income among the sample banks.

Correlation analysis

Pearson correlation analysis was conducted on these variables. The results indicated (see Table 5) that the correlation coefficient between the core explanatory variable "Proportion of Inclusive Finance Loans (lagAIF)" and the explained variable "Return on Equity (ROE)" was -0.15, presenting a weak negative correlation. It is initially suggested that the expansion of inclusive finance business may have a certain inhibiting effect on banks' profitability.

Table 5: *Result of correlation analysis*
Source: *Own work, RStudio*

	lagAIF	**ROE**	**lagLTD**	**lagNPL**	**lagPCR**	**lagNIM**	**lagNIS**	**lagCAR**	**lagCIR**	**lagTDR**	**lagIRR**
lagAIF	1										
ROE	-0.15	1									
lagLTD	0.17	-0.55	1								
lagNPL	-0.13	-0.60	0.29	1							
lagPCR	0.11	0.63	-0.44	-0.79	1						
lagNIM	0.02	0.11	-0.08	0.19	-0.10	1					
lagNIS	-0.05	0.11	-0.15	0.14	-0.09	0.76	1				
lagCAR	-0.16	0.02	-0.14	-0.08	-0.05	-0.07	-0.01	1			
lagCIR	0.22	-0.02	0.00	-0.04	-0.04	-0.22	-0.19	0.07	1		
lagTDR	0.32	0.46	-0.37	-0.45	0.48	-0.09	-0.12	-0.45	0.30	1	
lagIRR	-0.44	0.00	0.13	0.09	-0.10	-0.46	-0.37	-0.05	0.03	-0.01	1

Model establishment and selection

This paper constructs a multiple linear regression model with the proportion of inclusive finance loans lagging by one period as the core explanatory variable, as shown below:

$$ROE = \alpha + \beta_1 lagAIF + \beta_2 lagLTD + \beta_3 lagNPL + \beta_4 lagPCR + \beta_5 lagNIM + \beta_6 lagNIS + \beta_7 lagCAR + \beta_8 lagCIR + \beta_9 lagTDR + \beta_{10} lagIRR + \varepsilon \quad (1)$$

Where α represents the intercept term, ε is the error, and β_i is the variable coefficient.

To determine the most appropriate model for the analysis, this study conducts a Hausman test. The hypotheses are set as follows:

H0: Random effects model is appropriate

H1: Fixed effects model is appropriate

If the null hypothesis is not rejected, the random effects model is preferred; otherwise, the fixed effects model should be used.

Table 6: *Hausman test*
Source: *Own work, RStudio*

Test Summary	Chi-Sq. Statistic	Chi-Sg. d. f.	Prob.
Cross-section randoms	2.6598	10	0.9883

The test results show that the Chi-square statistic is 2.6598, the degree of freedom is 10, and the corresponding p-value is 0.9883, which is much higher than the significance level of 0.05. Therefore, the null hypothesis cannot be rejected, indicating that the random effects model is more appropriate.

Empirical results and analysis

The random effects regression model was adopted for analysis, and the conclusions are shown in Table 7.

Table 7: *Results of the random effects regression model*
Source: *Own work, RStudio*

Variables	**ROE**	**ROE**
lagAIF	-0.028 (0.034)	-0.053** (0.027)
lagLTD		-0.058** (0.024)
lagNPL		-1.064 (1.029)
lagPCR		0.009*** (0.003)
lagNIM		1.251 (1.059)
lagNIS		1.135 (0.760)
lagCAR		0.044 (0.162)
lagCIR		0.078 (0.051)
lagTDR		0.817** (0.347)
lagNIIR		0.054* (0.028)
Constant	11.384*** (0.654)	-68.564* (35.990)

*p<0.1; **p<0.05; ***p<0.01

The results indicate a negative relationship between financial inclusion and the profitability of Chinese commercial banks. The coefficient of the inclusive finance loan ratio is -0.053, which is statistically significant at the 5% level. This suggests that a 1% increase in the proportion of inclusive micro and small enterprise loans leads to a 0.053 percentage point decrease in the weighted average ROE. This finding implies that, during the sample period, banks with a higher share of inclusive lending may experience a certain degree of suppression in capital returns. This could be attributed to relatively low yields and higher operational and risk-management costs associated with inclusive loans during their initial development stage, thereby limiting their contribution to overall bank profitability. Particularly under the influence of policy mandates and social responsibility objectives, achieving short-term commercial sustainability remains challenging.

In addition, the lagLTD has a significant negative impact on ROE at the 5% level, indicating that for Chinese commercial banks, excessive loan issuance relative to deposit mobilisation may lead to declining asset quality, rising funding costs, and increased liquidity risk, thereby adversely affecting profitability. Although the coefficient of the lagNPL ratio is negative, it is not statistically significant. In contrast, the lagPCR is positively associated with ROE at the 1% significance level, with a coefficient of 0.009. This suggests that banks with higher levels of loan loss provisions tend to have stronger profitability, possibly due to enhanced risk mitigation capabilities that boost confidence among markets and investors. Moreover, both the lagTDR and the lagNIIR show significant positive relationships with ROE at the 5% and 10% levels, respectively. This implies that a moderate increase in leverage, as well as proactive development of non-interest income businesses, such as agency services, financial consulting, payment settlement, and asset management, can positively contribute to commercial bank profitability.

Although profitability indicators, such as lagNIM and lagNIS, have positive coefficients on ROE, they do not reach statistical significance, indicating that interest margins across banks had limited explanatory power for return on equity during the sample period. Similarly, variables such as the lagCAR and the lagCIR do not exhibit statistically significant effects.

Robustness test

In this paper, the weighted average Return on Total Assets (ROA) is used as the explained variable for the robustness test to ensure the accuracy and reliability of the model. The results are shown in Table 8. From the robustness analysis, it can be found that at the 10% significance level, the proportion of inclusive micro and small loans is negatively correlated with commercial bank profitability, indicating that using ROA as the explained variable does not change the correlation in the original model.

Table 8: *Robustness test*
Source: *Own work, RStudio*

Variables	ROA	ROA
lagAIF	-0.004 (0.002)	-0.004* (0.002)
lagLTD		-0.004** (0.002)
lagNPL		-0.036 (0.085)
lagPCR		0.0004

		(0.0003)
lagNIM		0.108
		(0.100)
lagNIS		0.081
		(0.066)
lagCAR		0.005
		(0.011)
lagCIR		0.004
		(0.004)
lagTDR		-0.003
		(0.021)
lagIRR		0.005**
		(0.002)
Constant	0.0839***	0.657
	(0.043)	(2.186)

*p<0.1; **p<0.05; ***p<0.01

Conclusion and recommendations

Conclusion

As an important instrument for enhancing financial inclusiveness and optimising resource allocation, inclusive finance plays a key role in improving the accessibility and equity of financial services. This paper employs panel data on 20 A-share listed commercial banks in China from 2018–2023 to empirically analyse the impact of the proportion of inclusive finance loans on banks' profitability. The results show a significant negative correlation between the share of inclusive finance loans and banks' ROE. This finding suggests that inclusive finance remains at a stage characterised by "high input, low return." In the process of providing financial services to MSEs, self-employed individuals, and rural economic entities, banks face structural challenges, including difficulties in risk identification, high operating costs, and severe information asymmetries, all of which limit profitability improvements. Nevertheless, the development of inclusive finance holds long-term strategic value for optimising customer structure and fostering inclusive economic growth.

Recommendations

To fully leverage the multifaceted functions of inclusive finance, expand its coverage and service depth, and enable it to better support the real economy and promote social equity, a systematic approach is needed across several dimensions, including policy guidance, institutional capacity, service models, coordination mechanisms, and credit infrastructure. On the one hand, the policy support system should be continuously improved by increasing fiscal support, providing tax incentives, and enhancing risk compensation and credit guarantee mechanisms, thereby effectively reducing the operational costs and risk exposure faced by financial institutions engaged in inclusive finance. Local governments should also be encouraged to formulate targeted, differentiated support policies based on regional development realities to promote balanced growth in inclusive finance across urban and rural areas and regions.

On the other hand, financial institutions must enhance their capacity for product and service innovation. Commercial banks, rural credit cooperatives, and other financial entities should be guided to develop financial tools with strong adaptability, such as unsecured loans, order financing, and supply chain finance, tailored to the diverse needs of micro and small

business owners, self-employed individuals, and farmers. Moreover, inclusive finance service models should be optimised by extending financial infrastructure to rural and remote areas, exploring mobile service platforms and specialised branches to improve service accessibility and convenience, and developing specialised products such as agricultural insurance and green finance aligned with local industrial characteristics.

In addition, it is essential to deepen government–financial institution cooperation by leveraging policy-based funds to attract and mobilise commercial capital, promoting trilateral collaboration among governments, banks, and enterprises. Demonstration models in areas such as industrial chain finance and platform-based cooperation should be developed and scaled up. Finally, strengthening financial education and the credit system is foundational. Greater efforts are needed to promote financial literacy and risk awareness among microentrepreneurs and rural residents. Meanwhile, improving the credit reporting mechanism and establishing a comprehensive, transparent, and widely accessible credit platform can help mitigate long-standing issues of information asymmetry and credit deficiency in inclusive finance, laying a solid foundation for its sustainable development.

Limitation

Although this paper reveals the relationship between financial inclusion and the profitability of Chinese commercial banks through empirical analysis, it still has some limitations. First, due to data availability and accessibility, only 20 A-share listed commercial banks are selected in this paper, which may limit the generalizability of the research findings. Second, the time span selected in this paper is 2018–2023, which includes the special period of the COVID-19 pandemic, during which abnormal fluctuations in bank profitability structure may affect the stability of the research results. The follow-up study can extend the observation period to identify the trend in long-term impact. Third, the core explanatory variable in this paper only uses the inclusive loan ratio, and further research could introduce a more comprehensive evaluation index system. In addition, although lagged variables are used to mitigate the endogeneity problem, the policy orientation (e.g., the central bank's targeted cut in RRR) may affect both the scale of inclusive lending and bank profitability, so subsequent studies will use more rigorous causal inference methods (e.g., double-difference modelling) to verify this. These limitations point to directions for future research that will expand sample coverage, develop a more comprehensive analytical framework, and improve causal identification.

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Achieving quality education: present and future

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Abstract

This paper explores disparities in access to quality education through a qualitative analysis of UNESCO's 2007 comparative study of 16 of the most populous and largest countries across Africa, Asia, and Latin America – as well as Canada, the Russian Federation, and the United States - supplemented by some frameworks from UNICEF and Sustainable Development Goal 4 (SDG 4). The qualitative methodology is based on document analysis and the interpretation of key indicators such as enrolment ratios, expenditure per pupil, and pupil-teacher ratios to evaluate horizontal equity within national education systems. The findings reveal significant regional disparities in both access and resource allocation. While countries such as Canada, Peru, and Mexico show relatively low disparities, India, Brazil, and Pakistan experience pronounced inequalities, especially in secondary education. Generally, wealthier regions demonstrate higher enrolment and better resource provision, though exceptions exist, such as higher primary enrolment in some poorer areas. In defining quality education, the paper draws on UNICEF and SDG 4 frameworks, emphasising inclusive environments, relevant curricula, and measurable outcomes. The study also considers the emerging role of artificial intelligence (AI) in improving access to education and personalisation. While AI offers promising solutions for addressing disparities, its implementation must be carefully managed to ensure equity and long-term sustainability.

Keywords: Quality Education, Educational Equity, Sustainable Development Goal 4 (SDG 4), Artificial Intelligence in Education, Educational Disparities

JEL classification: I2, I24, O33, H4, F01

UNESCO's case study on 16 countries – disparities in primary and secondary education

In the essay, I focus on the 16 countries compared in UNESCO's 2007 study. The above-mentioned countries are among the largest and most populous in the world.

The study presents three countries in Africa (Egypt, Nigeria, and South Africa), five in Asia (Bangladesh, China, India, Indonesia, and Pakistan), five in Latin America (Argentina, Brazil, Ecuador, Mexico, and Peru), and another 3 - Canada, the Russian Federation, and the United States. (UNESCO Institute for Statistics, 2007)

UNESCO's study compared countries on their key aspects of educational policy and tried to assess the relative equity of their education systems - this was all based on the differences in access to education and the provision of educational resources provided for public education.

First, the 16 countries were reviewed in relation to their relative standing on horizontal equity, based on three equity dimensions: enrolment ratios, expenditure per pupil, and pupil-teacher ratios. Those countries that ranked at the top had relatively small disparities across their regions, while those in the middle had moderate disparities.

Access to education: Enrolment ratios

Nine countries' reports were reviewed in this part; their primary and secondary education enrolment were both examined.

- Mexico had relatively small disparities (at both educational levels),
- Egypt and the Russian Federation had small disparities.

- Large regional disparities were evident in the case of India and Brazil.

Among countries that reported only their primary enrolment ratios, China had relatively small disparities, whereas in Bangladesh and Pakistan, they were relatively large. As for secondary education, disparities in enrolment ratios were relatively small in Canada and the United States.

Educational resources: Expenditure per pupil and pupil-teacher ratios

- Smaller interregional disparities in expenditure per pupil for primary and secondary education: Canada, Peru, South Africa, and the United States showed the following trends:
- In pupil-teacher ratios in primary education, disparities were smallest in Argentina, Brazil, Indonesia, Mexico, and Peru.
- Moderate range: Bangladesh, China, Ecuador, and the United States.
- Largest: Egypt, India, Nigeria, and Pakistan.
- As for the disparities at the secondary level, pupil-teacher ratios showed some similarities and some differences with primary education:
- China, Indonesia, Mexico, and Peru showed the smallest differences.
- Brazil, Ecuador, Egypt, and the United States were in the moderate range,
- While in Argentina, India, and Pakistan, they were the largest.

Relationship between regional wealth and regional enrolment ratios

Access to education - Enrolment ratios:

Taking this equity dimension into account, Egypt, Mexico, and Peru performed the worst. Between regional wealth and enrolment ratios in both primary and secondary education, there were moderate-to-strong positive relationships.

In Argentina, Brazil, Canada, India, Indonesia, South Africa, and the United States, wealthier regions had higher secondary education enrolment ratios.

It was noticeable that, in the poorer regions of four countries (Argentina, Brazil, India, and South Africa), enrolment ratios were higher in primary education, with India the only country with a strong relationship.

Educational resources - Expenditure per pupil and pupil-teacher ratios

It was evident that wealthy regions were able to provide greater expenditure per pupil for primary and secondary education in 10 countries (at least, where data were available). The countries where the relationships were strong were Argentina, Brazil, Canada, China, South Africa and the United States, while in Egypt, Mexico, Peru, and the Russian Federation, they were moderate.

In Argentina, Brazil, Canada, China, Egypt, India and Peru, lower pupil-teacher ratios in wealthier regions were associated with higher levels of expenditure. Wealthier regions had lower pupil-teacher ratios in primary education in Argentina, Brazil, China, Egypt, India and Peru. The same was true for secondary education in six countries (including Mexico).

To summarise this chapter, UNESCO's 2007 study clearly showed both similarities and differences among the 16 examined countries. What made this study special was that these countries were located on three different continents; therefore, circumstances and other vital factors could show major discrepancies.

In my opinion, the level of education shall improve in every country, not just in the 16 examined. One way to achieve this is through the effective use of artificial intelligence.

Quality education

Definition

It is challenging to provide an exact definition of quality education as there are many different views on this topic. In this section, however, I will attempt to summarise the essence of the concept.

UNICEF's definition at the meeting of the International Working Group on Education (Florence, Italy, June 2000)

The paper published in connection with the aforementioned meeting does not define quality education; rather, it focuses on key areas that can be included in this concept. These areas are the following:

a) Learners who are healthy, well-nourished, ready to participate and learn, and supported in their learning by their families and communities; (UNICEF, 2000)
b) Environments that are healthy, safe, protective, gender-sensitive, and that provide adequate resources and facilities;
c) Content that is reflected in relevant curricula and materials for the acquisition of basic skills, especially in literacy, numeracy and life skills, as well as knowledge in areas such as gender, health, nutrition, HIV/AIDS (prevention and peace). HIV is a pathogen that attacks the human immune system, causing immunodeficiency, and can also directly attack certain human cells (nerve cells, bone marrow, skin, and certain intestinal cells) (HIVInfo, s.a.). It is one of the retroviruses, which are characterised by their ability to insert their entire genetic information (genome) into the host cell genome. (In other words, they penetrate the cell, insert their own genes into its DNA, and use it to produce new viruses that infect other cells.)
d) Processes through which trained teachers use child-centred teaching approaches in well-managed classrooms and schools, and skilful assessment to facilitate learning and reduce disparities;
e) Outcomes that encompass knowledge, skills and attitudes, and are linked to national goals for education and positive participation in society.

Of course, in addition to the above, it should be noted that many authors have different perspectives on the topic. What can also be stated, however, is that there is considerable consensus concerning the basic dimensions of quality education today.

SDG 4 definition of quality education

The 4th Sustainable Development Goal gives the following definition of quality education: *"SDG4 can be seen as a commitment to 'ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.'"* It can also be counted as a pivotal driver for positive change: something that emphasises the transformative power of education in fostering a sustainable and equitable world.

A general overview of how effectively quality education is implemented in practice

About a decade ago, UNESCO published a comprehensive report that provided insight into how countries were accelerating progress towards the global Sustainable Development Goal on education (SDG 4). The report highlights examples of countries' actions to transform their education systems (UNESCO, 2015).

In this section, I will outline seven ways in which education systems can be improved based on the findings of the Transforming Education towards SDG 4: *'Report of a global survey*

on country actions to transform education', published ahead of the 2024 Global Education Meeting. (UNESCO, 2024)

a) Exploring multiple paths to transforming education:

The necessity of a multifaceted, context-specific approach to transforming education is emphasised. It is important to note that different countries are at different stages of their educational transformation journeys and are adopting various approaches to address their specific needs.

b) Securing consistent funding for education:

Financing must be prioritised and sustained, and innovative measures must be adopted to accelerate transformation. Without sufficient funding, the quality of education can deteriorate, adversely affecting the future of countless learners.

How can countries improve this action?

They can do so by increasing investment in education from all sources, including international aid and innovative financing, to meet their SDG 4 targets while ensuring the efficient and effective use of resources.

To achieve effective education financing, the following methods are required:

- cutting inefficiencies
- enhancing governance
- linking investments to education outcomes, while focusing on maximising impact and accountability.

c) Prioritising inclusion, equity, and gender equality in education

These factors are essential for achieving quality education and can serve as guiding principles for countries seeking to transform their education systems.

d) Embracing digital transformation to drive educational change

Digital transformation is essential to transforming education: countries are focusing on enhancing connectivity, digital resources, and educator training.

e) Investing in teachers to transform education

This factor includes the following:

- enhancing professional development,
- equipping teachers with new pedagogical skills, digital tools, and updated curricula.

f) Adopting a holistic, lifelong approach to transforming education and supporting individual and societal well-being

Transforming education requires a comprehensive and integrated approach: one which reimagines curricula, teaching methods, and lifelong learning opportunities.

g) Engaging stakeholders, especially the youth and students, to transform education meaningfully

An increasing number of countries are recognising the importance of incorporating youth engagement into their governance frameworks, thereby ensuring that the voices of those directly affected by educational transformation are included in policies and decision-making processes.

In conclusion, transforming education is essential. In this regard, innovations, digital and technological developments, such as artificial intelligence, can play a crucial role. Additionally, eliminating inefficiencies and prioritising inclusion, equity and gender equality in education are essential to improving its quality.

Targets and indicators of SDG4

This chapter covers all the targets of SDG4, along with some indicators I found most relevant. Target 4.1. Determines that by 2030, all girls and boys should have access to free, fair, and high-quality primary and secondary education that leads to relevant and effective learning outcomes (United Nations, 2015).

Indicator 4.1.1: Indicator 4.1.1 states that children and young people in Grades 2/3, at the end of primary education, and at the end of lower secondary education should achieve at least a minimum proficiency level in reading and mathematics, with results reported by sex.

Indicator 4.1.2 focuses on the completion rate of primary, lower, and upper secondary education.

Target 4.2 aims to ensure that by 2030, all girls and boys have access to quality early childhood development, care, and pre-primary education, so they are prepared for primary education.

Indicator 4.2.1: contains provisions on the proportion of children aged 24–59 months who are developmentally on track in terms of health, learning and psychosocial well-being, broken down by sex.

Indicator 4.2.2: emphasises the participation rate in organised learning (one year before the official primary school entry age), broken down by sex.

Target 4.3: aims to ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university, by 2030.

Indicator 4.3.1 examines the participation rates of young people and adults in formal and non-formal education and training over the previous 12 months, broken down by sex.

Target 4.4: Within five years, there should be a substantial increase in the number of young people and adults with the relevant skills for employment, decent jobs and entrepreneurship, including technical and vocational skills.

Meanwhile, indicator 4.4.1. is concerned with the proportion of young people and adults who have information and communications technology (ICT) skills, categorised by skill type.

Target 4.5.: By 2030, gender disparities in education are to be eliminated, with equal access ensured at all levels of education and vocational training for vulnerable groups, including persons with disabilities, indigenous peoples and children in vulnerable situations.

Indicator 4.5.1: focuses on parity indices, differentiating between female and male, and between the bottom and top wealth quintiles, as well as mentioning other factors such as disability status, indigenous peoples, and conflict-affected populations, for all education indicators.

Target 4.6.: states that all young people, as well as a substantial proportion of adults, both men and women, shall achieve literacy and numeracy.

Indicator 4.6.1: ensures that a given proportion of the population in each age group achieves a minimum level of proficiency in functional literacy and numeracy.

Target 4.7: makes sure that, within five years, all learners have the knowledge and skills needed to promote sustainable development. This will be done through education for sustainable development and sustainable lifestyles, human rights, gender equality, the promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and culture's contribution to sustainable development.

Indicator, 4.7.1. focuses on the extent to which global citizenship education and education for sustainable development are incorporated into national educational policies, curricula, teacher training and, finally, student assessment.

Target 4.a. states that building and upgrading child-, disability- and gender-sensitive education facilities is essential, as is providing safe, non-violent, inclusive and effective learning environments for all.

Indicator 4.a. focuses on the proportion of schools offering basic services.

Target 4.b: ensures that in five years the number of scholarships available shall be substantially expanded globally to developing countries - in particular in least developed countries, small islands, developing states, and African countries, for enrolment in higher education, including vocational training and information and communications technology,

technical, engineering and scientific programmes, in developed countries and other developing countries.

Target 4.c: states that by 2030 the supply of qualified teachers will have increased substantially, particularly in developing countries, least developed countries and small island developing states, through international cooperation for teacher training.
Finally, its indicator 4.c.1 concerns the proportion of teachers who have the minimum required qualifications for their level of education.

The emerging role of AI in quality education

Artificial intelligence (AI) began to emerge several decades ago (Seifedine K., ed., 2024). The term "artificial intelligence" was coined by John McCarthy, often regarded as one of the founding figures of the field (Iberdrola, n.d.). McCarthy also played a key role in developing LISP (LISt Processing), one of the earliest programming languages specifically designed for artificial intelligence research. Created in the late 1950s at the Massachusetts Institute of Technology under McCarthy's leadership, LISP was intended to facilitate operations involving symbolic expressions. Its development was motivated in part by the need to address problems in computer algebra, such as the formal differentiation of mathematical expressions, as well as by efforts to create programs capable of logical reasoning, such as the "Advice Taker" system (Szépkúti, 1991). Despite its early origins, LISP continues to play an important role in certain areas of AI research today.
Artificial intelligence (AI) has advanced significantly over recent years and decades and is now widely used across various fields, including education, which is often considered one of its most important areas of application. AI is frequently described as the design and development of intelligent agents that perceive their environment through sensory data and act in ways that influence that environment. It can also be understood as a field within computer science, as it relies on algorithms and machine learning techniques to replicate or simulate aspects of human intelligence. In the following section, I consider several key aspects of the three main types of artificial intelligence. These are the following:

- Narrow AI: It is the most common and realised form. Some of its additional features include being goal-oriented and employing machine learning to realise a task.
- General AI (also known as "Deep AI"): It is deemed on par with human capabilities, which can discern the needs or emotions of other intelligent beings.
- Artificial superintelligence

The connection between quality education and AI

In addition to what is covered in the second part, quality education can be described as a holistic educational approach that provides learners with academic knowledge, critical thinking, problem-solving skills, creativity, and—last but not least—a sense of social responsibility.

Quality education should also have the following features:

- Inclusivity, equity, and accessibility for all learners
- Promotion of lifelong learning
- Preparation of recipients for active participation in society
- Serving as the foundation for individual growth and global societal development
- Contributing to societal progress by promoting social integration, reducing inequality, and fostering the development of an informed and engaged citizenry.

It should also be noted that nations where citizens receive quality education are better prepared and equipped to address the challenges of poverty, health and environment. These

nations more often than not develop better innovations and adapt more easily and favourably to the demands of a rapidly evolving economy. Quality education is a major driving force for achieving sustainable development and progress in societies, while simultaneously shaping and empowering individuals.

Regarding the relationship between artificial intelligence (AI) and quality education, it should be noted that AI can be used to support personalised learning, instructional systems, educational analytics, etc. Furthermore, artificial intelligence-powered learning management can be seen as a major development in achieving quality education. This is supported by the fact that learning analytics can significantly enhance understanding of learning processes within the field of learning sciences, both theoretically and in practical applications. Continuing this line of thought, through data analysis, AI can optimise content delivery in the following ways:

- personalising learning paths,
- accessing learners' performance, and
- improving engagement with adaptive learning techniques. (University of New York in Prague, 2024.)

Another advantage of AI is that it easily adapts to the needs of learners, provides content and feedback, and effectively actualises learning outcomes. Furthermore, teachers can use it to create more effective lesson plans and assessments. Artificial intelligence can also assist them in guiding learners to achieve the best possible outcomes.

As for helping students, AI has the potential to become a companion and/or an assistant. The main reason for this is that artificial intelligence is able to assess students' strengths and weaknesses. It can also analyse the learner's pace and identify their latent skills as well, which is important because it could bring out the best in the students.

From the perspective of this study, it may be useful to examine some AI-powered Learning Management Systems (LMS), defined as software applications used to plan, deliver, and monitor training and educational programmes. (SAP., s.a.)

- Zavvy: an AI-powered LMS that is known for its features that can be used to create engaging training courses in a very short duration. It's also effective for assisting in launching workshops, creating (on-demand) courses, and it is also an advantage that it is faster than traditional learning platforms, e.g. classic classrooms.
- Paradiso: an AI-powered authoring tool that is useful for creating e-learning courses, helping users generate content, images, presentations, and videos, which can later be transformed into training materials.
- Docebo: Provides efficient and customised learning programs which contain special features for creating audience-specific pages by using drag-and-drop functionality. It supports auto-tagging, content suggestions, and customised learning experiences through virtual coaching, thereby enhancing personalised learning.

Additionally, AI-powered intelligent classroom assistants - such as Squirrel AI, Edmodo, or Brainy - can also enhance the quality of education. AI can also enhance personalised and individualised learning by adapting to individual learners' requirements, while also improving the grading systems used in the educational sector. It also promotes global access to quality education for users all over the world through global classrooms. Last but not least, it is useful because it can adjust learning paths, predict learners' needs, and is also accessible and inclusive.

By using artificial intelligence, countries can achieve quality education more easily. In developed countries, AI is used more often; however, given the targets and indicators of SDG4, quality education could be achieved more easily globally. It would require technological development worldwide, starting in developing countries.

The field of education is constantly evolving. Currently, the Council of Europe is organising a 3rd working conference on the topic of ensuring Quality Education in the AI Era.

(Council of Europe, 2025.) Their main goal is to “develop each pupil’s and student’s personality, talents, and mental and physical abilities to their fullest potential”, “recognise everyone’s learning and social needs”, “enable pupils and students to develop the necessary skills, self-confidence, and critical thinking to become responsible citizens”, and “rely on qualified teachers”.

Therefore, they are proposing a new strategic tool to operationalise the values of AI: the Compass for AI and Education. It is structured around five key components. These are the following: Evaluation, Governance, Literacy, Practice and Regulation. The Compass will be significant for providing member states and stakeholders with standards and guidance to ensure that AI contributes to democratic participation, human dignity, the integrity of educational institutions, and quality education. As educators, civil society and the private sector, together with students and governments, are invited to the conference, the Council of Europe is reaffirming its commitment to shaping a future in which AI contributes to quality education.

Conclusion

The above targets and their indicators broadly define sub-goals that must be achieved under SDG4. They address areas such as scholarships, the development and upgrading of educational facilities, global citizenship education, and education for sustainable development, among others. It should also be noted that these targets and indicators often place special emphasis on developing countries—particularly least developed countries, African nations, and small island states. This focus reflects several challenges faced by these regions, including limited access to educational infrastructure, shortages of schools and qualified teachers, and the marginalisation of certain population groups, all of which can contribute to higher proportions of children and adults who are uneducated or undereducated.

Furthermore, recent studies suggest and confirm that AI-based personalised learning tools can improve student engagement and learning outcomes. In addition to the aforementioned, virtual tutors and assistants should also be mentioned, as they are becoming a valuable resource for students.

Not surprisingly, higher education shall also not be left out of technological improvement. So-called „smart campuses” are emerging where AI helps streamline everything from administrative tasks to student services. AI chatbots, like those used by universities in the United States of America and the United Kingdom, assist students with registration, scheduling, and accessing resources such as libraries and counsellingservices.

Last, but not least, AI is being used in research labs to assist students and faculty with data analysis, predictive modelling, and even grading – all of which help reduce professors' workload and enable more focus on creative and critical thinking. Consequently, artificial intelligence may help improve the quality of education, but it is important to handle this topic cautiously, as AI still needs to be developed in several fields.

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The Impact of ESG practices in China's manufacturing SMEs on regional economic coordination

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Abstract

In recent years, the integration of Environmental, Social, and Governance practices has become pivotal for enterprises aiming to enhance competitiveness and contribute to sustainable regional economic development. Manufacturing Small and Medium-sized Enterprises (SMEs) in China, as significant contributors to the national economy, play a crucial role in this transformation. This study investigates the current state of Environmental, Social, and Governance implementation among China's manufacturing SMEs and examines its impact on regional economic coordination. An Environmental, Social, and Governance evaluation index system tailored for SMEs is constructed, encompassing environmental performance, social responsibility, and corporate governance. Utilising multiple linear regression analysis and mediation effect models, the research empirically assesses the influence of Environmental, Social, and Governance practices on regional economic indicators such as Gross Domestic Product growth, employment rates, and income distribution. Findings indicate that robust Environmental, Social, and Governance practices significantly enhance enterprise performance, thereby fostering balanced regional economic development. Moreover, enterprise performance partially mediates the relationship between ESG practices and regional economic outcomes. Based on these insights, the study proposes policy recommendations to strengthen Environmental, Social, and Governance capabilities among SMEs, improve information disclosure mechanisms, and optimise policy support systems, thereby promoting sustainable development within the manufacturing sector and achieving coordinated regional economic growth.

Keywords: ESG practices; manufacturing SMEs; regional economic coordination; sustainable development; empirical analysis

JEL Classification: L60, R11

Introduction

Research background

Against the backdrop of global efforts to address climate change, environmental degradation, and social inequality, Environmental, Social, and Governance (ESG) has become a key tool for companies to advance the sustainable development agenda, build market trust, and maintain long-term competitive advantage. Especially since the United Nations 2030 Agenda for Sustainable Development and the Paris Agreement came into force, ESG is no longer a "moral label" attached to companies but has gradually evolved into a standard framework for measuring corporate sustainability and systemic resilience. (Friede, Busch, & Bassen, 2015)
In the Chinese setting, the scope and intensity of policy support for ESG practices continue to grow. In 2022, the China Securities Regulatory Commission released the "Guidance on

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Strengthening ESG Information Disclosure by Listed Companies," urging companies to actively disclose information on environmental and social responsibilities. Financial institutions have progressively integrated ESG metrics into investment ratings, credit evaluations, and risk management frameworks. Small and medium-sized firms that exhibit a favourable stance on ESG may enhance their prospects of securing green finance, preferential collaboration rights with supply chain partners, and policy benefits. (Tsang et al., 2023)

In contrast to large publicly traded corporations, manufacturing SMEs inherently face challenges in institutionalising ESG practices: firstly, the absence of standardized and systematic mechanisms for ESG data collection; secondly, constrained capacity to invest in capital, human resources, and expertise; and thirdly, insufficient information disclosure and external accountability mechanisms, hindering their ability to attain recognition from the capital market for their ESG initiatives. (Shalhoob & Hussainey, 2022) Numerous studies have indicated that SMEs may play a distinctive role in sustainable transformation through "small and flexible" management strategies and an enhanced capacity to incorporate localised resources into the execution of ESG initiatives. (Y. Liu et al., 2021)

More importantly, the widespread distribution of SMEs in China's manufacturing industry is highly coupled with regional development strategies. According to data from the National Bureau of Statistics, the proportion of SMEs in the central and western regions and in third-tier and lower cities is significantly higher than that of large enterprises, and their development quality directly affects the regional employment structure, tax capacity, and ecological load. With “regional coordinated development” written into the “14th Five-Year Plan” and the “National New Urbanisation Strategy”, the problem of regional imbalance is considered a core obstacle to China's overall modernisation process. (Petushkova, 2022) Therefore, analysing how ESG enhances SME performance and promotes coordinated regional development contributes both to sustainable corporate governance theory and the achievement of national strategic objectives.

Theoretical contributions

This study builds on the existing literature with the following theoretical extensions and academic innovations:

- Initially, traditional ESG research predominantly emphasizes micro-level aspects, including internal governance efficiency, financial performance, and investor reactions. (Zhao et al., 2023; Wan et al., 2024) The macroeconomic effects of business conduct on regional economic or social frameworks are seldom discussed. To our knowledge, this study is among the first to integrate the “enterprise-region” system into a cohesive analytical framework, establishing the transmission pathway of “ESG practices → enterprise performance → coordinated regional development”, thereby addressing the inquiry of how corporate sustainable governance behaviours influence regional economic or social structures, and the role of corporate sustainable governance practices in the adjustment mechanism of regional economic imbalances.
- This study improves the analytical approach by combining detailed information from individual firms with broader regional statistics and creating a model to explain how ESG affects firm performance and its impact on regional development. This study approach goes beyond the closed-system method that examines firms in isolation, providing a repeatable, logical model for further exploring how policies work and how external factors affect businesses.
- The choice to focus on the issue of “SMEs” holds significant theoretical importance. Current ESG studies frequently omit SMEs due to insufficient data. (Sun & Saat, 2023) This study aims to address the information gap and behavioural measurement bias by

constructing an ESG index system that aligns with SME characteristics and conducting a preliminary exploration to promote the applicability of ESG theory in the SME sector.

Policy and practical value

The empirical findings of this study have the following three important policy and practical applications:

- **Government policy dimension:** According to the research findings, national and local governments should establish ESG incentive mechanisms tailored to the characteristics of industries and the stages of regional development. The scheme could include initiatives such as "special subsidies for ESG capability enhancement" and "green credit interest subsidy programs" to facilitate the green transformation of enterprises. (Huang et al., 2012) At the same time, it is important to encourage local finance to work together with green financial systems, improve the ESG grading assessment framework and guide businesses to set ESG goals that match their growth stages.
- **Enterprise practice dimension:** The research findings indicate that the factor of good governance (G) is very useful in enhancing performance. Enterprises must prioritise enhancing information disclosure systems, transparency of equity structures, and internal supervisory capacities during the initial development of ESG. (Akhtar et al., 2025) Simultaneously, digital technologies, such as blockchain traceability and automated disclosure platforms, can enhance the accessibility and reliability of ESG information, thereby augmenting competitiveness in supply chain collaboration and market entry.
- **Financial institution dimension:** To address the problem of "difficult and expensive financing" for small and medium-sized businesses, a credit rating system could be developed focusing on ESG and offering financial benefits such as lower loan interest rates and support for green bonds to companies that show strong ESG performance. At the same time, banks, securities institutions, and local regulatory authorities should be urged to collaboratively establish an ESG database to improve the industry's overall data transparency and policy responsiveness. (X. Sun et al., 2023)

The results of the study provide a practical way to apply the United Nations 2030 Sustainable Development Goals (SDG) in China, especially SDG 8: Promote inclusive and sustainable economic growth, and SDG 9: Build resilient infrastructure and promote sustainable industrialisation, creating a strong connection between individual company actions and larger development goals.

Literature review and theoretical basis

ESG in manufacturing

Given that sustainability is emerging as a fundamental strategic concern for corporations, ESG practices are widely implemented in the manufacturing sector, particularly in resource-intensive industries, to address the dual challenges of social responsibility, carbon regulation, and governance transparency. Manufacturing businesses prioritise critical aspects such as energy efficiency, pollution management, and employee safety in developing ESG practices. (Zhong et al., 2022) The study shows that Chinese manufacturing companies are moving from simply following ESG rules to using these strategies to create value, especially as green manufacturing, circular production, and sustainable supply chains become key ways to gain a competitive edge in achieving carbon neutrality goals.

In addition, the study also found a strong link between ESG and corporate financial performance. (Sun & Saat, 2023) Panel data analyses show that manufacturing companies with strong governance and good environmental practices are more likely to receive loans, attract

investors, and maintain stable share prices in the capital market. However, some studies show that manufacturing companies still face high material costs, slow returns on investment, and unclear ways to measure performance when adopting ESG, leading to significant confusion in planning strategies and deciding how to use their resources.

Progress of ESG practices in SMEs

SMEs are a significant segment of China's manufacturing sector, representing over 90% of all enterprises and playing a crucial role in local employment, industrial support, and regional economic stability. Unlike large firms, SMEs often face greater challenges in creating and implementing ESG strategies, including insufficient compliance staff, poor data-sharing systems, and limited understanding of external regulations. Nevertheless, certain studies highlight that SMEs possess an inherent advantage regarding organisational flexibility and regional integration, enabling them to react more swiftly to local social and governmental demands. (D. Chen & Wang, 2024) In a study of 80 manufacturing SMEs, some enterprises were found to have indirectly realised the initial benefits of ESG by participating in local government-led green rating systems, signing social responsibility commitments, and introducing digital supply chain systems, among other measures. At the same time, L. Liu et al. (2022) find that SMEs that excel in governance dimensions, such as those with employee representation mechanisms and basic disclosure systems, tend to be better able to cope with crises, stabilise profit volatility, and maintain customer stickiness.

Nevertheless, the majority of current research emphasises case studies or cross-sectional descriptive analyses and is deficient in empirical examinations utilising large samples. Particularly at the regional level, firms' micro-behaviours enhance the local ecological and social environment, yet this remains an ambiguous domain in both theory and practice.

The relationship between ESG and the coordinated development of the regional economy

Regional coordinated development, a crucial component of China's national plan, aims to achieve balanced development across the economic, social, and ecological dimensions in the eastern, central, and western regions by optimising resource allocation and providing differentiated support. (Tsang et al., 2023) point out that the collective leap in ESG performance of regional firms helps improve the local region's image, investment attractiveness, and talent concentration, which in turn drives local governments to improve infrastructure and policy synergies, creating a virtuous cycle.

In addition, (Yang & Hei, 2024) found, through spatial econometric model analysis, that there is a significant positive correlation between the ESG level of manufacturing and regional per capita income, infrastructure completeness, air quality, and other indicators. Especially in the central and western regions, some manufacturing companies have obtained green subsidies from the central government and green credit support from financial institutions by improving their ESG ratings, thereby driving upstream and downstream companies to join the sustainable supply chain and achieve ecological transformation at the industrial cluster level.

Nevertheless, few studies have explored the role of corporate performance as a mediating mechanism in the ESG-Regional Harmonisation pathway, especially the lack of empirical research on how micro-firms' behaviour translates into regional macro-advantages through improved performance, which constitutes the entry point for this study (Garrido-Ruso et al., 2024).

Theoretical basis

To effectively explain how SMEs' ESG practices affect regional coordinated development through performance, this study constructs the following theoretical support framework:

1. **Stakeholder Theory:** It is suggested that firms should address various stakeholder demands, including those from employees, the supply chain, the community, and governments, alongside the goal of profit maximisation. For SMEs, ESG behaviours serve as both a reaction to external pressures and a strategic mechanism for fostering trust and obtaining resources. When a company successfully aligns with its stakeholders' expectations, both its financial and social capital performance are likely to improve concurrently. (Freeman & Phillips, 2002)
2. **Institutional Theory:** According to the institutional isomorphism view of Kim et al. (2024), firms are more inclined to imitate industry leaders or conform to institutional norms in the face of uncertainty. This study argues that differences in institutional environments across regions affect SMEs' ESG strategy choices and implementation paths, leading to differential impacts on their performance and regional contributions.
3. **Sustainable Development Theory:** This theory emphasises the coordinated promotion of economic growth, social equity, and ecological protection (Jiang et al., 2023). In the practice of manufacturing SMEs, ESG is the key instrument to realise this three-dimensional balance. Only by balancing environmental protection and social responsibility can enterprises form a long-term, stable development path and extend the results into the regional system.

Research questions and hypotheses

Based on the above literature review and theoretical support, this study focuses on the following research questions:

- **Research question 1:** Can ESG practices of manufacturing SMEs significantly improve their financial and operational performance?
- **Research question 2:** Does corporate performance play a mediating role between ESG practices and coordinated regional economic development?
- **Research question 3:** Does regional heterogeneity affect the strength of ESG's impact on corporate performance and regional contribution?

Accordingly, the following research hypotheses were formulated:

- **H1:** ESG three-dimensional indicators (environment, society, governance) all have a positive impact on the performance of manufacturing SMEs.
- **H2:** Corporate performance has a significant mediating effect between ESG practices and coordinated regional economic development.
- **H3:** The regional institutional environment has a moderating effect on the ESG performance path, and there is significant heterogeneity in the intensity of the impact in different regions.

Research methods and data analysis

Research design and overall framework

This study employed quantitative empirical analysis to examine how SMEs' support for ESG practices in manufacturing affects both company success and regional growth. The design is closely linked to three goals: to assess whether ESG practices improve company performance, to examine whether better company performance supports regional development, and to determine whether ESG affects regional development through its impact on company performance.

The design of this study unfolds in a multi-layered nested logic that consists of the following four levels:

1. **Theoretical support level:** Based on stakeholder theory, institutional theory, and sustainable development theory, it explains the motivation and path of enterprises to implement ESG strategy under multiple external pressures.
2. **Variable dimension level:** The three dimensions of enterprise ESG are selected as core explanatory variables, enterprise financial performance (Return on Assets (ROA), Return on Equity (ROE), revenue growth) is used as the mediating variable, and the regional coordinated development index is used as the final response variable.
3. **Empirical model level:** A multivariate linear regression model is constructed to analyse the direct effect of ESG on enterprise performance, and the bootstrap method is further used to test the mediating effect.
4. **Indicator system level:** Enterprise-level ESG scores are introduced from the mainstream database; regional development indicators are independently constructed by this study and weighted using the entropy method, covering the three dimensions of economy, society, and ecology.

This study aims to examine how the sustainable development strategy (ESG) at the enterprise level translates into micro-performance advantages while fostering the synergistic development of regional economic, social, and ecological components through the agglomeration effect of enterprise clusters at the regional level. (Koteikina, 2024) Its primary advantage lies in its consideration of both theoretical frameworks and policy implementation, since it adheres to the "enterprise-region" paradigm while also reinforcing the examination of causal mechanisms. The three-stage pathway of "ESG → enterprise performance → regional coordinated development" clarifies how corporate responsibility practices impact broader developmental objectives, providing empirical validation and a decision-making reference for the efficacy of ESG policy instruments (S. Wang & Esperança, 2023).

Data source and sample description

Data source

Enterprise-level data:

- ESG ratings:Morgan Stanley Capital International (MSCI) China ESG Ratings, SynTao Green Database, The China Stock Market & Accounting Research (CSMAR) Enterprise ESG Disclosure Index, National Bureau of Statistics of China and company annual reports;
- Enterprise financial performance: CSMAR database, Wind enterprise database;
- Control variables (enterprise size, industry, region, debt-to-asset ratio, etc.): enterprise annual report, industrial and commercial information database.

Regional-level data:

- Regional economic coordinated development indicators: National Bureau of Statistics (provincial GDP, per capita income, urban-rural income ratio, infrastructure investment, green energy investment, etc.);
- Regional classification: based on the National Development and Reform Commission's classification standards for the central, eastern, and western regions.

Sample range

Time span: 2018–2022;

- Enterprise type: small and medium-sized manufacturing enterprises, limited to employees not exceeding 1,000 and total assets not exceeding 500 million yuan;

- Regional scope: enterprises from 6 provinces in the east, central and western regions are selected as samples to construct balanced panel data;
- Effective sample: complete data of about 500 enterprises.

Regional coordinated development index and entropy method weighted construction

This study establishes an indicator system that encompasses economic, social, and ecological dimensions to assess coordinated development levels across regions scientifically. The entropy-weight method is employed to determine the weights and consolidate the scores. This method is widely employed in sustainable development and regional assessment studies because it objectively allocates weights based on variable dispersion, thereby mitigating the influence of subjective factors on outcomes. (Y. Liu et al., 2021; Zhao et al., 2023)

Table 1: *The indicator system*
Source: *Own work*

Dimension	Index	Type	Data source
Economy	GDP per capita, urban-rural income ratio	Forward/ Reverse	National statistical office, provincial statistical yearbooks
Social	Investment in basic education as a share of GDP, public service coverage	Forward	Education yearbook, local statistical yearbook
Ecology	Carbon emissions per unit of GDP, green space coverage, sewage treatment rate	Forward/ Reverse	Ecological Environment Yearbook, China Carbon Emissions Database

The steps for calculating the entropy method are as follows:

1. **Standardised treatment:** The raw data were standardised for polarity, and the forward and reverse indicators were treated separately.
2. **Calculating entropy e_j**:

$$e_j = -k \sum_{i=1}^{n} p_{ij} \ln(p_{ij}), \quad p_{ij} = \frac{x_{ij}}{\sum_{i=1}^{n} x_{ij}}, \quad k = \frac{1}{\ln(n)}$$

p_{ij} indicates the share of region i in indicator j.

3. **Redundancy calculation and weight generation**:

$$d_j = 1 - e_j, \quad w_j = \frac{d_j}{\sum_j d_j}$$

4. **Composite score construction**:

$$CoordinationIndex_i = \sum_j w_j \cdot x'_{ij}$$

x'_{ij} is the standardised indicator value.

Model setting and analysis method

Descriptive statistics and variable correlation tests

First of all, the ESG indicators, enterprise performance indicators, and regional development indicators were subjected to statistical calculations, including mean, median, standard deviation, skewness, etc., and the Pearson correlation coefficient was used to conduct an initial test of correlations between variables.

Multiple linear regression model

To validate H1, the following basic model is used:

$$\text{Performance}_{it} = \beta_0 + \beta_1 ESG_{E,it} + \beta_2 ESG_{S,it} + \beta_3 ESG_{G,it} + \beta_4 Controls_{it} + \epsilon_{it}$$

- Performance $_{it}$: Corporate performance (ROA, revenue growth, etc.)
- ESG_E, ESG_S, ESG_G: Three-dimensional ESG metrics
- Controls $_{it}$: Control variables (firm size, industry, region, etc.)

Mediating effects model (bootstrap method)

To test H2, a combination of Baron & Kenny path analysis and the bootstrap method was used for modelling:

- Step 1: ESG → Corporate performance (mediating variable)
- Step 2: Corporate performance → Regional coordinated development index (dependent variable)
- Step 3: ESG → Regional coordinated development, whether it is fully/partially mediated is determined by the significance of the regression coefficient.

Bootstrap repeats the sample 1000 times and reports the confidence intervals:

$$\text{RegionCoord}_{jt} = \alpha_0 + \alpha_1 ESG_{it} + \alpha_2 Performance_{it} + \alpha_3 Controls_{jt} + \epsilon_{jt}$$

Research results and discussion

Descriptive statistical analysis

After collecting and analysing data from Chinese manufacturing SMEs from 2018 to 2022, a valid sample of 580 companies was selected, including 200 from the eastern region, 185 from the central region, and 195 from the western region, along with various subsectors such as machinery, electronics, new materials, and automotive components. Descriptive statistical analyses of ESG dimensions, firm performance, and regional coordinated development indices are conducted to clarify their basic distribution patterns and differences between regions. We perform descriptive statistical analyses of ESG dimensions, firm performance, and regional coordinated development indices to elucidate their fundamental distribution characteristics and inter-regional heterogeneity.

Table 3: *Descriptive statistical analysis*

Index	Average	Str.	Max	Min	Eastern average	Central average	Western average
ESG Credits	45.31	13.28	79.65	15.21	52.64	43.87	39.26
ESG_E	12.53	5.14	23.71	3.45	14.56	11.73	9.86
ESG_S	18.92	4.89	29.76	6.20	20.67	18.24	16.78
ESG_G	13.86	3.45	22.18	4.01	15.21	13.34	12.01
ROA （%）	5.28	2.14	12.34	-1.76	6.19	4.96	4.25

Index	Average	Str.	Max	Min	Eastern average	Central average	Western average
ROE（%）	9.35	3.98	22.61	-3.29	11.31	8.62	7.49
Regional coordination index	0.472	0.084	0.643	0.297	0.532	0.468	0.417

Data were collected from SYNTAO Green Finance, MSCI ESG Ratings, CSMAR Database, National Bureau of Statistics of China, and company annual reports (Friede, Busch, & Bassen, 2015; Bai et al., 2024).

The findings indicate that ESG scores differ markedly among areas. Enterprises in the eastern region surpass those in the central and western regions regarding E/S/G metrics, and their total corporate performance (ROA, ROE) is also superior. The regional coordinated development index indicates a tendency toward elevated values in the east and diminished values in the west, illustrating a positive association between economic performance and sustainable governance skills.

Results of the entropy calculation of the regional coordinated development index

Table 4: *Weights of each indicator calculated by the entropy method*

Index	Weight	Index	Weight
GDP per capita	0.133	Coverage of educational resources	0.095
Advanced industrial structure	0.097	Energy intensity	0.093
labour productivity	0.112	Carbon intensity	0.084
Ratio of income between urban and rural areas	0.086	Sewage treatment rate	0.179
Public service expenditures as a percentage	0.121		

Note: Data were collected from SYNTAO Green Finance, MSCI ESG Ratings, CSMAR Database, National Bureau of Statistics of China, and company annual reports (Friede, Busch, & Bassen, 2015; Bai et al., 2024).

From the perspective of weight distribution, environmental performance indicators carry a high weight (35.6% in total), especially the sewage treatment rate (0.179), indicating that, in the current regional coordinated development, the green governance dimension makes the greatest contribution to differentiation.

These regional development indices are subsequently introduced into the regression model as dependent variables and as one of the explanatory terms in the mediation model, ensuring a reasonable mapping of multidimensional developmental differences in the empirical model, reflecting methodological rigour and the explanatory power of the economic implications. (Jun et al., 2024; Li & Hu, 2025)

Multivariate regression analysis

Table 5: *Multivariate regression analysis*

Variable	Regression coefficient	t	p	Explanation
ESG_E	0.024**	2.91	$p < 0.01$	Environmental investment has a significant impact on corporate profitability, possibly through resource

Variable	Regression coefficient	t	p	Explanation
				conservation and brand efficiency improvements.
ESG_S	0.017*	2.04	$p < 0.05$	Social responsibility (employee training, workplace safety): Improving internal management and employee efficiency.
ESG_G	0.031***	4.17	$p < 0.001$	Improvements in governance mechanisms that increase the transparency of disclosures and build investor trust are most effective.
Gearing	-0.007	-1.23	Insignificant	Debt size has a limited impact on earnings, or industry heterogeneity masks the effect.
Employee Size	0.002	0.95	Insignificant	The number of employees has no significant effect on performance improvement.

Note: Data were collected from SYNTAO Green Finance, MSCI ESG Ratings, CSMAR Database, National Bureau of Statistics of China, and company annual reports (Friede, Busch, & Bassen, 2015; Bai et al., 2024).

The results show that the three dimensions of ESG have a significant positive impact on corporate performance, especially the governance dimension, which is consistent with the view of (Liang et al., 2025) that "governance structure determines resource allocation efficiency and market expectations," indicating that the internal governance capabilities of enterprises are the core driving factors of sustainable performance.

Analysis of intermediation effects

To test the mediating role of corporate performance in the "ESG practices → coordinated regional development" pathway, the bootstrap method (95% confidence interval) was used, supplemented by the Baron & Kenny three-step method.

- **Step 1:** ESG → Regional Coordination Index: $\beta = 0.053$, $p < 0.01$
- **Step 2:** ESG → Corporate ROA: $\beta = 0.029$, $p < 0.01$
- **Step 3:** ROA → Regional Coordination Index: $\beta = 0.072$, $p < 0.05$
- **Step 4:** ESG → Regional Coordination Index (after controlling for ROA): β drops to 0.041, p is still significant, indicating that some mediation exists

The bootstrap mediation effect confidence interval [0.004, 0.027] does not contain 0, confirming that the mediated path holds.

In addition, further subregional tests find that the mediating effect is more pronounced for firms in the eastern region, while the marginal effect on the improvement of the regional coordination index after the improvement of ROA for western firms is weaker, suggesting that different regional policies, resources, and market conditions may interfere with the play of the mechanism's pathway. (Mao et al., 2024)

Conclusion

Conclusion

This study examines the influence mechanism of ESG practices in small and medium-sized firms within China's manufacturing sector on corporate performance and regional coordinated growth. It establishes an ESG indicator system centred on environment (E), society (S), and governance (G); incorporates the regional coordinated development index as a metric for macro

development levels; and quantifies multidimensional regional development indicators using the entropy method, thereby creating a logical link between micro-enterprise behaviour and macro-regional development. The following main conclusions were also verified:

- All ESG dimensions have a significant positive impact on corporate performance, among which the governance dimension has the strongest influence, reflecting that small and medium-sized enterprises can significantly gain market recognition by enhancing governance transparency and compliance mechanisms.
- Corporate performance has a partial mediating effect between ESG practices and regional coordinated development, indicating that the optimisation of micro-governance structure can promote the improvement of regional overall development quality through financial performance improvement.
- Regional comparison shows that enterprises in the east are more prominent in ESG practice maturity and performance improvement path, but the central and western regions have greater room for improvement and a significant marginal improvement effect.

This study contributes to existing theories by combining ESG with regional coordinated development, creating a model that connects micro-governance, performance, and regional sustainability, while also filling gaps in research about CSR behaviours and national development strategies. Simultaneously, the scientific amalgamation of multidimensional indicators of regional development is achieved through the integration of the entropy value approach, which enhances analytical capacity for regional disparities. The study suggests creating a system that helps companies follow ESG practices in a coordinated way within regions, emphasising that policies should focus on providing financial support for small and medium-sized enterprises (SMEs) and improving information sharing to motivate companies to participate in regional sustainable development through good governance.

Limitations

Although this paper uses multi-dimensional data and multiple empirical models, there are still three limitations:

1. Limited sample availability: In particular, there are fewer ESG scoring samples for small and medium-sized enterprises in the western region, which affects the representativeness of comparisons between regions;
2. Inconsistent evaluation standards: ESG scores come from different institutions. Although they are standardised in the study, there is still a problem of subjective weight setting.
3. Inter-period impacts are not explicitly modelled: The study uses data from the same period and has not yet established a lag term or dynamic model to reflect the long-term action path of ESG (Zeng et al., 2024).

Future Research Directions

Although this study has made positive progress in empirical paths and theoretical construction, there is still room for further expansion. Future research can be deepened in the following directions:

1. Introducing dynamic panels and lag effect modelling
   Given that the impact of ESG on performance and regional development may have long-term lag characteristics, in the future, a lag structure can be constructed to capture the long-term performance feedback and policy response effects of corporate governance behaviour.
2. Expansion of industry heterogeneity and industrial chain synergy perspective

Different industries (such as new energy and food processing) have distinct ESG concerns and external constraints. In the future, cross-industry comparisons can be used to analyse the differences in ESG structures and the synergistic paths of industrial chain co-governance mechanisms.

3. Integrating qualitative analysis methods (such as interviews and CSR text analysis)
   In-depth interviews with executives and text mining of ESG reports can be introduced to identify behavioural differences between "symbolic" and "substantive" ESG and to enhance the ability to assess governance effects and information disclosure consistency.

Through the above expansion, future research can further promote the strategic integration evolution of ESG practices from "corporate spontaneous behaviour" to "regional development mechanism" and provide decision-making support for building more resilient and sustainable regional governance.

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Corporate sustainable practices and family business internationalisation: A literature review and conceptual framework

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Abstract

This article reviews recent literature on the internationalisation of family firms, with a particular focus on how corporate sustainability practices address challenges in adopting internationalisation strategies. It presents a conceptual framework illustrating the interplay between corporate sustainability practices and international expansion. A systematic literature review method was adopted to synthesise insights from 31 Scopus-indexed peer-reviewed articles published between 2019 and 2024. This period was chosen to capture the most recent developments in the field, including the impact of COVID-19 and the growing global emphasis on sustainability in international business. The study identifies five key themes. First, corporate sustainability aligns family firms' long-term objectives with their priorities for socioemotional wealth. Second, corporate sustainability enhances financial performance, although financial constraints may act as a barrier. Third, family firms' unique resources, such as reputational capital and cultural heritage, mediate the relationship between sustainability and global expansion. Fourth, governance practices, including board diversity and leadership dynamics, play a pivotal role in aligning corporate sustainability efforts with internationalisation strategies. Finally, institutional and cultural contexts act as moderators, influencing the effectiveness of corporate sustainability practices across diverse markets by shaping their legitimacy and acceptance. The proposed framework offers a new perspective by integrating Socioemotional Wealth, Resource-Based View, and institutional theories to explain the interplay between corporate sustainability and internationalisation in family firms. Through these theoretical lenses, the study provides valuable insights for academics and practitioners, emphasising how socioemotional wealth priorities, unique resources, governance dynamics, and institutional contexts influence the sustainable global expansion of family firms.

Keywords: sustainability, corporate social responsibility, family firms, internationalisation, socioemotional wealth

JEL Classification: M14; L21

Introduction

Family firms (FFs) are the predominant type of business globally, contributing over 70% of the world's gross domestic product and accounting for approximately 60% of global employment. In addition to the economic impact, FFs are essential for the sustainable development of local communities across sectors such as infrastructure, education, and healthcare (McKinsey & Company, 2023). FFs are distinguished from non-FFs as they are driven by family values, heritage, and a long-term orientation. This alignment with family priorities is central to the concept of socioemotional wealth (SEW), which refers to the non-financial drivers that shape FFs' strategies and direct their decision-making (Seow, 2024; Temouri et al., 2022).

In an increasingly interconnected global business environment, internationalisation has become a strategic necessity for companies to access new markets, enhance competitiveness, and achieve long-term sustainability (Melo De Andrade Junior, 2023). Despite their dominance

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in the global economy, FFs face challenges when expanding into international markets. Their unique characteristics, including a strong preference for maintaining control and preserving legacy, often make them more risk-averse. This caution limits their ability to embrace the uncertainties of global expansion. Compounding these issues are resource constraints, such as limited financial capital, managerial expertise, and innovation capacity. Each of these is critical for navigating international markets (Fernández and Nieto, 2014). Espinosa-Méndez et al. (2024) highlighted that these limitations can hinder the scalability of operations and restrict growth opportunities of FFs. Additionally, governance structures dominated by family members may impede professional decision-making processes, further complicating their ability to operate effectively in complex international environments (Wang and Wang, 2024). These challenges create a complex landscape for family firms, underscoring the need for strategic solutions to support their internationalisation.

The integration of CS practices, such as Corporate Social Responsibility (CSR) and Environmental, Social, and Governance (ESG), is discussed as a mechanism for addressing challenges faced by FFs in their internationalisation efforts. Accordingly, the aim of this article is to explore how CS practices mitigate these barriers and enable FFs to achieve international success. Drawing on the SEW, resource-based view (RBV), and institutional theory, the paper develops a conceptual framework linking sustainability practices to the internationalisation of family firms.

Theoretical background

Definition of family firms

FFs are uniquely characterised by significant family involvement in ownership, management, and strategic decision-making. These firms have been described through shared attributes highlighting different dimensions of their governance and operational frameworks. According to Seow (2024), family firms are enterprises where decision-making power is concentrated within a family, often tied to the family's desire to preserve SEW. Similarly, Espinosa-Méndez et al. (2024) define family businesses as organisations guided by both financial and non-financial objectives, prioritising family legacy and the preservation of long-term reputation. Oware and David Kweku Botchway (2023) emphasise that what defines FFs is the use of moral capital and intergenerational continuity. On the other hand, Singh (2024) argues that the integration of cultural heritage and traditional craftsmanship into their operations is a distinguishing trait. Further, Temouri et al. (2022) note that FFs are defined by their dual focus on risk aversion and ethical responsibility. Additionally, Bielawska (2021) adds that family firms are embedded within local communities, with a strong commitment to regional development and philanthropy. These definitions underscore FFs' cautious yet strategic engagement in internationalisation, shaped by their desire to maintain a balance between family values and global expansion.

Socioemotional wealth theory

SEW is the set of non-financial goals such as family control, legacy preservation, and emotional attachment (Fernández and Nieto, 2014). These priorities differentiate FFs from non-family firms and heavily influence their strategic decisions (Smulowitz et al., 2023; Latrous et al., 2024). SEW plays a pivotal role in fostering internationalisation by aligning global expansion strategies with FFs' non-financial goals. According to Espinosa-Méndez et al. (2024), FFs leverage SEW to build trust and legitimacy in foreign markets, particularly through their commitment to ESG practices. This alignment ensures that internationalisation efforts do not compromise the family's legacy or reputation. Similarly, Wang et al. (2024) highlight that FFs' adherence to SEW priorities fosters stakeholder trust and reduces liabilities of foreignness,

making global market entry more feasible. Despite its role in fostering international expansion, SEW may hinder entry into foreign markets. As noted in Temouri et al. (2022), SEW introduces risk aversion, as FFs may avoid international opportunities that threaten their control or reputation. This dual effect underscores SEW's role as both a motivator and a constraint in global strategies, with its net impact determined by the firm's ability to align internationalisation goals with SEW preservation. On the other hand, SEW acts as a critical driver of CS by aligning long-term business strategies with family values. Seow (2024) argues that FFs' pursuit of SEW motivates them to adopt robust ESG practices, viewing sustainability as a mechanism to enhance reputation and secure intergenerational continuity. This perspective is echoed in Patuelli et al. (2022), who link SEW to the adoption of Sustainable Development Goals (SDGs) as a means of reinforcing family identity and long-term objectives. Moreover, Oware and David Kweku Botchway (2023) highlight how SEW fosters moral capital, a form of intangible wealth derived from ethical and socially responsible practices.

Resource-based view

RBV offers a framework for understanding how FFs leverage unique internal resources to achieve competitive advantages, particularly in the contexts of internationalisation and corporate sustainability. FFs' ability to successfully expand globally is strongly influenced by their resource endowments. According to Wang et al. (2024), family firms utilise their intangible resources, such as reputation, trust, and governance stability, to mitigate the risks of entering foreign markets. These resources enhance their legitimacy, enabling smoother integration into international markets. However, RBV also emphasises the constraints FFs face due to resource limitations, such as managerial expertise or financial capital, which can hinder rapid internationalisation. Oware and David Kweku Botchway (2023) support this perspective by noting that family firms must strategically deploy their moral and relational capital to offset financial constraints when pursuing international opportunities. Likewise, Singh (2024) illustrates how cultural heritage and craftsmanship, deeply embedded in the identity of family firms, serve as valuable resources. These unique attributes allow family firms to carve out niche markets globally, where consumers highly value authenticity and cultural resonance. By leveraging these cultural and creative resources, family firms enhance their differentiation and appeal, providing them with a competitive advantage in international arenas.

Institutional theory

Institutional theory underscores the role of CS in supporting FFs' adaptation to regulatory and societal pressures by providing a structured framework for compliance and legitimacy. For instance, Oware and David Kweku Botchway (2023) demonstrate that ESG compliance not only reduces institutional friction but also serves as a safeguard against financial vulnerabilities in foreign markets. This argument aligns with findings in Temouri et al. (2022), which demonstrate that adherence to global ESG standards mitigates reputational risks and enhances institutional legitimacy. Additionally, Patuelli et al. (2022) extend this perspective by highlighting that alignment with international frameworks, such as the United Nations SDGs, strengthens FFs' ability to navigate diverse institutional landscapes. Recent evidence also shows that ESG performance becomes particularly critical during market-wide crises, such as the COVID-19 pandemic, where high-ESG firms and portfolios demonstrated greater resilience and risk mitigation than their low-ESG counterparts, underscoring the institutional value of sustainability in turbulent environments (Broadstock, 2021).

Research question

Based on the previous theoretical background, the article attempts to answer the following main research question: *How do the dynamics of corporate sustainability practices influence the internationalisation of family firms, considering the roles of socioemotional wealth, unique resources, governance, and institutional contexts?*

Methodology

This study employs a systematic literature review (SLR) to explore the role of CS practices in addressing challenges faced by FFs in expanding globally. The review synthesises insights from recent studies to offer a nuanced understanding of the interplay between sustainability initiatives and international business strategies in family firms.

Data collection

To identify relevant articles for this study, a systematic search was conducted using the Scopus database. Our choice is justified as Scopus is regarded as one of the most comprehensive academic databases (Adamo et al., 2025), covering nearly 60% more literature than other repositories such as Web of Science (Minutiello & Tettamanzi, 2021). The initial query, which yielded 64 results, targeted keywords related to family businesses (e.g., "family firms," "family-owned," "family-controlled," "socioemotional wealth"), sustainability (e.g., "CSR," "ESG," "sustainability," "sustainable practices"), and internationalisation (e.g., "globalisation," "foreign markets"). The dataset was refined by restricting areas to Business and Management, Social Sciences, and Environmental Science, and limiting publication years to 2019–2024 to capture the most recent developments in the field, including the impact of COVID-19 and the growing global emphasis on sustainability in international business. This reduced the results to 37. One non-English article was excluded, leaving 36. Finally, restricting the results to peer-reviewed journal articles yielded a dataset of 31 articles. The detailed selection process is summarised in Table 1.

Table 1: *Summary of the article selection process*
Source: *Prepared by the author based on the query used and the inclusion and exclusion criteria applied.*

Step	Filter Applied	Number of articles
Initial query	TITLE-ABS-KEY with keywords for family business, CSR/ESG, sustainability, and internationalisation/globalisation	64
Publication years and subject areas	Limited to 2019–2024 and subject areas: *Business, Management and Accounting, Economics, Econometrics and Finance, Social Sciences,* and *Environmental Science*	37
Language	Limited to English	36
Document type	Limited to peer-reviewed articles	31

Data analysis

After an in-depth review of the abstracts and findings sections of the collected articles, thematic categorisation was adopted based on the research results.

Findings

The SLR identified five key themes that offer a comprehensive view of the relationship between CS and the internationalisation of FFs.

Sustainability as a core priority for family firms

CS plays a pivotal role in aligning FFs' long-term objectives with their SEW priorities. Latrous et al. (2024) emphasise that FFs are more actively engaged in CSR activities compared to non-FFs, driven by their intrinsic commitment to SEW. Similarly, Ahmad et al. (2020) underscore CSR's role in enhancing the sustainable survival of family SMEs, highlighting how it mediates the connection between family involvement and longevity. Bielawska (2021) further examines the transgenerational sustainability of FFs, showing that philanthropic and community-based CSR efforts address societal needs while fostering long-term stability. These local impacts are critical for societal relevance, as García-Sánchez et al. (2021) reveal, showing how CSR strategies help FFs balance stakeholder demands and demonstrate resilience in hostile environments. Expanding the scope, Abdelhalim and Eldin (2019) link CSR to the SDGs, particularly in emerging economies.

Incorporating CS into FFs' internationalisation strategies expands the benefits of sustainability beyond domestic markets. This integration links the FFs' SEW objectives with the expectations of global markets. By focusing on business model innovation to create value in foreign markets, López-Nicolás et al. (2024) emphasise that CSR-driven innovation in FFs not only aligns with SEW priorities but also serves as a strategic tool to support internationalisation. Similarly, Haddoud et al. (2021) argue that CSR practices help FFs overcome operational barriers in foreign markets. Their findings highlight that environmental initiatives boost international exporting intensity. Expanding on this perspective, Patuelli et al. (2022) explore the adoption of SDGs as an extension of CS. They suggest that FFs strategically leverage global sustainability frameworks to strengthen their position. Moreover, Wang et al. (2024) emphasise that ESG performance, as a dimension of CS, promotes outward foreign direct investment through reputation-building mechanisms.

Enhancing financial performance through corporate sustainability

CS plays a key role in protecting the value of FFs by enhancing their financial stability and resilience. Literature indicates that environmental and social dimensions of CS improve firm value (Espinosa-Méndez et al., 2023). Additionally, Maquieira et al. (2024a) found that stronger ESG performance is associated with higher Z-scores, indicating lower default risk. In the same context, Espinosa-Méndez et al. (2024) add that during crises (i.e., the COVID-19 pandemic), FFs with robust ESG profiles demonstrated resilience by maintaining financial performance and mitigating reputational risks. Moreover, Rivo-López et al. (2021) highlight the evolution of CSR activities in response to emergencies, suggesting that FFs use CSR as a mechanism to maintain stakeholders' trust amid uncertainty. Corporate social irresponsibility and its implications during crises are addressed in Choi et al. (2024), which discusses the risks of hypocrisy in sustainability practices. It emphasises the importance of authenticity in CSR initiatives, as firms caught in a perceived act of hypocrisy face significant reputational damage. Regarding the governance dimension of CS, Godbole and R. L. (2024) examine the impact of FFs' board diversity on their financial performance. The findings show that women's representation on the board positively enhances a firm's financial position. In contrast, CS initiatives impose additional financial burden on FFs. While ESG practices positively influence FFs' performance, financial constraints negatively influence the FFs' solvency (Maquieira et al., 2024b). Therefore, despite their commitment to sustainability, FFs face challenges in balancing ESG initiatives with their financial capability.

Family firms' resources as key enablers of sustainability

Utilising the RBV, FFs' unique resources, such as reputational capital, cultural heritage, and governance stability, are consistently identified as enabling mechanisms that transform sustainability efforts into successful internationalisation strategies. For example, Wang et al. (2024) emphasise that ESG-related resources foster legitimacy in foreign markets, reducing liabilities of foreignness and building trust with international stakeholders. These resources bridge the gap between sustainability initiatives and market acceptance, showcasing their mediating role in achieving global expansion. Moreover, Patuelli et al. (2022) reveal that family-specific resources, such as relational capital and long-term orientation, are instrumental in aligning sustainability with internationalisation. By leveraging these resources, FFs can navigate institutional complexities and align with global sustainability standards, thereby enhancing their adaptability across diverse markets. Additionally, Singh (2024) illustrates how cultural resources mediate the relationship by enabling FFs to integrate sustainability into culturally resonant offerings that appeal to international consumers.

Governance as a lever for sustainability

Governance and board diversity have become key factors in shaping the sustainability outcomes FFs seek. For instance, Wang and Wang (2024) highlight that female leadership enhances ESG performance, particularly in the social and governance dimensions. However, Campopiano et al. (2019) conclude that the female-family relationship moderates this role as non-family female directors are more CSR initiatives-oriented, whereas family-member female directors are more inclined toward philanthropic activities.

Complementing these insights, Beji et al. (2021) emphasise that board diversity enhances CSR engagement. Gender diversity, for instance, improves human rights and governance, age diversity boosts environmental and social initiatives, and foreign directors drive environmental performance and community involvement. In the same context, Seow (2024) emphasises the critical influence of leadership dynamics on aligning FFs with global ESG expectations. This study highlights the role of CEO attributes, such as tenure, experience, and board interlocking, in enhancing ESG reporting within FFs. However, it notes that CEO ownership negatively impacts these efforts due to potential conflicts with broader sustainability commitments.

Kallmuenzer et al. (2023) shift the focus to employee-directed CSR initiatives in FFs, demonstrating their capacity not only to enhance organisational commitment but also to strengthen the firm's positioning at both local and international levels. By fostering a deeper connection between employees and the firm, these CSR activities enhance the firm's reputation locally and globally, thereby supporting its internationalisation efforts and aligning internal engagement with external market expansion. Despite these positive impacts, governance challenges persist. As Beji et al. (2021) reveal, family boards are less diverse than non-family boards, with fewer independent or highly educated directors. The lack of diversity may limit the firm's sustainability efforts.

Institutional and Cultural Influences on Sustainability

Institutional and cultural contexts play a moderating role in shaping the relationship between CS and the internationalisation of FFs. These contexts influence the effectiveness of sustainability strategies by conditioning their acceptance and impact across different foreign markets. FFs, rooted in SEW, are particularly sensitive to institutional pressures and cultural variations, which can either enhance or constrain their international expansion efforts. According to Patuelli et al. (2022), FFs align their sustainability initiatives with institutional norms to enhance their legitimacy in diverse markets. This alignment reduces the liability of

foreignness and facilitates smoother entry into new institutional environments. However, the study emphasises that institutional complexity in host markets can moderate the effectiveness of sustainability practices, as misaligned or inadequately implemented initiatives may fail to build the intended legitimacy. Similarly, Wang et al. (2024) highlight that ESG practices gain greater acceptance in countries with strong regulatory frameworks and societal expectations for sustainability. In these contexts, CS initiatives are more likely to strengthen FFs' reputations and stakeholder relationships, thereby enhancing their internationalisation efforts. Conversely, in regions with less stringent institutional frameworks, the positive effects of sustainability practices may be diminished. Expanding on this perspective, Singh (2024) illustrates the importance of cultural alignment in global markets. FFs that embed culturally resonant sustainability practices into their international strategies are more likely to succeed in engaging stakeholders and navigating cultural barriers. This demonstrates how cultural context moderates the relationship by determining the relevance and appeal of CS initiatives to local stakeholders. Despite these advantages, institutional and cultural challenges can also impose constraints. For example, Temouri et al. (2022) suggest that SEW-driven FFs may hesitate to engage in markets with unfamiliar or complex institutional environments. These concerns can limit their ability to fully leverage CS as a tool for internationalisation, highlighting the moderating role of institutional unfamiliarity.

Conceptual framework

Based on the findings, a conceptual framework is developed (Figure 1), which positions SEW as an independent variable influencing FFs' internationalisation, framed as the dependent variable. CS and unique resources of FFs, such as reputational capital, cultural heritage, and governance stability, serve as mediators that translate SEW priorities into effective internationalisation strategies. These mediators demonstrate how FFs leverage sustainability practices and inherent resources to meet global market demands while preserving their SEW objectives. The framework also incorporates institutional and cultural contexts as moderating variables, emphasising their role in shaping the effectiveness of sustainability strategies across diverse foreign markets. Additionally, corporate governance, particularly board diversity and leadership dynamics, serves as a critical moderator influencing the alignment between sustainability efforts and international outcomes.

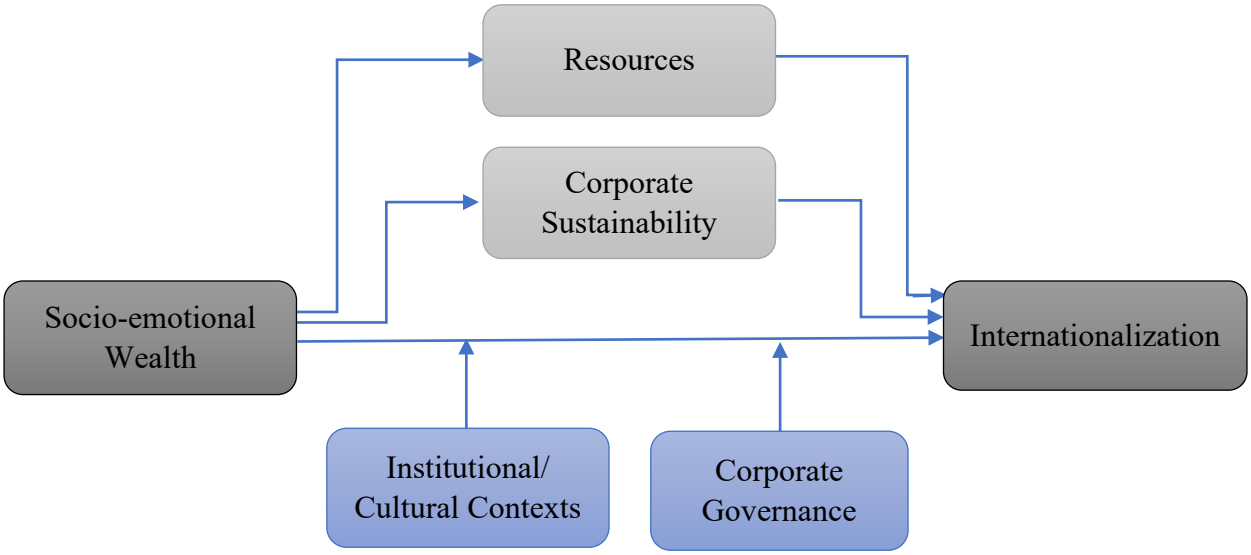

Figure 1: *Conceptual framework linking SEW, corporate sustainability, resources, governance, and contexts to internationalisation in family firms*
Source: *Prepared by the author based on the findings of the review*

Discussion and conclusion

This systematic literature review aimed to explore how CS practices can address the challenges FFs encounter when pursuing internationalisation. By integrating SEW, RBV, and institutional theory, the present study demonstrates that sustainability initiatives, when strategically aligned with FFs' long-term objectives and family-centric values, contribute significantly to global expansion. Specifically, SEW emerges as both a catalyst and a constraint for internationalisation, highlighting the importance of balancing non-financial objectives with market opportunities. At the same time, RBV underscores the pivotal role of FFs' unique resources—such as reputational capital, cultural heritage, and governance stability—in shaping the effectiveness of sustainability strategies for global market entry. Finally, institutional theory reveals that socio-political and cultural frameworks in host markets moderate the impact of CS initiatives, thereby influencing FFs' ability to overcome the liabilities of foreignness.

Taken together, the reviewed studies highlight five overarching insights: (1) CS aligns with the long-term orientation of FFs, bolstering their resilience and stakeholder trust; (2) robust CS practices strengthen financial performance but must be balanced against potential resource constraints; (3) intangible FF resources serve as mediators that bridge sustainability efforts with successful internationalisation; (4) governance mechanisms, including board diversity and leadership dynamics, are key to integrating CS and expanding abroad; and (5) institutional and cultural factors moderate the influence of sustainability on international outcomes. By elucidating these themes, the proposed conceptual framework provides a comprehensive lens for understanding how FFs can leverage sustainability to navigate the complexities of international markets.

Despite these contributions, certain limitations merit mention. First, the relatively small sample of articles (31 articles) with a limited time range (2019–2024) may limit the breadth of perspectives. Accordingly, future research should pursue empirical investigations—such as longitudinal case studies, cross-country surveys, or large-scale quantitative analyses—to test and refine our proposed conceptual framework.

In essence, this study's synthesis highlights CS not merely as an ethical imperative but as a strategic enabler of FFs' global ambitions. By drawing upon the interplay of SEW, RBV, and institutional theory, the proposed framework offers both scholars and practitioners a foundation for examining and operationalising sustainable internationalisation strategies in FFs.

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Enhancing quality education through AI and youth-driven digital platforms - A scalable model for achieving SDG 4

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Abstract

This paper examines how Artificial Intelligence and youth-driven digital platforms can transform education to achieve Sustainable Development Goal 4. Using a conceptual synthesis of policy frameworks, a literature review on AI in education, and access statistics, it critiques the limitations of traditional models and proposes a scalable, learner-centred framework that leverages mobile technology, Artificial Intelligence-enabled personalisation, and creator-educators. The model addresses barriers such as digital divide, data privacy, and teacher displacement while emphasising ethical governance, public-private partnerships, and inclusive access. By reframing education as flexible, culturally contextualised, and human-centred, the paper outlines a pragmatic pathway to equitable, high-quality learning for digital-native generations, especially in underserved regions, and positions Artificial Intelligence as a complement to, not a replacement for, teachers.

Keywords: quality education; artificial intelligence in education; mobile-first learning; digital platforms; creator-educators; digital divide; policy and governance.

JEL Classification: I20, I28, O33

Introduction

In 2015, the United Nations adopted the 2030 Agenda for Sustainable Development, consisting of 17 Sustainable Development Goals (SDGs) aimed at addressing the most pressing global challenges. Among them is SDG 4: Quality Education, which seeks to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (United Nations). This goal recognises education as a fundamental human right and a critical enabler of sustainable development, poverty reduction, and social mobility.

Despite global efforts, the world remains significantly off track in achieving SDG 4. According to the United Nations Educational, Scientific and Cultural Organisation (UNESCO) Global Education Monitoring Report (GEM) (2023), more than 244 million children and youth are still out of school, and many who are in school are not acquiring basic literacy and numeracy skills. The COVID-19 pandemic further exacerbated these inequalities, revealing deep gaps in educational access, digital infrastructure, and the adaptability of learning systems in both high- and low-income countries (United Nations, 2023).

Traditional educational systems, designed during the industrial era, have struggled to keep pace with the demands of the 21st century. They often rely on standardised, "one-size-fits-all" instruction that does not reflect the diversity of student needs, learning styles, or technological realities. As the global community seeks to accelerate progress toward SDG 4, there is a growing recognition that innovation, flexibility, and learner-centred approaches must become central to education reform.

This paper argues that integrating Artificial Intelligence (AI) and youth-centric digital platforms, such as YouTube and mobile-first learning environments, can play a transformative role in achieving SDG 4. By leveraging AI's personalisation capabilities and the accessibility

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of digital content delivery, education can become more inclusive, engaging, and scalable, especially for digitally native generations.

The current state of education

Modern educational systems are often criticised for their stagnation and failure to evolve in tandem with societal and technological advancements. Traditional classrooms, characterised by rigid structures and standardised testing, have remained largely unchanged for over a century, despite significant technological progress in other sectors (Prince Ea, 2016). This outdated model of education is ill-suited to meet the diverse needs of today's learners and the demands of a future workforce dominated by AI and other advanced technologies.

Albert Einstein famously remarked, "Everybody's a genius, but if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid" (Prince Ea, 2016). This analogy underscores the inadequacy of "one-size-fits-all" educational approaches that fail to recognise and nurture individual talents and learning styles.

These systems were effective for their time, serving the needs of factory-based economies and hierarchical labour markets. However, in the context of today's fast-evolving digital world, such models are increasingly obsolete and misaligned with the skills, interests, and needs of contemporary learners.

The conventional classroom model emphasises standardised curricula, teacher-centred instruction, and high-stakes assessments. While these components aim to ensure consistency and control, they often suppress creativity, overlook individual learning differences, and contribute to student disengagement. Many learners are labelled as underachievers not because they lack potential, but because the system fails to acknowledge their unique learning styles and cultural contexts.

"One-size-fits-all" education has also struggled to keep pace with rapid technological change. Despite the widespread availability of smartphones, internet access, and online resources, many schools still rely on outdated textbooks, rigid timetables, and passive lecture formats. Moreover, the dominance of summative exams and grade-based competition prioritises memorisation over critical thinking, collaboration, and innovation, which are essential for thriving in the 21st-century global economy.

This disconnect is particularly pronounced among Generation Z and Alpha learners, who have grown up in digitally connected environments and increasingly demand interactive, personalised, and relevant learning experiences. These learners are not disengaged from education itself, but rather from a system that does not reflect how they live, communicate, or think. The rigid and homogenised nature of traditional education often stifles creativity and critical thinking, skills that are crucial in the modern world.

Purpose and significance of the study

The purpose of this study is to explore how integrating sustainable artificial intelligence (AI) with youth-centric digital platforms can enhance the quality, equity, and adaptability of learning systems to meet the goals of SDG 4: Quality Education. Specifically, this research investigates how AI technologies, when deployed ethically and inclusively, can support personalised learning, improve educational access, and foster engagement among digitally native learners. It examines the role of informal digital platforms such as YouTube, which already serve as alternative learning spaces for millions of young people around the world.

The significance of this study lies in its emphasis on merging technological innovation with sustainable educational practices. Although considerable attention has been given to the transformative potential of AI in high-income contexts, its strategic use in low-resource environments remains underexplored (Arruda & Arruda, 2024). Similarly, youth-driven

learning behaviours on digital platforms are often overlooked in mainstream educational policy and planning, despite their growing influence and scale (Sterling, 2024).

By addressing these gaps, this study contributes to the broader discourse on how education systems can evolve to meet contemporary needs. It also highlights the importance of designing AI-driven learning ecosystems that are not only technologically advanced but also aligned with human values, inclusion, and sustainability (D, 2024; Abunamous et al., 2022). In doing so, the paper offers practical insights and a conceptual framework that can guide educators, policymakers, and technology developers in building more resilient, equitable, and learner-centred education systems.

Rethinking quality education in the 21st century

Limitations of traditional classroom models

The conventional model of education, rooted in industrial-era design, is increasingly seen as inadequate for preparing learners for the demands of the 21st century. Traditional classrooms often rely on standardised teaching methods, rigid curricula, and teacher-centred instruction, which offer limited flexibility for adapting to students' individual learning needs and styles (Abunamous et al., 2022; Saputra et al., 2023). These systems prioritise uniformity and compliance, often at the expense of creativity, critical thinking, and learner autonomy.

One of the most critical limitations lies in the "one-size-fits-all" approach. Students are frequently grouped by age rather than ability or interest, and instruction is delivered at a fixed pace with minimal differentiation. This creates a learning environment in which advanced students may become disengaged due to a lack of challenge, while struggling students fall further behind due to insufficient support (Arruda & Arruda, 2024).

Moreover, traditional education models typically depend on rote memorisation and high-stakes testing as indicators of academic success. These methods often fail to assess the learner's capacity for problem-solving, collaboration, or adaptability, which are essential in a fast-evolving, digitally connected world (Sahney et al., 2004). The system rewards compliance and accuracy over curiosity and innovation, producing graduates who may excel at test-taking but lack the competencies needed to thrive in real-world, complex situations.

The physical structure of classrooms also reinforces outdated pedagogical assumptions. Students are arranged in rows, expected to remain passive while teachers deliver information from the front, mirroring factory-floor layouts of the past century (Prince Ea, 2016). This configuration discourages interaction, experimentation, and dynamic engagement, thereby limiting students' ability to take ownership of their learning process.

Crucially, these systemic limitations persist even as technological infrastructure is expanding faster than educational reform. For example, by the end of 2023, nearly 70% of the global population was a smartphone user, with over 7 billion smartphone subscriptions worldwide, projected to rise to 8 billion by 2028 (Laricchia, 2024). This rapid technological adoption, particularly in low- and middle-income regions, offers a unique opportunity to deliver digital education at scale, yet traditional systems are not designed to leverage it.

Innovations such as Starlink, which now delivers internet access to remote and rural communities globally, make it possible to imagine a world where quality education can reach the most underserved learners. If governments and global institutions, such as the UN, were to invest in online tutors, subsidise access to digital platforms, and make subscriptions to tools like Starlink affordable, they could overcome geographic barriers and close critical equity gaps in education delivery.

Therefore, the limitations of traditional classroom models are not merely pedagogical; they are structural, digital, and policy-related. To achieve SDG 4, education systems must

evolve beyond static classrooms and harness the global growth of mobile technology and digital access to build flexible, inclusive, and future-ready learning environments.

Rise of digital native learners

Today's learners are not just students in classrooms; they are digital natives. Born into a world saturated with technology, members of Generation Z and Generation Alpha have grown up with smartphones, tablets, and instant internet access. Their behaviours, expectations, and ways of processing information differ significantly from those for whom traditional educational systems were designed.

Digital-native learners are accustomed to interactivity, autonomy, and personalisation in their content consumption. Platforms like YouTube, TikTok, and Khan Academy have become major sources of informal education, where students can learn on demand, rewind or replay difficult concepts, and choose instructors who resonate with their learning style and interests. This shift reflects a broader movement toward learner-centred education, where engagement and relatability matter as much as curriculum standards.

Data support this behavioural shift. As mentioned above, in 2023, nearly 70% of the global population used smartphones, with over 7 billion active subscriptions (Laricchia, 2024). These numbers are projected to increase, indicating that mobile-first learning is becoming the new default. Students today can access content from anywhere on buses, at home, or in rural communities, provided they have a connection. With innovations like Starlink providing internet in remote areas, access to online education is no longer a privilege but a scalable opportunity.

What sets digital-native learners apart is not just their access to technology, but how they expect it to be used. They are increasingly self-directed in their learning, seeking platforms that offer flexibility, visual content, gamification, and interaction. Moreover, they gravitate toward educators who feel authentic, relatable, and human, often creators rather than traditional institutional educators. As a result, digital platforms are becoming not only entertainment hubs but learning ecosystems, organically integrated into students' daily lives.

This evolving learner profile calls for a rethinking of educational delivery models. Rather than competing with digital platforms, education systems must integrate them, leveraging their reach, familiarity, and adaptability to make learning more engaging and effective. Recognising and adapting to the habits and preferences of digital-native learners is a crucial step in making quality education both inclusive and relevant, in line with the targets of SDG 4 (UNESCO, 2023).

The role of artificial intelligence in education

Artificial intelligence (AI) is rapidly transforming industries worldwide, and education is no exception. In the context of Sustainable Development Goal 4 (SDG 4), AI offers powerful tools for advancing inclusive, equitable, and quality education for all. By supporting personalisation, enhancing engagement, and automating administrative burdens, AI has the potential to address many of the systemic challenges faced by traditional education systems, particularly those in underserved regions.

Personalisation and adaptive learning

One of the most promising applications of AI in education is personalised learning. AI systems can analyse student performance in real time and adapt content, pace, and feedback to suit each learner's strengths, weaknesses, and preferences. This approach stands in stark contrast to the "one-size-fits-all" instruction, allowing students to progress at their own speed and revisit difficult concepts as needed (Arruda & Arruda, 2024; Saputra et al., 2023).

Platforms such as Khanmigo, powered by Generative Pre-trained Transformer (GPT) based AI, offer real-time, tailored tutoring experiences across subjects. Similarly, applications like Dream Box and Squirrel AI in China use machine learning algorithms to adjust lesson difficulty based on user interactions, helping close performance gaps while keeping learners motivated. These tools are especially beneficial for students with learning disabilities or those in multilingual and multicultural contexts.

AI-powered assessment and feedback

AI also enhances formative assessment and feedback loops, allowing teachers and learners to monitor progress more accurately and in a timely manner. Intelligent systems can instantly evaluate quizzes, assignments, or written content, reducing the burden on educators while giving students targeted insights on how to improve.

Such systems also help track learning patterns and dropout risks, enabling proactive interventions. For example, AI-integrated learning management systems in universities can predict which students are likely to disengage and suggest timely support strategies (D, 2024). This is particularly useful in large-scale, online or hybrid education environments.

Language, accessibility, and inclusion

AI technologies are also helping to bridge language and accessibility gaps, making education more inclusive. Tools like speech recognition, real-time translation, and text-to-speech applications empower students with disabilities or those learning in non-native languages (Arruda & Arruda, 2024). For learners in multilingual countries or displaced communities, such tools offer a lifeline to education that is both culturally and linguistically responsive.

Mainly in areas with acute teacher shortages, AI can serve as a support mechanism, supplementing classroom instruction or facilitating independent study when in-person teachers are unavailable.

Limitations and responsible use

Despite its promise, the use of AI in education is not without risks. Concerns include data privacy, algorithmic bias, and over-reliance on automation. If not carefully designed and deployed, AI systems may reinforce existing inequalities or reduce the human elements essential to effective teaching and mentorship (Abunamous et al., 2022; Sterling, 2024).

Open platforms introduce risks, variable content quality, distraction from recommendation feeds, and opaque ranking algorithms. Mitigations include curated playlists aligned to national syllabi, age-appropriate modes, offline packs for controlled use, and transparent recommendation criteria.

To be truly effective, AI must be implemented ethically and transparently, with ongoing oversight and teacher involvement. As technology advances, it should not replace educators, but rather empower them to focus on deeper, human-centred interactions with students.

Youth-driven learning culture and digital platforms

YouTube as a learning ecosystem

In the digital age, platforms traditionally associated with entertainment are rapidly transforming into alternative learning environments. Among these, YouTube has emerged as a dominant player in informal education, particularly among digital native youth. As the world's second most visited website and largest video-sharing platform, YouTube hosts a vast array of educational content ranging from kindergarten through 12th grade (K-12) lessons and

university lectures to language tutorials, science explainers, and do-it-yourself skill development. As shown in Figure 1, top educational creators reach audiences at a scale unmatched by formal institutions (Social Blade, 2025).

For today's learners, YouTube is not merely a tool for passive viewing; it is a dynamic, interactive ecosystem where they can learn at their own pace, choose educators they relate to, and explore content that aligns with their passions and interests. This aligns with Generation Z's preference for autonomy, relatability, and flexibility in learning (Sterling, 2024). Educational creators like Khan Academy, CrashCourse, and Kurzgesagt have amassed millions of followers and billions of views, underscoring a massive and growing demand for self-directed, creator-led learning.

For example, as of 2025, Cocomelon has amassed over 192 million subscribers and an astonishing 199.8 billion views, while ChuChu TV follows with 95.8 million subscribers and 54.7 billion views. Baby Shark Pinkfong reaches an audience of 81.2 million subscribers with over 49 billion views. Other prominent channels, including Infobells Hindi and Billion Surprise Toys, add significantly to this total, bringing the collective reach to over 360 billion views across just a handful of top educational platforms.

Top 100 Education YouTube Creators by Subscribers 104ms

#	Grade	Name	Subscribers	Views	Videos
1st	A+	Cocomelon - Nursery Rhymes	193M	201.98B	1.54K
2nd	B+	ChuChu TV Nursery Rhymes & Kids Songs	96.2M	54.93B	865
3rd	A	Baby Shark - Pinkfong Kids' Songs & Stories	81.6M	49.74B	3.54K
4th	A	Infobells - Hindi	69.6M	42.45B	777
5th	B+	Billion Surprise Toys	57.6M	12.75B	1.41K

Figure 3: *Top educational YouTube creators by subscribers and views (2025)*
Source: *Social Blade, accessed 2025*

This level of engagement far surpasses the reach of most traditional education systems and signals a paradigm shift in how learning is consumed and delivered. YouTube's multilingual content, visual storytelling, and comment-based interaction make it particularly inclusive for learners with varying literacy levels or language backgrounds. Its mobile accessibility also allows learners in low-resource areas to engage with high-quality educational content, often at little or no cost, especially when paired with expanding internet coverage from services like Starlink.

YouTube's distinctiveness as a learning tool lies in its ability to blend education with entertainment, a concept known as edutainment. This increases retention and motivation, especially among younger audiences. Additionally, learners can subscribe to channels, receive updates, and build long-term learning relationships with creators who serve as informal mentors. While YouTube cannot replace formal education entirely, it provides a powerful supplement that aligns with the habits, values, and lifestyles of modern learners. Recognising its potential as a learning ecosystem and investing in the development of high-quality, culturally relevant content is essential for making education more accessible, engaging, and inclusive in the digital era.

Learner autonomy, creator-educators, and mobile-first behaviour

As education shifts into the digital age, young people are no longer passive recipients of knowledge; they are becoming active curators of their own learning journeys. This transformation is driven by a blend of technological access, behavioural changes, and the proliferation of user-generated content. Learner autonomy, supported by creator educators and mobile-first technology, is shaping a new paradigm of education, one that aligns closely with the goals of SDG 4 in both spirit and scale.

Learner autonomy

Digital-native learners increasingly prefer to learn on demand, at their own pace, and through formats that align with their personal preferences. This autonomy enables them to revisit difficult concepts, skip ahead when confident, and explore topics driven by curiosity and real-world relevance. Such self-directed learning fosters intrinsic motivation, critical thinking, and lifelong learning habits, all of which are pillars of quality education (Arruda & Arruda, 2024; Sterling, 2024).

Learner autonomy is critical in bridging equity gaps. Students in underserved or rural areas, for instance, may not have access to qualified teachers or consistent school attendance. Still, with digital resources and agency, they can pursue learning independently, guided by technology and informal mentors.

The rise of creator educators

Unlike traditional educators limited by geography and institutional constraints, creator-educators use platforms like YouTube, TikTok, and Instagram to reach global audiences. These educators are often peer-aged or culturally relatable, which increases their impact and trust among youth. Their content is typically modular, visual, and emotionally engaging, allowing learners to connect with material beyond textbooks and lectures.

Mobile-first behaviour

By the end of 2023, nearly 70% of the global population used a smartphone, with over 7 billion active subscriptions projected to reach 8 billion by 2028 (Laricchia, 2024). These statistics represent more than technological growth; they mark a shift in learning behaviour.

Smartphones have become the primary learning device for millions of students, particularly in Africa and the Global South, where access to computers and tablets remains limited. With mobile-optimised educational content, learners can study while commuting, in low-resource school settings, or from rural homes connected through satellite internet services such as Starlink.

Mobile-first learning is not only about convenience but also about scalability, equity, and resilience. It enables education to reach learners who would otherwise be excluded due to geography, conflict, or poverty. By embracing learner autonomy, supporting creator educators, and designing for mobile-first use, education systems can become more aligned with how young people naturally learn.

Synergising AI and youth-centric platforms: a new model for SDG 4

Proposed framework for inclusive, scalable, and personalised learning

While AI and digital platforms each hold transformative potential on their own, it is in their synergy that the greatest opportunity for reimagining education lies. The proposed model for achieving SDG 4 combines the personalisation and intelligence of AI with the accessibility,

flexibility, and relatability of youth-centric digital platforms, such as YouTube, mobile apps, and creator-led content ecosystems.

The proposed architecture is summarised in Figure 2. This hybrid model addresses the three key pillars of quality education as defined by UNESCO: accessibility, equity, and learning outcomes by using technology not to replace teachers or schools, but to augment and scale personalised learning in ways previously impossible.

How the model works: core components

1. Learner-centred AI engine

AI technologies serve as the personalisation core of the system. They deliver adaptive content tailored to each student's performance, pace, and preferences, provide real-time tutoring and individualised feedback, analyse behavioural data and progress trends to identify at-risk learners and recommend interventions to help prevent dropout or disengagement (Arruda & Arruda, 2024; D, 2024).

2. Digital content platforms

Platforms like YouTube, Khan Academy, and TikTok Edu act as distribution hubs for educational content. They host short, multilingual, and engaging videos from trusted creator-educators. Enable two-way interaction through comments, likes, and content sharing. Foster learning communities by enabling learners to subscribe to, follow, and engage with content that aligns with their identity and interests (Sterling, 2024).

3. Mobile-first access

Mobile phones are the most accessible learning tools worldwide. This model prioritises delivery via smartphones, optimised for low bandwidth. It supports use in rural or underserved areas, leveraging technologies like Starlink to expand internet access. It also empowers displaced or low-income learners with flexible, on-demand access to education (Laricchia, 2024).

4. Human–machine collaboration

Rather than replacing educators, the model positions technology as an assistant, allowing teachers to take on roles as facilitators, mentors, and learning designers. AI handles curriculum adaptation, formative assessment, and learner analytics. Digital creators complement formal instruction by offering culturally relevant, accessible, and engaging content (Saputra et al., 2023).

5. Sustainability and equity layer

For the model to be inclusive and ethical, it must be supported by strong governance and equitable investment. This layer includes policy frameworks that ensure responsible AI use, data privacy, and algorithmic transparency.

Global partnerships provide funding for content creation, infrastructure, and affordable connectivity. Platform standards promote diversity, representation, and accessibility in educational content (Abunamous et al., 2022).

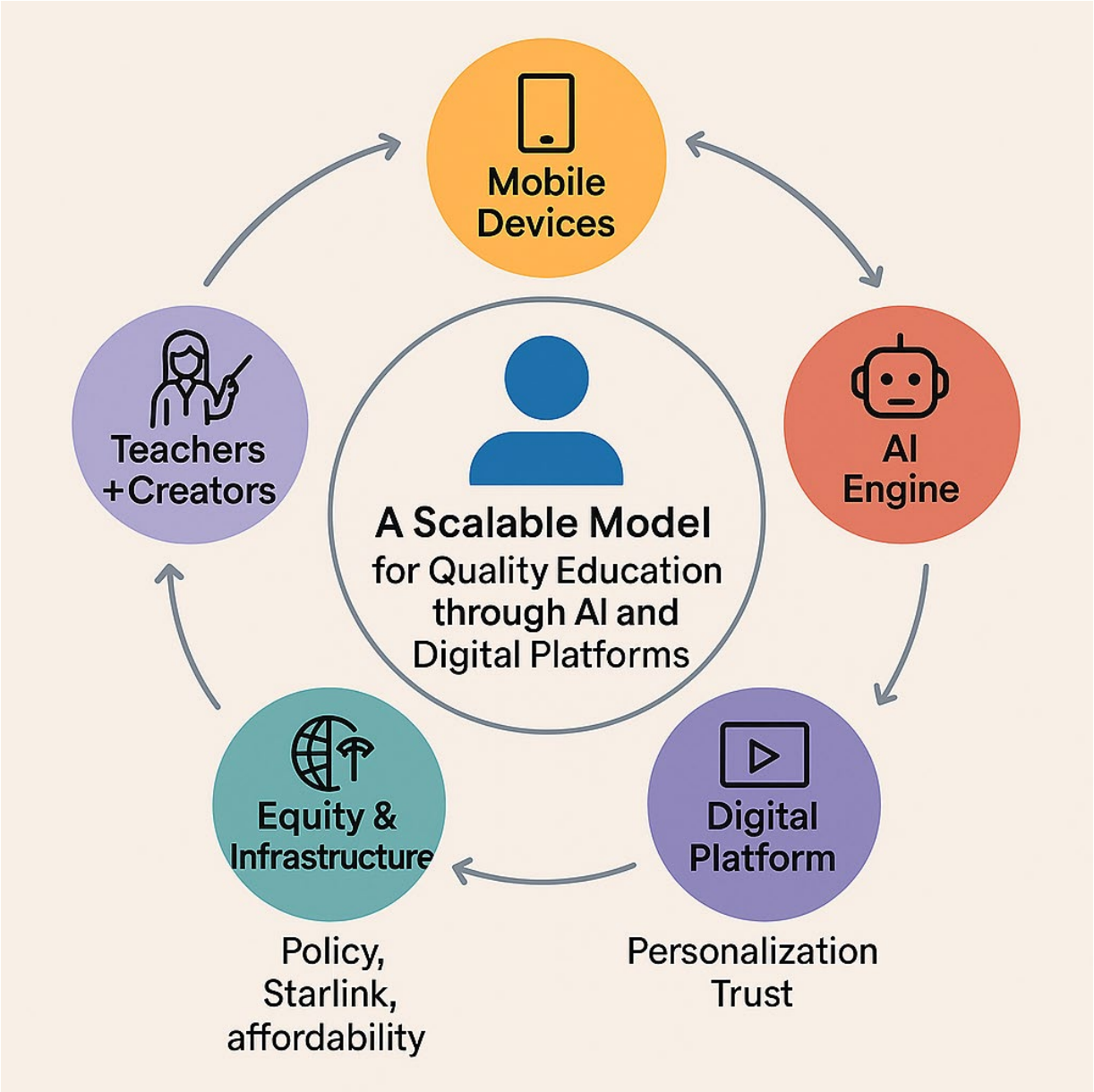

Figure 4: *A scalable model for quality education through AI and digital platforms*
Source: *Author's design, informed by UNESCO (Education 2030; GEM Reports)*

Real-world potential: Such a model could be especially impactful in regions where teacher shortages are severe, learning loss due to COVID-19 persists, and traditional schooling is inaccessible due to conflict, poverty or migration.

By leveraging AI to scale personalisation and platforms such as YouTube to scale access and engagement, this model presents a viable path to universal, inclusive, and quality education, a central aim of SDG 4 (Arruda & Arruda, 2024; D, 2024; GEM Report, 2023).

How AI + platform-based learning = scalable quality education

Achieving SDG 4, "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all", requires more than simply building schools or distributing textbooks. It demands scalable, flexible, and context-sensitive solutions that meet learners where they are geographically, digitally, and emotionally. The combination of artificial intelligence and youth-centric digital platforms presents a unique opportunity to fulfil this

demand by tackling the three main dimensions of education reform: access, personalisation, and engagement.

1. Scalability through mobile and platform infrastructure

With over 70% of the world's population using smartphones and platforms like YouTube, TikTok, and Khan Academy already reaching hundreds of millions of learners, digital education has the infrastructure in place and deployed, especially in the Global South (Laricchia, 2024). Unlike brick-and-mortar schools, digital platforms do not require massive physical investments to scale. A single high-quality video lesson can reach millions instantly, in multiple languages and formats.

When integrated with AI tutors, learners can also receive tailored support from concept explanations to practice quizzes and real-time feedback. Services such as Starlink expand the digital frontier further, making education accessible even in remote, conflict-affected, or impoverished areas.

2. Personalisation at scale

Traditional classrooms struggle to accommodate individual needs. AI solves this by adjusting content to each learner's pace, learning gaps, and preferred formats. Whether through voice interfaces, predictive analytics, or personalised recommendations, AI adapts to learners dynamically, something no single teacher can do for hundreds of students.

When combined with digital platforms, this personalisation becomes instantly scalable. A student watching a science video on YouTube, for example, can be guided by an AI overlay suggesting follow-up videos, practice exercises, or even a conversation with a chatbot tutor. This ecosystem reduces dropout risk, boosts retention, and builds learner confidence (Arruda & Arruda, 2024; Saputra et al., 2023).

3. Engagement through culture and choice

One of the core problems with traditional schooling is the lack of emotional connection to content. In contrast, platform-based learning allows learners to choose instructors they relate to, content formats they enjoy, and topics they care about. This sense of control and cultural resonance increases motivation and deepens understanding. Learners on digital platforms can interact through comments, share content, subscribe to educators they admire, and form peer-learning networks that mimic the social dimension of learning in a digital space.

Personalisation, flexibility, and reach

The integration of artificial intelligence and youth-driven digital platforms brings together three transformative features that traditional education models often lack: personalisation, flexibility, and global reach. These features are not merely innovations; they are essential for making education inclusive, adaptable, and equitable, especially in the context of Sustainable Development Goal 4 (SDG 4).

Personalisation

AI technologies can tailor educational content based on each learner's performance history, learning speed, individual strengths and weaknesses, and preferred learning styles.
This level of personalisation is impossible to achieve in most traditional classrooms, where teachers must address diverse learners with a single method. Through real-time feedback, adaptive learning paths, and individualised recommendations, AI makes the learning experience more relevant and effective for each student (Arruda & Arruda, 2024; D, 2024).

In a world where millions of students are left behind by standardised instruction, personalised learning not only improves academic outcomes, it also fosters self-confidence, agency, and engagement, particularly for marginalised groups and students with special needs.

Flexibility

Digital platforms and mobile technologies provide learning anytime, anywhere. Whether a student is in a refugee camp, a rural village or commuting in an urban area, access to a smartphone and internet connection enables participation in learning activities.
This flexibility is vital for students with limited access to formal schooling, learners balancing education with work or caregiving responsibilities, and those recovering from disruptions such as pandemics or conflict. Mobile-based, on-demand learning allows individuals to pause, rewind, and revisit lessons, engage with bite-sized modules, or explore topics based on personal interests and at their own pace, ultimately creating a learner-driven experience that adapts to real-life constraints and fosters continuous engagement (Laricchia, 2024).

Reach

While traditional education systems are bound by geography, infrastructure, and personnel, digital platforms and AI transcend these boundaries. YouTube channels, AI tutors, and education apps can deliver content to millions instantly and on a scale. Combined with emerging internet access solutions like Starlink, even the most remote areas can now be integrated into the global learning network.

The reach of digital education is further amplified by features such as multilingual content, visual and auditory formats, culturally relevant creators, and community-based interactions and feedback loops. These elements enhance inclusivity by accommodating diverse linguistic, cultural, and cognitive needs, thereby enabling more learners, regardless of background, to access, engage with, and benefit from educational content. All together these elements push the global community closer to achieving truly universal, equitable, and high-quality education in line with the objectives of SDG 4.

Together, personalisation, flexibility, and reach create an agile, inclusive, and resilient learning ecosystem. By embedding these qualities into educational systems through AI and digital platforms, we not only address the gaps in current systems but also build a foundation for an education model that can evolve with generations to come.

Barriers and ethical considerations

Digital divide and infrastructure issues

Figure 3 shows persistent access gaps from the global distribution of internet users. While the integration of artificial intelligence and digital platforms holds immense potential to transform education, its implementation is not without challenges. Chief among these is the persistent digital divide, which continues to limit equitable access to technology-enhanced learning. Without addressing these foundational inequalities, the risk remains that AI-driven education may exacerbate rather than reduce disparities, especially in low-income, rural, and marginalised communities.

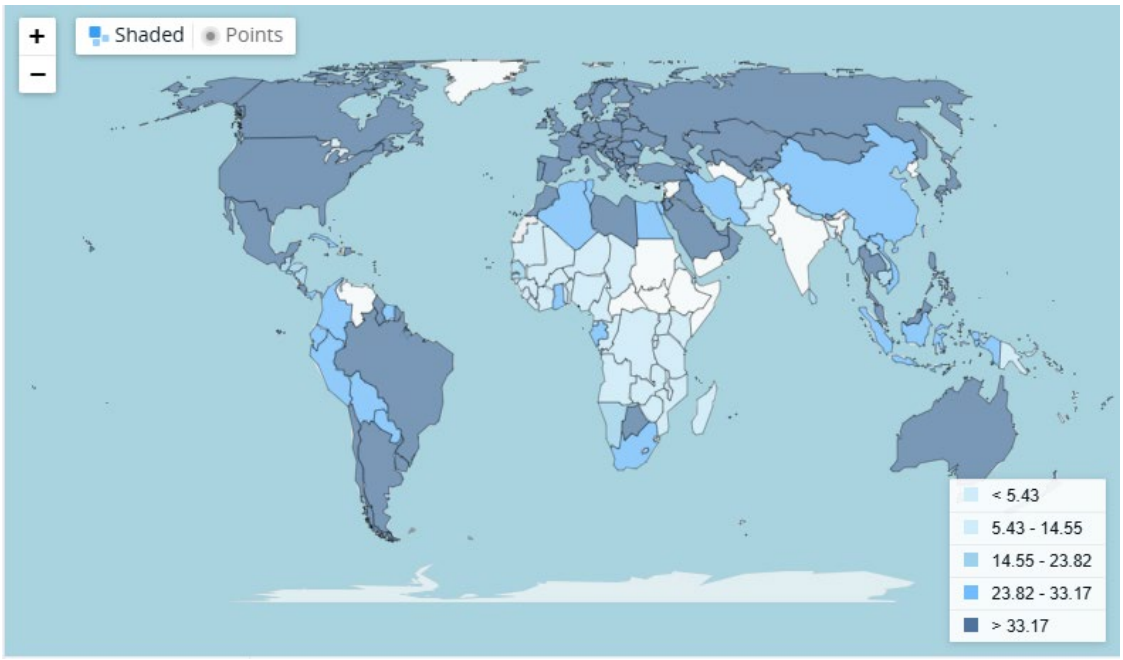

Figure 5: *Global digital divide*
Source: *World Bank, World Telecommunication/ICT Indicators Database*, *International Telecommunication Union (ITU) (2023)*

The digital divide manifests in several interrelated dimensions

1. Connectivity gaps

In many parts of the Global South, reliable internet access is still a major barrier to digital education. According to UNESCO (2023), nearly half of the world's population lacks stable internet access, leaving millions of people unable to access online platforms. Even in areas with some connectivity, data costs remain prohibitive for students who rely on mobile devices as their primary learning tool. Although services like Starlink are beginning to provide satellite-based internet in remote locations, widespread affordability and government support are needed to scale such infrastructure.

2. Device and hardware limitations

Access to devices is another constraint. While global smartphone ownership has reached nearly 70% of the population, device quality varies widely (Laricchia, 2024). Many learners rely on outdated phones with limited storage, poor screen resolution, or low processing power, making it difficult to engage with interactive or video-heavy educational content. Households with multiple children, device sharing and limited availability can reduce learning time and continuity, especially when synchronous learning or long-form lessons are required.

3. Electricity and technical support

Infrastructural issues such as intermittent electricity, especially in rural or conflict-affected areas, further restrict access to consistent learning opportunities. Even when the internet and devices are available, students may face frequent disruptions due to power outages or a lack of charging facilities. The lack of local technical support, such as device repair services or digital literacy training, can leave learners disconnected for extended periods, even with minor technical issues.

4. Educational infrastructure and policy readiness

In many education systems, policy frameworks have not kept pace with technological advancement. Schools may lack the capacity to integrate AI tools, and teachers may not be trained to use digital platforms or manage hybrid learning environments. This limits the

effectiveness of even the best technologies when introduced without systemic support (Saputra et al., 2023; Sterling, 2024).

Data privacy and algorithmic bias

As artificial intelligence becomes more embedded in educational technologies, new ethical and regulatory challenges have emerged, chief among them being data privacy and algorithmic bias. These concerns are not merely technical; they strike at the core of equitable, inclusive, and trustworthy education. If left unaddressed, they risk undermining the very goals that AI-driven solutions seek to achieve under SDG 4.

1. Data privacy concerns in learning environments

AI systems require large amounts of data to function effectively, tracking user behaviour, collecting performance metrics, and adapting content in real time. While this data-driven personalisation enhances learning, it also introduces significant risks related to student privacy.

Learners, particularly minors, often lack the legal understanding or digital literacy to give informed consent regarding how their data is collected, stored, and used. Moreover, educational platforms may engage third-party vendors for cloud storage, analytics, or ad services, raising questions about who owns the data, who can access it, and for what purposes (Arruda & Arruda, 2024).

Without robust data protection policies, students' personal and academic information may be exposed to misuse, profiling, or commercial exploitation, especially in countries lacking strong digital rights frameworks. This is particularly concerning in contexts where government surveillance or data-based discrimination could have lifelong consequences.

2. Algorithmic bias and inequity in AI systems

AI systems are not inherently neutral; they reflect the biases embedded in their training data, design processes, and deployment contexts. In education, this can lead to algorithmic discrimination, where certain groups of learners receive less favourable content recommendations, are misclassified in assessments, or are filtered out of learning pathways based on inaccurate assumptions.

For example, AI trained primarily on data from English-speaking or high-income contexts may underperform for students in multilingual, indigenous, or underrepresented communities. Predictive algorithms might reinforce stereotypes by systematically disadvantaging learners from low-performing schools or marginalised ethnic groups, thereby widening educational inequality rather than reducing it (Abunamous et al., 2022).

The opacity of many commercial AI systems makes it difficult for educators or policymakers to understand how decisions are made, or to contest potentially harmful outputs. This lack of transparency not only weakens trust in AI tools but also raises ethical questions about accountability in learning outcomes.

Teachers as facilitators, not replaced by tech

As artificial intelligence and digital platforms continue to reshape educational landscapes, a key concern among educators, unions, and policymakers is the fear of displacement. However, effective integration of AI and youth-centric technologies is not about replacing teachers, but about redefining and elevating their role in a modern learning ecosystem.

Teachers play irreplaceable human roles in education that machines cannot replicate. They provide emotional support and mentorship, foster social skill development, mediate sensitive or complex content, and adapt instruction to students' cultural, psychological, and personal contexts. While AI may outperform humans in content delivery, data processing, or automated grading, it lacks the empathy, ethical judgement, and relational intelligence required

to guide learners through challenges, insecurities, and social development stages (Sterling, 2024; Abunamous et al., 2022).

Policy and implementation recommendations

Government support for AI in education

Governments play a central role in shaping the future of education, and their support is essential for the ethical, equitable, and impactful implementation of artificial intelligence (AI) in learning environments. To ensure AI serves as a force for educational inclusion rather than exclusion, policy frameworks must proactively guide innovation while addressing risks and inequalities.

1. National strategies and regulatory frameworks

Many countries still lack formal strategies for integrating AI into their education systems. To foster sustainable implementation, governments must establish comprehensive national policies that define the scope and goals of AI in education, standards for data protection and ethical use, curriculum alignment and teacher training requirements, valuation metrics and equity safeguards.

These strategies should be developed in consultation with educators, learners, AI developers, and civil society, ensuring that technological solutions are both pedagogically sound and socially responsible (Arruda & Arruda, 2024).

2. Investment in infrastructure and access

Effective AI integration requires a robust digital infrastructure. Governments must invest in internet connectivity, particularly in rural and underserved regions, and subsidise access to mobile data, devices, and platforms. Initiatives like public-private partnerships with providers such as Starlink could dramatically expand access in remote areas, transforming the internet from a luxury item into a learning necessity (Laricchia, 2024).

Governments should support open-source AI tools that promote educational equity, grants or funding schemes for educational content creators, and the development of local language and culturally contextualised content.

3. AI literacy and teacher capacity building

Without adequate support, even the most advanced AI systems risk becoming underused or misused. Government policy must prioritise professional development for teachers, equipping them with the skills to interpret and utilise AI-generated learning data, blend AI tools with classroom instruction and identify and report algorithmic bias or malfunction.

Ministries of education should integrate digital and AI literacy into pre-service teacher education and offer ongoing upskilling opportunities.

4. Monitoring and evaluation mechanisms

Government support must also encompass robust monitoring and evaluation mechanisms to assess the true impact of AI tools on academic performance, equity, learner engagement, and overall well-being. Policies should mandate periodic reviews focused on critical indicators, including data privacy compliance, disparities in learning outcomes across demographic groups, and user satisfaction among both teachers and students. These evaluations are essential for ensuring that AI implementation remains aligned with the principles of inclusive, equitable, and quality education as outlined in SDG 4 (UNESCO, 2023).

United Nations support for AI-driven quality education

The United Nations and its specialised agencies, particularly UNESCO, United Nations International Children's Emergency Fund (UNICEF), and the International Telecommunication Union (ITU), have a pivotal role in guiding, funding, and scaling global efforts to harness AI and digital innovation for achieving SDG 4. Their involvement is especially vital for ensuring

that such innovations reach low- and middle-income countries, conflict-affected regions, and marginalised populations often left behind by national initiatives.

1. Normative guidance and global standards

UNESCO has taken a leading role in establishing ethical guidelines for the use of AI in education, providing global frameworks through publications such as the Global Education Monitoring (GEM) Reports and the Recommendation on the Ethics of Artificial Intelligence. These guidelines ensure that AI is human-centred, inclusive, and non-discriminatory; that data-privacy and child-protection standards are upheld; that cultural and linguistic diversity is respected in educational content; and that AI tools are used to enhance, not replace human interaction in learning. These standards are essential for informing policies and procurement processes, particularly in countries lacking national AI strategies.

2. Funding and infrastructure support

The United Nations can play a pivotal role in accelerating progress toward SDG 4 by supporting both infrastructure development and equitable access to AI-powered educational tools. Key actions include subsidising digital learning platforms in low-income countries, partnering with connectivity providers such as Starlink to expand internet access in remote and underserved regions, and providing grants to content creators, particularly from the Global South to develop inclusive, culturally relevant educational materials. By strategically directing resources toward digital equity, the UN can help ensure that no learner is excluded from AI-enhanced education due to poverty, geography or displacement.

3. Global collaborations and knowledge exchange

Through initiatives such as Education 2030 and the Broadband Commission, the UN fosters global partnerships among governments, tech companies, research institutions, NGOs and civil society. These multi-stakeholder collaborations support scalable pilot programmes, promote the sharing of best practices, and encourage open research on AI's educational impact. The UN can create a centralised repository of vetted AI tools, teacher training modules, and impact data, especially valuable for small nations or conflict-affected regions seeking guidance.

4. Advocating for learners' rights in the digital age

UN has a unique mandate to advocate for the rights of children and youth in digital spaces. As AI and platform-based learning expand, new challenges around digital consent, AI profiling, and algorithmic exclusion require rights-based global governance. UNICEF's work on child rights in the digital world can be expanded to ensure that education-related AI tools prioritise equity, safety, and well-being.

Public and private partnerships with EdTech creators

As the educational landscape becomes increasingly shaped by digital innovation, public-private partnerships (PPPs) between governments, NGOs, and education technology (EdTech) creators have emerged as a critical mechanism for expanding access to quality learning. These collaborations are essential for bridging the gap between policy aspirations and technological implementation, especially in regions with limited public sector capacity.

1. Leveraging Innovation and Reach

EdTech creators ranging from global platforms like Khan Academy and YouTube Learning to regional start-ups and grassroots content creators bring creativity, agility, and deep user engagement. Their understanding of learner behaviour, mobile-first design, and platform algorithms enables them to produce engaging, scalable content that aligns with how young people actually learn (Sterling, 2024).

Through strategic partnerships, governments and international bodies can leverage the strengths of EdTech creators and digital platforms to enhance educational delivery. These collaborations can help localise content into multiple languages and cultural contexts, adapt learning materials to align with national curricula, and ensure access to creator educators in

regions where formal teaching resources are limited. Additionally, such partnerships enable the integration of AI-based personalisation tools into content delivery systems, ensuring that learning experiences are both inclusive and tailored to individual learner needs.

2. Funding and incentivising inclusive content development

Public funding and incentive schemes can be strategically directed toward content creators who prioritise equity and inclusion, particularly those developing educational materials for girls and young women in STEM, indigenous and minority language learners, learners with disabilities, and displaced or refugee communities. These creators play a vital role in bridging content and accessibility gaps often overlooked by mainstream education systems. Support can take the form of microgrants, visibility partnerships or platform infrastructure assistance, ensuring that creators have both the resources and motivation to align their work with the inclusive aims of SDG 4.

3. Infrastructure and platform access

Governments can also collaborate with private companies to expand access to digital learning platforms and devices, especially for underserved populations. Key strategies include offering zero-rated data packages for educational content, as successfully implemented in countries like South Africa and India, partnering with telecom providers to lower subscription fees for students, and co-investing in the distribution of devices such as Chromebooks or tablets preloaded with curriculum-aligned materials. In return, private companies benefit from enhanced market access, strengthened brand credibility, and the opportunity to generate positive social impact. This creates a mutual value proposition that supports long-term, sustainable collaboration in the education sector.

4. Oversight, ethics, and alignment with public goals

To ensure that public-private partnerships in education serve the public interest, it is essential to establish transparent governance structures. Governments should take the lead in setting ethical and equity standards for educational content, ensuring interoperability and robust data privacy protections, and monitoring the impact of these collaborations on learning outcomes and inclusion. Additionally, care must be taken to avoid overreliance on a single provider or platform, which could undermine diversity and resilience in the education ecosystem. Ideally, such partnerships should be shaped by independent evaluations and meaningful civil society input, ensuring they remain learner-centred, transparent, and aligned with national education goals.

Affordable access to mobile-based learning

Access to mobile devices and connectivity is no longer a luxury; it is a gateway to education for millions worldwide. As mobile-based learning becomes the primary medium for young people, especially in developing regions, ensuring affordability is essential to bridge the digital divide and deliver on the promise of inclusive, equitable, and quality education.

1. Smartphones as primary learning devices

Globally, smartphones are the most widely used digital tools for learning, with nearly 70% of the world's population owning one and over 7 billion subscriptions in 2023, a figure expected to reach 8 billion by 2028 (Laricchia, 2024). For many learners in rural or low-income communities, smartphones are the only learning devices they have, often shared among siblings or families.

Mobile-based learning, delivered via platforms such as YouTube, Khan Academy, and WhatsApp classrooms, enables students to access a range of educational resources, including short video lessons, AI-powered practice tools, peer and tutor feedback, language-specific content, and offline learning apps. These tools offer flexibility and accessibility, especially in low-resource settings. Despite widespread mobile phone ownership, affordability remains a

significant barrier, particularly for data usage costs, paid app subscriptions, and ongoing device maintenance, which can limit consistent access for many learners.

2. Reducing the cost of access

Governments, NGOs, and development partners must prioritise cost-reduction strategies to make mobile learning universally accessible. These strategies include zero-rating educational content by collaborating with telecom providers to exempt key learning platforms from data charges: subsidising internet access to offer free or low-cost mobile data to students in low-income households, and partnering with providers like Starlink to deliver affordable satellite-based internet in remote and underserved regions. Efforts should focus on distributing preloaded learning devices equipped with offline capabilities and aligned curriculum materials to support learners in areas with limited or no internet connectivity.

3. Inclusive mobile app ecosystems

Affordability must go hand in hand with relevance to ensure effective mobile-based learning. Educational apps should be free or freemium, available in local languages, and compatible with low-end devices to serve a broader user base. They should also be optimised for low-bandwidth environments, feature video compression and offline functionality, and align with national education standards to maintain curriculum relevance. Supporting local developers and creators in building such apps helps ensure that the content remains culturally appropriate, context-specific, and sustainable over time.

4. Policy measures for long-term affordability

Governments can adopt long-term policies to support digital education by implementing tax exemptions for educational devices and software, integrating mobile learning into national budgets and donor frameworks, and facilitating bulk procurement and distribution of smartphones or tablets to students. Digital inclusion should be embedded within broader universal service policies, ensuring that connectivity and access to mobile-based education are treated as public goods rather than private luxuries (Saputra et al., 2023).

Upskilling teachers for AI literacy

Teachers are the frontline agents of educational transformation. While artificial intelligence (AI) offers promising solutions for personalised learning, content automation, and administrative efficiency, its impact will only be fully realised if teachers are empowered, not sidelined. Ensuring that teachers are AI literate is crucial to achieving SDG 4 in an ethical, inclusive, and scalable way.

1. The role of AI literacy in teaching

AI literacy goes beyond basic digital competence. It requires that teachers understand how AI systems work and how they make decisions, interpret AI-generated learning analytics and feedback. They should use AI-powered tools for assessment, tutoring or content delivery. Teachers should recognise ethical concerns such as data privacy, algorithmic bias, and student autonomy. Without these skills, educators may either underuse AI or apply it in ways that could widen existing inequities or misguide learners (Sterling, 2024).

2. Integrating AI training into teacher education

To close this gap, ministries of education and teacher training institutions must embed AI literacy and digital pedagogy into pre-service teacher education and offer continuous professional development (CPD) focused on emerging EdTech tools.

They should provide micro-credentials and certifications that recognise tech-integrated teaching excellence and equip teachers with the confidence to critically evaluate AI resources and co-design their use in classrooms. These training initiatives should also include practical workshops, case studies, and peer-exchange forums where teachers can reflect on their experiences and share strategies.

3. Building a culture of human-tech collaboration

Effective AI integration hinges on a paradigm shift: moving from a model in which technology replaces teachers to one in which it amplifies their role. Teachers must be positioned as co-designers of AI-enhanced learning, using technology to tailor instruction, identify students at risk, foster deeper engagement, free up time for mentorship, creativity and socio-emotional learning. This requires not only training but also recognition and institutional support, such as time allowances for experimentation, incentives for innovation, and leadership opportunities in EdTech development.

4. Ensuring equity in access to training

Support mechanisms such as offline training modules, radio or TV-based upskilling programs, and mobile learning apps for teachers can play a crucial role in extending AI literacy and digital pedagogy to educators in regions with limited or no internet access. These alternative delivery methods are vital to ensure inclusiveness in professional development. Special attention must be given to rural teachers and educators in low-resource settings, female teachers who may encounter gender-based barriers to digital access, and those working in refugee camps or conflict-affected areas, where traditional training infrastructure is often unavailable.

Conclusion

Recap of key points

The present paper explored how the integration of artificial intelligence (AI) and youth-centric digital platforms can accelerate global progress toward Sustainable Development Goal 4 (SDG 4): Quality Education for All. It has identified the critical limitations of traditional education models, including standardisation, inaccessibility, and a disconnect from learners' real-world needs.

In contrast, today's digital-native students seek personalised, flexible, and mobile-first learning experiences that are increasingly delivered through platforms like YouTube, mobile apps, and AI-powered learning systems. When strategically deployed, these tools can deliver education that is scalable, inclusive, and responsive to the needs of diverse learners, including those in underserved or remote areas.

The paper has also emphasised that AI alone is not a panacea. Its benefits must be matched with robust infrastructure, policy support, ethical oversight, and teacher empowerment. With the right partnerships, especially among governments, the United Nations, EdTech innovators, and educators, technology can be transformed from a digital divide into a digital bridge.

Reframing SDG 4 as a flexible, scalable mission

Traditionally, SDG 4 has been interpreted through the lens of physical schooling and standardised metrics. This paper argues for a necessary reframing of viewing SDG 4 as a living, adaptable mission capable of evolving with technological and social shifts.

Education today must be flexible, meeting learners where they are physically, emotionally, and cognitively. It must also be scalable, capable of reaching billions without compromising quality. To be truly effective, education must be culturally contextualised, ensuring that global goals are realised through content and delivery methods that resonate locally. Equally important, it must be ethically governed, protecting learners from exploitation, profiling, or exclusion. This reframing transforms SDG 4 from a static checklist into a dynamic, inclusive ecosystem that supports lifelong, equitable learning in a digitally connected world.

Vision for the future: inclusive, accessible, human-centred education

The path forward must prioritise education that is not only technologically advanced but fundamentally human-centred. AI should be a partner to educators, not their replacement, and

digital platforms should serve as springboards for curiosity, connection, and growth, not mere content repositories.

In this vision, students learn from educators they relate to, in formats they enjoy, and at times that fit their lives. Teachers become guides and innovators, empowered, not constrained by AI. Governments and international bodies play a pivotal role by investing in equitable access and ethical safeguards, ensuring no learner is left behind. Learning becomes as mobile as the world we live in and as adaptable as the learners we serve.

Realising this vision will require bold leadership, global collaboration, and an unwavering commitment to equity, innovation, and sustainability. But if achieved, it will mark a monumental leap not only for education, but for humanity itself.

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Beyond compliance: embedding ESG on organisational culture-a Kenyan perspective

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Abstract

Environmental, Social and Governance (ESG) principles have evolved from a mere regulatory compliance framework and checklist into a powerful catalyst for business sustainability and long-term success. However, many Kenyan firms remain at the compliance stage, approaching ESG principles as a checklist for reporting rather than a strategic imperative. This study used Kenya Power, a major electricity corporation in Kenya, as a case study. Through analysis of its annual ESG disclosures and integrated financial reports (2020–2024), the study evaluated the degree of cultural assimilation across three ESG principles domains: environmental mindfulness, social inclusivity and ethical governance. The study found that Kenya Power has strongly institutionalised ESG principles with clear mandates, but certain aspects still require further development. Also, Kenya Power's ESG practices are strong on compliance but weak on embedding organisational culture. However, the company is slowly but steadily transitioning from ESG principles compliance and reporting to embedding them in its organisational culture. This study recommends that regulatory bodies and governments should mandate ESG principles disclosure beyond reporting and require information on the level of Environmental, Social and Governance principles integration in organisational culture.

Keywords: Environmental, Social and Governance, Organisational Culture, Sustainability, Competitive Advantage, Business Transformation

JEL Classification: M14, Q56, O55

Introduction

Within the current corporate environment, Environmental, Social and Governance (ESG) principles have become an integral pillar of sustainable entrepreneurial practice and business performance (Mukhtar et al., 2024; Sierdovski et al., 2022; Zahari et al., 2024). ESG presently supersedes the traditional concept of Corporate Social Responsibility (CSR) by integrating governance excellence, long-term environmental considerations and practices, and social accountability into core business strategies (Gill et al., 2023; Mukhtar et al., 2024). ESG also transcends conventional investor reporting and compliance checklists in order to be effective, efficient and strategic (Bao et al., 2024; Kim et al., 2022; Rane et al., 2024). However, scholars have advanced the argument that for ESG to be fully effective, efficient and strategic, it must be embedded into the organisational culture of business enterprises, to the extent that it shapes the ideologies, behaviour, values, leadership and decision-making at every organisational level (Cahyono et al., 2024; Sierdovski et al., 2022; Zahari et al., 2024).

The urgency to embed ESG into organisational culture has been further exacerbated by the increasing focus on climate change, the expanding spectacle of social inequality, and failures in corporate governance structures (Garg & Manchanda, 2023; Goncalves, 2024; Howard-Grenville & Gapp, 2022). The aforementioned gaps have so far exemplified the current stakeholder pressure on businesses to not just account for ESG metrics but to exhibit value-driven and authentic leadership at all levels of the organisation (Olanrewaju et al., 2024). In

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fact, regulators, investors, civil society, consumers, and employees currently expect and demand the internalisation of ESG values in organisations, as reflected in their community engagement, operations, employee relations, and supply chains (Howard-Grenville & Gapp, 2022).

Despite the notable value of ESG in organisations, the majority of organisations persist in treating ESG as what Gowers (2024) called a bolt-on initiative, characterised by a focus on external commitments rather than internal organisational culture. The divide accounts for the ineffectiveness, lapses, lack of resilience and lack of credibility of ESG programmes. Embedding ESG into the organisational culture of businesses thus ensures that ethical behaviour and sustainability are intrinsically ingrained in organisational operations, rather than simply communicated externally (Olanrewaju et al., 2024; Zahari et al., 2024).

Organisational culture has been defined as the shared belief system, values, traditions, practices and norms that direct and shape organisational behaviour (Hofstede, 1980). It affects the manner in which employees and other direct stakeholders engage with the organisation, decode organisational goals, operate within the organisational structures and deal with ethical dilemmas (Grover et al., 2022; Schein, 1990). It has thus been argued that without cultural integration, ESG risks employee inertia and resistance, and consequently its misapplication within the organisation (Lam et al., 2021; Sierdovski et al., 2022; Zahari et al., 2024).

Thus, an organisational culture that has effectively embedded ESG is characterised by environmental mindfulness, with prioritisation of climate action and resource efficiency (Bai et al., 2024; Mukhtar et al., 2024). It is also characterised by social inclusivity, with equity, diversity, community impact, and employee well-being as central focus areas. Another critical characteristic of a culture embedded in ESG is ethical and excellent governance, characterised by accountability, transparency, regulation, control, and compliance (Van Holt et al., 2021; Zahari et al., 2024). To that extent, embedding ESG into the organisational culture demands the adoption of transformational leadership, systems thinking approach, robust employee engagement and intentional capacity building that aligns the goals of ESG to daily organisational operations, performance measures and organisational metrics and goals (Khaddage-Soboh et al., 2024; Zahari et al., 2024).

An examination of global trends shows that ESG has transitioned from a compliance focus into a strategic imperative (Li et al., 2024; Xiao et al., 2023). Consequently, regulators of organisations in the USA, parts of Asia and the European Union (EU) are currently requiring compulsory ESG disclosures (Annessi et al., 2025; Sulkowski & Jebe, 2022). Further, there is a growing scale of ESG-bounded investment funds, signposting a shift in conventional capital markets toward responsible fund investment (Annessi et al., 2025; Sulkowski & Jebe, 2022; Xiao et al., 2023). Further, there is an increasing reward among Gen Z and Millennials for brands that are strongly ecologically conscious and embrace social justice issues (Cinciulescu et al., 2024; Olteanu & Ionașcu, 2023). Accordingly, organisations that have embedded ESG into their organisational culture are more inclined to enhance stakeholder trust, attract top talent, better minimise and mitigate risks, expand their innovativeness, and achieve sustainability results (Olteanu & Ionașcu, 2023; Zahari et al., 2024). Conversely, those with embedding weaknesses confront regulatory challenges and penalties, reduce their competitive edge and suffer reputational costs (Mukhtar et al., 2024; Olteanu & Ionașcu, 2023; Zahari et al., 2024).

In developing regions, including Kenya, where the ESG concept is gaining momentum, its implementation appears stuck at an early stage of maturity (Muigua, 2022; Onsongo et al., 2025). Many of the organisations in Africa, in general, and Kenya in particular, still confront weak regulatory understanding of the ESG practices and standards (Saka, 2024; Onsongo et al., 2025); poor enforcement protocols (Onsongo et al., 2025); constraints in the ESG implementation capacity (Mukhtar et al., 2024; Onsongo et al., 2025); and disconnect between current trends in consumer preferences, employee practice at the lower levels and leadership

commitment at the higher levels (Muigua, 2022; Saka, 2024). Thus, more succinctly, many Kenyan organisations still approach ESG as a checklist for reporting rather than as a strategic imperative.

However, empirical analysis strongly suggests that critical Kenyan sectors of agriculture, banking, manufacturing and energy are steadily recognising the value of ESG as a critical catalyst for effective green financing, accessing export standards, receiving tax rebates and building valuable and sustainable business models (Saka, 2024; Onsongo et al., 2025). Nonetheless, embedding ESG into the organisational culture for many Kenyan firms remains a challenge owing to inadequate literacy in ESG concepts and values, legacy, business orientation and practices, and a focus on short-term profit-making (Onsongo et al., 2025). From the outset, it can be said that many organisations in the developing world, and Kenya in particular, have not proactively and effectively embedded ESG into their organisational culture. Furthermore, studies conducted in the region on ESG have mostly focused on ESG compliance and reporting (Agutu & Githira, 2023; Mukhtar et al., 2024; Onsongo et al., 2025), with a paucity of studies on the embedding of ESG within organisations' internal mechanisms, particularly organisational culture. This study thus aims to examine the influence of Embedding ESG into organisational culture from a Kenyan perspective. It does this by using Kenya Power, a Kenyan energy-based conglomerate, as a case study. The primary goal of this study is to offer practical recommendations and insights for Kenyan organisations and those in the developing world to enable a better understanding and effective implementation of ESG practices embedded in organisational culture, as a means of advancing their sustainable business models and organisational outcomes.

Literature review

Literature related to ESG has expanded considerably in recent years due to increasing stakeholder pressure on businesses to meet the contemporary needs of social inclusion, environmental sustainability, ethical practices, and sustainable business models (Lam et al., 2021; Sierdovski et al., 2022; Zahari et al., 2024). However, the aspect of cultural internalisation of ESG, which demands that ESG be embedded into the shared belief system, values, traditions, practices and norms that direct and shape organisational behaviour, has so far been under-explored predominantly in developing countries (Agutu & Githira, 2023; Mukhtar et al., 2024; Onsongo et al., 2025). The subsequent section explores empirical literature on ESG and its value within organisational cultures from a global, African, and local perspectives, not only to identify the concepts that undergird the embedding of ESG within organisational culture but also to identify notable gaps. Furthermore, it discusses notable theories applied in the relevant discussions on the subject.

Globally, studies on ESG and organisational culture in countries such as the USA, UK, and Canada have found that ESG has successfully transitioned from a purely CSR framework to a more performance-oriented and strategic framework (Borger & Costa, 2020; Tonelli et al., 2024; Wan, 2023). As a strategic aspect, ESG has consistently required integration into the organisational culture so that it permeates the organisation's psyche, rather than being a stand-alone component (Singhania & Saini, 2023). Further, studies from the global perspective have identified agencies like the Global Reporting Initiative (GRI), the UN-Based Principle of Responsible Investment (PRI) and Task Force on Climate-related Financial Disclosures (TCFD) as instrumental agencies that have standardised ESG protocols and standards sufficiently to make ESG an integral part of organisational existence in the Western and European world (Rasche et al., 2023).

Empirically, studies conducted in the Global North have found that organisations that have culturally internalised ESG principles outperform their counterparts in terms of innovativeness, financial performance, and overall organisational outcomes (Roy & Mukherjee,

2022; Roszkowska-Menkes, 2023; Shin et al., 2023). Other studies have noted that organizations that use a triple Bottom Line model that balances profit making, social issues with environmental conservation offer a more sustainable business model that is better aligned to the future of the capital markets (Aich et al., 2021; Dyer et al., 2021). These companies have also observed significantly improved organisational outcomes in terms of financial sustainability, creativity, customer engagement and satisfaction and employee motivation and performance (Aich et al., 2021; Dyer et al., 2021).

Conversely, while studies have identified the positive value of ESG principles for organisations, especially when integrated into organisational culture, there are also significant empirical reviews showing that organisations are generally disinclined to sacrifice profit-making (Dias, 2024; Wasiuzzaman et al., 2023). The studies show that many organisations do not see the value of social and environmental conservation alongside profit-making, choosing to stick to the traditional short-term focus on profits at the expense of potential long-term benefits that would accrue from being socially and environmentally responsible (Dias, 2024; Wasiuzzaman et al., 2023). Studies that have identified the inclination towards profit-making have noted that these organisations lack transformational leadership that is forward-looking and sustainability-oriented (Morales-Sanchez & Pasamar, 2019). The argument proffered is that transformational leaders have the capacity to shape the attitudes, values, norms, and belief systems of all organisational stakeholders, and that if they were to effectively embrace ESG, positive changes and stakeholder buy-in would inevitably follow (Morales-Sanchez & Pasamar, 2019).

Further, ethical attitudes and concepts are increasingly on the radar of organisational leadership in their pursuit of sustainable outcomes (Lam et al., 2021; Sierdovski et al., 2022; Zahari et al., 2024). Organisations that keep ESG principles at the forefront are better placed to advance ethical attitudes and standards to both their external (consumer) and internal (employee) audiences (Sierdovski et al., 2022; Zahari et al., 2024). The ESG principles also notably ensure environmental stewardship for global organisations, not only for employee support but also for consumer engagement and access to consumer preferences (Gill et al., 2023).

Moreover, studies emerging on the global stage highlight that ESG often fails in environments where employees lack the knowledge, skills, and attitudes needed to effectively implement ESG within the organisation (Farooq, 2015; Roy & Mukherjee, 2022; Roszkowska-Menkes, 2023). They argue that embedding ESG into the organisational culture allows ESG to direct and inspire the recruitment process and to underscore performance evaluations and leadership development, aspects that are also integral to culture building (Chen et al., 2025). On the global stage, conglomerates such as Patagonia, Unilever and Danone are notably cited as having successfully integrated ESG into their culture and, consequently, posted positive organisational outcomes in terms of financial, innovative, satisfaction and competitive performance (Tariq, 2024).

Studies examining the African case as far as embedding ESG into organisational culture have noted that ESG integration is on the rise within larger corporations in Africa than in smaller corporations (Al-Hiyari et al., 2023; Ogundajo et al., 2022; Ogolime & Ibrahim, 2024). Some of the reasons relate to the resource capacity of larger corporations (Kogi et al., 2025). However, other studies have found that embedding ESG into organisational culture in smaller organisations in Africa is easier and more efficient owing to the flexibility in terms of leadership and change adaptation that smaller organisations enjoy over larger corporations (Ajayi, 2024; Jin & Kim, 2022). What is clear is that there is ambiguity about the level and influence of embedding ESG into organisational culture within the African case.

Furthermore, studies conducted in the African context have found that embedding ESG into organisational culture is strongest in Nigeria, Kenya and South Africa, driven by investor

demand, social equity pressure, climate change risks and consumer preferences (Ajayi, 2024). This is particularly exemplified by the presence of Nairobi Securities Exchange (NSE) ESG Reporting Guidelines in Kenya and the Johannesburg Stock Exchange Sustainability Disclosure Guidance in South Africa (Ajayi, 2024). The fact that only three countries are mentioned positively in terms of embedding ESG into organisational culture suggests a weak ESG culture among African companies.

Moreover, scholars have found that many African-based companies show a strong inclination towards a compliance-based ESG approach, rather than cultural internalisation or a strategic approach to ESG (Ogundajo et al., 2022; Ogolime & Ibrahim, 2024). The aforementioned firms often struggle with low ESG knowledge and literacy, resource constraints, and a lack of strategic alignment that brings the whole organisation onboard (Bukari et al., 2024; Pinheiro et al., 2025). Institutional voids, characterised by regulatory and compliance gaps, are another issue affecting the embedding of ESG into organisational culture within firms in Africa (Pinheiro et al., 2025).

Kenya has made tremendous strides in ESG adoption and awareness, particularly in its banking, manufacturing and telecommunications sectors (Agutu & Githira, 2023). The Nairobi Securities Exchange (NSE) ESG Reporting Guidelines (2021) encourage organisations to disclose their ESG mechanisms and strategies, yet very few have transitioned to effectively embed ESG into organisational culture (Agutu & Githira, 2023; Saka, 2024). Research by Mwangi and Ouma (2024) found that in Kenyan firms, senior management's commitment to adopting and implementing ESG is high, while that of middle-level and low–level employees is low due to a lack of skills and awareness, further exposing the gap between policy and practice in Kenya's ESG endeavours. Moreover, Kenyan-based studies have also noted that hierarchical leadership styles, overemphasis on regulatory reporting and compliance and short-term business focus on profitability negatively affect ESG cultural integration (Agutu & Githira, 2023; Saka, 2024).

Theoretical framework

This study is anchored on institutional Theory as postulated by DiMaggio and Powell (1983). Institutional Theory, as developed by sociologists Paul J. DiMaggio and Walter W. Powell (1983) provide a framework for understanding how ESG practices can become sources of competitiveness through social legitimacy. Institutional Theory suggests that organisations often adopt certain practices not only for their economic benefits but to align with the norms, values, and expectations of the society in which they operate. Companies, for instance, increasingly implement ESG practices under pressure from stakeholders, regulatory bodies, and societal expectations (Del Gesso & Lodhi, 2025; Liu et al., 2024).

By adopting ESG initiatives, organisations can enhance their legitimacy by aligning with socially responsible behaviours that improve their public image and reputation (Del Gesso & Lodhi, 2025). This social legitimacy can translate into competitive advantages, as consumers, investors, and employees are drawn to companies perceived as ethical and socially responsible (Liu et al., 2024). DiMaggio and Powell (1983) argue that companies face pressures toward institutional isomorphism, which is the tendency to adopt similar practices across an industry to maintain legitimacy, which can drive them to integrate ESG in ways that attract positive stakeholder attention and, in turn, foster competitiveness.

Institutional Theory also explains how ESG initiatives can enhance competitiveness by enabling companies to differentiate themselves in environments with varying degrees of institutional pressures (Liu et al., 2024). DiMaggio and Powell (1983) identify three forms of isomorphic pressures: coercive, mimetic, and normative that drive companies toward ESG adoption. Coercive pressures stem from regulatory or political forces, prompting companies to

comply with environmental and social standards to avoid legal repercussions and maintain their competitive standing. Mimetic pressures arise from market uncertainty, leading firms to imitate the socially responsible practices of successful peers to gain credibility and competitive parity. Normative pressures, influenced by industry standards and professional associations, encourage organisations to adopt CSR to conform to widely accepted ethical standards. Companies that proactively implement ESG, particularly those that go beyond basic compliance and adopt innovative practices, can distinguish themselves in competitive markets (Kim et al., 2024; Liu et al., 2024). By exceeding institutional expectations, they create unique reputational advantages and establish themselves as industry leaders in ESG. Institutional theory, therefore, suggests that ESG is not merely a trend but a strategic tool that aligns businesses with social values, enhances stakeholder trust, and solidifies a competitive position within the industry (Kim et al., 2024).

From the foregoing, notable research gaps in global, regional (African), and Kenyan-based studies on ESG cultural integration include a paucity of research on the specific ways ESG can be culturally integrated within organisations. There is also a lapse in a context-specific ESG cultural integration model applicable to the Kenyan organisations.

Research objective

Thus, this study sought to establish the level and influence of embedding environmental mindfulness, social inclusivity, and ethical governance on organisational culture in Kenya, using Kenya Power as the case study.

Methodology

This study used a secondary data research design to access readily available data from Kenya Power related to ESG disclosed data from Kenya Power Company, Kenya. The sources for the secondary data included: Kenya Power Annual integrated reports and financial reports (2020-2024); Kenya Power sustainability and ESG strategy 2024; Nairobi Securities Exchange industry reports; and Federation of Kenya Employers (FKE) reports for the selected company. Table 1 summarises the key ESG variables examined in this study with specific indicators. Environmental mindfulness is reflected in climate action and resource efficiency, and in social inclusivity through equity, diversity, community impact, and employee wellbeing, while ethical governance is represented by accountability, transparency, regulatory control, and compliance. The table also links these dimensions to organisational culture by outlining the values, norms, traditions, and beliefs that underpin ESG integration.

Table 1: *ESG variable measurements*
Source: *Author's own elaboration*

Variables	Specific Indicators
Environmental Mindfulness	i climate action ii Resource Efficiency Prioritisation
Social Inclusivity	i Equity ii diversity iii community impact iv employee-wellbeing

Ethical Governance	i Accountability and transparency ii regulation control iii compliance
Organisational Culture	Values, norms, traditions and beliefs

Results and Findings

The results and findings are based on the key themes of the study: Environmental Mindfulness, Social Inclusivity, Ethical Governance, and organisational culture. The data sources are Kenya Power Annual integrated reports and financial reports (2020-2024); Kenya Power sustainability and ESG strategy 2024; Nairobi Securities Exchange reports for the industry; and Federation of Kenya Employers (FKE) reports for the selected company for the year ending 2024. Table 2 illustrates these findings clearly and brings together Kenya Power's performance across the three ESG domains. It maps the indicators against the GRI standards and SDGs, while also showing how far these practices have been embedded within the company's organisational culture."

Table 2: *ESG and organisational culture results for Kenya Power*
Source: *Author's own elaboration*

Variables	Specific Indicators	Kenya Power Implementation	Mapping to GRI and SDGs	Results (2024)	Embedded in Organisational Culture
Environmental Mindfulness	Climate action	Reduce GHG emissions via the development of a baseline GHG Inventory Develop road map to reduce GHG emissions	GRI 305 & SDG 13	Five million kg Carbon dioxide emissions avoided 350,000 trees planted 40,000 concrete poles replace wooden poles 3,753 electric vehicles (EVs) on the roads KShs 258 million allocated for e-mobility	☑
	Resource efficiency prioritisation	Invested and deployed the Loss Diagnostic Tool and Loss Monitoring and Mitigation Tool for resource efficiency	GRI 4 & SDG 9	Improved efficiency by 0.06% marginally	☒
Social Inclusivity	Equity	Developed a Diversity and Inclusion policy and framework	GRI 404, 405 & SDG 5, 8	No report	☒
	Diversity	Build a diverse workforce based on the Diversity and Inclusion	GRI 403 & SDG 8	Of the 10 board members, 3 are female, thus compliant, but no	☒

		policy and framework		compliance in employees	
	Community impact	Engage in CSR in education, plus other activities		Allocated KShs 171,000 to the Colobus Conservation Trust for habitat conservation, thus saving the ecosystem in Kilifi Connected 291,000 poor households for free Mentored 10,000 students through the mentorship program Spent over 1 million through the Kenya Power Endowment Fund 1% (100,000 million approximate) of net profit is committed to CSR	☑
	Employee-wellbeing	Developed a clear compliance framework related to Occupational Safety and Health (OSH)		Created a cost-of-living adjustment upwards by 11% Reviewed remuneration by 12% 10 staff fatalities and 118 non-staff injuries, and an increase of 2.3% from the year 2023. Employees have clear leave days and medical coverage	☑
Ethical Governance	Accountability and transparency	Developed a Code of Ethics		49 Employees dismissed for breaching ethics Did 2 companywide awareness programmes on the code of ethics Internal assessment of ethics compliance done, and gaps identified Carried sensitisation program to embed an ethical culture in the organisation Have a whistle-blowing mechanism	☑

				However, according to an audit by the Auditor General, the company did not comply with the proper regulations governing the remuneration of contract workers. There were also inconsistencies in consumer power billings	
	Regulation, control and Compliance			All required disclosures under the CMA is in the company website	☑

Findings

Kenya Power has strongly institutionalised ESG, with clear mandates for environmental mindfulness, social inclusivity, and ethical governance. However, the resource prioritisation under environmental mindfulness, equity and diversity, and the regulation and compliance aspects under ethical governance need further development.

Furthermore, Kenya Power's ESG practices are strong on compliance but weak on embedding organisational culture. However, a look at Kenya Power's efforts shows that the company is slowly but steadily transitioning from ESG compliance and reporting to embedding in its organisational culture.

Discussion

The study findings that Kenya Power has ESG mandates despite needing deepening in certain aspects agree with literature that shows that ESG has expanded considerably in recent years due to the increasing stakeholder pressure on businesses to adhere to contemporary needs of social inclusion, environmental sustainability, ethical practices and sustainable business models (Lam et al., 2021; Sierdovski et al., 2022; Zahari et al., 2024). Also, agreeing with studies done on ESG and organisational culture in countries like the United States of America, the United Kingdom, and Canada, which have found that ESG has successfully transitioned from a purely CSR framework to a more performance-oriented and strategic framework (Borger & Costa, 2020; Tonelli et al., 2024; Wan, 2023). The result also aligns with African-based studies showing that, as far as embedding ESG into organisational culture is concerned, ESG integration is on the rise within larger corporations in Africa than in smaller corporations (Al-Hiyari et al., 2023; Ogundajo et al., 2022; Ogolime & Ibrahim, 2024).

The finding that Kenya Power's ESG practice is high on compliance but low on culture internalisation aligns with the literature, which shows that while the ESG concept is gaining momentum, its implementation appears stuck at an early stage of maturity (Muigua, 2022; Onsongo et al., 2025). Furthermore, many African-based companies, even those in Kenya, show a strong inclination towards a compliance-based ESG approach rather than cultural internalisation or a strategic approach to ESG (Ogundajo et al., 2022; Ogolime & Ibrahim, 2024).

Limitations and policy implications

This study faced the limitation common in secondary data analysis: limited control over data quality and the general misfit between secondary sources and the primary focus of this study. This study recommends that regulatory bodies and governments should mandate ESG disclosure beyond reporting and require information on the level of ESG integration in organisational culture.

Conclusion

This study set out to explore how ESG practices are being embedded into organisational culture in Kenya, with Kenya Power as the case study. The findings reveal encouraging progress, but some gaps are clear. Kenya Power has taken meaningful steps in climate action and governance, yet issues such as resource efficiency, diversity, and equity remain underdeveloped. Ethical governance frameworks exist, but inconsistent practices in regulation and remuneration continue to weaken the impact. These results suggest that ESG in Kenya remains more about compliance than cultural transformation, with many companies stuck on ESG compliance and reporting rather than on ESG integration into organisational culture, and this needs to change.

Looking ahead, several steps could help bridge this gap. Companies need to invest more in building employee awareness and capacity so that ESG is lived across all levels of the organisation, not just discussed in boardrooms. Regulators, too, should move beyond disclosure requirements and place stronger emphasis on whether ESG principles are truly integrated into organisational culture. Leaders must adopt approaches that connect ESG to everyday work and long-term strategies, while researchers and practitioners should work to develop models that fit Kenya's unique social and economic context rather than relying solely on global templates.

From my perspective as the author, the biggest challenge lies in the tendency to treat ESG as a reporting exercise. If this continues, ESG will remain a checklist rather than a force for change. The experience of Kenya Power shows that meaningful cultural integration is possible, but it requires persistence, leadership, and a genuine commitment to values that go beyond compliance.

In the end, embedding ESG into organisational culture is not only about meeting regulatory standards. It is about shaping the way organisations think, act, and relate to their stakeholders. For Kenyan companies, this shift is both a necessity and an opportunity: a necessity to remain credible and competitive in global markets, and an opportunity to build stronger, more sustainable, and more trusted organisations for the future.

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Exploring tourists' perceptions of sustainable tourism: a bibliometric approach

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Abstract:

The global tourism industry now focuses on sustainable tourism, which protects the environment, respects local cultures, and supports economic growth. To promote responsible travel, policymakers must consider tourists' perceptions of sustainable tourism. These perceptions help develop effective policies and practices. This study employed bibliometric methods to explore research trends on tourists' perceptions of sustainable tourism from 1992 to 2024. A total of 205 English-language scholarly articles from 121 sources were analysed using bibliometric tools to evaluate publication trends, journal performance, author contributions, document impact, and key research themes. The analysis reveals a steady annual growth of 12.86% in publications on this topic, highlighting its increasing significance. Meanwhile, the 30.73% rate of international collaboration indicates that researchers worldwide are increasingly collaborating in this field. The keyword and co-word analysis further identifies the main research topics, popular themes, and emerging research areas within this field of study. The findings also highlight existing research gaps and offer valuable guidance for researchers and policymakers seeking to develop sustainable tourism strategies grounded in tourists' perspectives.

Keywords: Sustainable Tourism; Tourists' Perceptions; Tourism Research; Tourist Behaviour; Bibliometric Study

JEL Classification: Z32

Introduction

Due to global warming and growing environmental concerns, sustainable development has become a top priority in many industries. Tourism actively supports sustainable practices while also benefiting from their outcomes. Sustainable tourism basically focuses on reducing negative economic, social, and environmental impacts now and in the future (Baloch et al., 2023; Roblek et al., 2021). It has become a key priority in government agendas and a driving force behind innovation in the tourism industry. Tourists today are not just passive consumers. They play a key role in sustainable tourism. Their values, expectations, and awareness actively influence how sustainability is shaped in tourism destinations around the world (Basendwah et al., 2024). Consequently, understanding how tourists perceive sustainable tourism is crucial for developing effective destination plans and promoting responsible travel behaviours. In recent years, there has been a growing research interest in understanding tourists' attitudes, motivations, and behaviours toward sustainability. This growing interest is driven by the increasing visibility of challenges such as climate change, cultural erosion, and over-tourism. Scholars have explored tourists' willingness to spend more on sustainable and eco-conscious services (Suhardono et al., 2025; Suryawan et al., 2025; Göktaş & Çetin, 2023; Musa & Nadarajah, 2023). They have also looked at how environmental certifications and green

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communication affect tourists' decisions (Nelson et al., 2021; Lee et al., 2019; Martínez García de Leaniz et al., 2018). These studies reveal that tourists hold diverse and shifting views on sustainability. Their perceptions are influenced by factors such as nationality, destination type, travel experience, and their level of awareness about sustainability (Mohaidin et al., 2017; Jin et al., 2016).

With rapid growth in research publications on this topic, bibliometric analysis offers a reliable and systematic approach to evaluate how studies on tourists' perceptions of sustainable tourism have developed. It enables a clear overview of the evolving academic landscape. This study uses the Scopus database to look at research published between 1992 and 2024. It tracks the development of academic discussions, identifies key contributors, and highlights the field's main topics. Earlier literature reviews have mostly looked at sustainable tourism in a broad sense. They have also used qualitative summaries of selected studies rather than quantitative analysis. In contrast, this study focuses on filtering articles by their titles' keywords. This approach ensures that authors accurately capture research specifically about tourists' perceptions of sustainability.

The present paper makes several key contributions to sustainable tourism research. First, this study identifies the most influential authors, institutions, and countries contributing to this study area. This reveals the primary hubs of academic influence and leadership. Second, the study identifies key thematic clusters and emerging research areas. These include perception-based segmentation, modelling sustainable behaviours, the impact of eco-labels, and changes in tourist awareness after the pandemic. Third, the study highlights gaps in current knowledge and suggests directions for future research. It emphasises the need to explore technological tools, behavioural economics, and cross-cultural comparisons in understanding tourists' perceptions. Lastly, this study offers practical insights for tourism marketers, planners, and policymakers. It highlights the need to adapt strategies to reflect travellers' growing concern for sustainability and responsible tourism. The primary goal of this study is to address the following key research questions:

RQ1: What is the intellectual and conceptual structure of the research field concerning tourists' perceptions of sustainable tourism?

RQ2: What are the major themes, trends, and influential contributions (authors, institutions, countries) in the literature on tourists' sustainable behaviour and awareness?

RQ3: How have the research themes and focus areas evolved, particularly with environmental awareness, responsible travel, and post-pandemic shifts?

RQ4: What are the key gaps in the current literature, and what future directions can be proposed for advancing the study of tourists' perceptions in the context of sustainability?

The structure of this study comprises four key sections that systematically explore the research objectives. The second section outlines the methodology, including data collection strategies and the application of a bibliometric tool. The third section presents the study's results and analysis using performance metrics and science mapping tools. It identifies leading authors, highlights key research themes, and examines patterns of collaboration in the field. Finally, the fourth section discusses the implications of the findings, addresses limitations, and suggests avenues for future research on tourists' perceptions of sustainable tourism.

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Methodology

Figure 1 describes the data retrieval process and analysis flowchart. This study applies bibliometric analysis to systematically examine the academic literature on tourists' perceptions of sustainable tourism across the entire study period. In 1969, Pritchard first introduced bibliometric analysis as a powerful quantitative tool for evaluating the growth, structure, and dynamics of academic fields (Pritchard, 1969; Salinas-Ríos & García López, 2022). This method is significant for identifying key authors, influential journals, collaboration patterns, and dominant research themes (Keathley-Herring et al., 2016). It also provides a data-driven perspective for understanding the intellectual landscape and scientific development of the study area. To ensure a high-quality and comprehensive dataset, this study relies exclusively on the Scopus database. Scopus is widely recognised for its broad and reliable coverage of peer-reviewed literature across multiple disciplines (Schotten et al., 2017). Scopus provides comprehensive metadata, including author affiliations, citations, and co-authorship information.

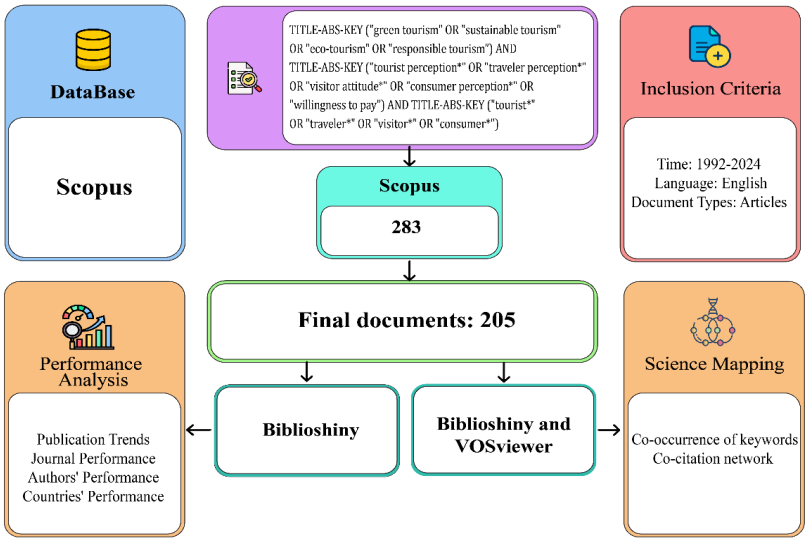

Figure 1. *Data retrieval process and analysis flowchart*
Source: *Authors' work*

This rich data enhances the accuracy and depth of bibliometric analyses. The data collection process involved conducting a title-specific keyword search using the phrase "tourists' perceptions" AND "sustainable tourism," focusing on journal articles published between 1992 and 2024. The title-based filtering method ensures conceptual clarity and thematic relevance while minimising the inclusion of unrelated works. Initially, 283 documents were found. To ensure the dataset remained relevant, consistent, and manageable, the search was limited to English-language articles published between 1992 and 2004. After applying these criteria, the final dataset included 205 English articles. Following the guidelines of Donthu et al. (2021) and Weismayer & Pezenka (2017), this study applies a bibliometric method that combines performance analysis with science mapping. Using the Biblioshiny package in R, performance analysis was conducted to assess scientific productivity among authors, institutions, countries, and journals. In contrast, VOSviewer was used for science mapping to investigate the intellectual structure by examining keyword co-occurrence and co-citation networks. These analyses collectively help chart the thematic evolution of the field and identify emergent frontiers for future research.

Results

This research explores tourists' perceptions of sustainable tourism and is divided into five key dimensions: literature output, journal-level performance, author-level contributions, document-level significance, and thematic insights.

Scientific production (based on years and countries)

Figure 2 illustrates the trend in annual progress in research output on tourists' views of sustainable tourism from 1992 to 2024. According to Table 1, the annual growth rate of publications is 12.86%, indicating steady, sustained interest in the research area over the years. In total, 205 journal articles were sourced from 121 different publications. In 1992, just one article was published. After that, only a few articles appeared occasionally until 2007. Starting with 4 articles in 2008, the annual number of published articles has steadily increased. In 2019, the yearly publication count entered double digits with 16 articles. This growth continued steadily, reaching 48 publications by 2024. This expansion reflects the rising focus on sustainability by international organisations, such as the UN, and the tourism industry. The United Nations established the 2030 Agenda for Sustainable Development in 2015, highlighting the importance of sustainable tourism (Boluk et al., 2021). Additionally, the designation of 2017 as the International Year of Sustainable Tourism for Development further boosted global attention to this issue (Cardia, 2017). The study also reveals that the documents in the dataset are, on average, 6 years old and have each received 22.77 citations, highlighting their significance. Figure 3 shows the top 10 research contributions by country. Spain leads the field with 70 articles, followed by China with 56 publications and the USA with 48. Spain, the USA, and China support tourism research through strong funding, universities, and research centres. Italy and Malaysia also make notable contributions, with 44 and 39 publications, respectively. Additional key contributors include Indonesia (29), India (28), Portugal (28), Romania (23), and South Korea (23). This geographic diversity shows involvement from both developed and emerging economies. Simultaneously, International collaborations account for 30.73% of the publications, highlighting the field's global and collaborative nature.

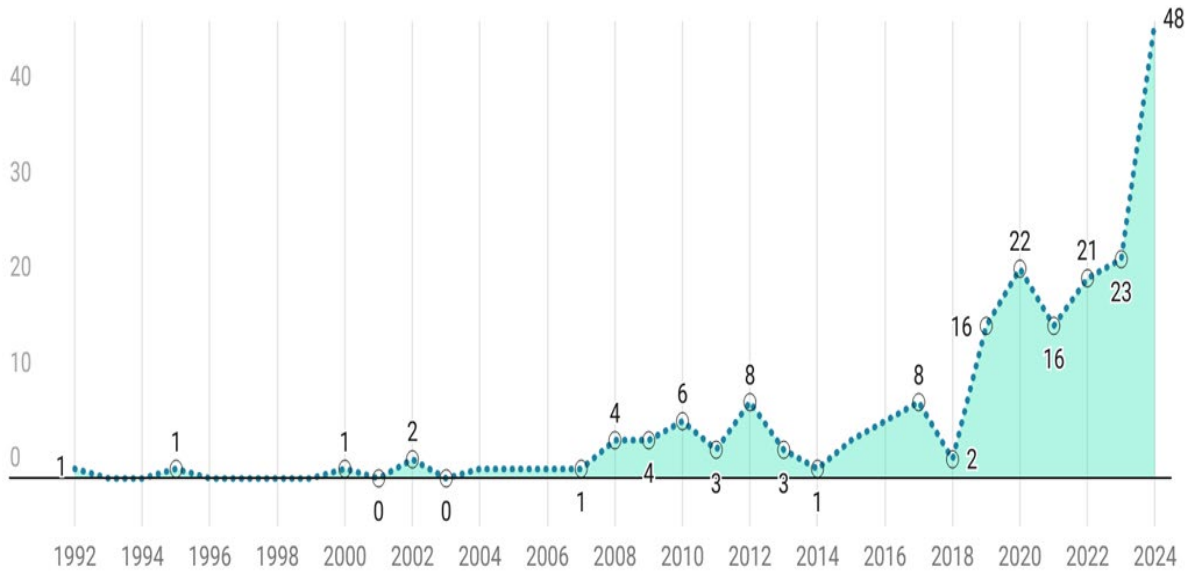

Figure 2: *Annual scientific production*
Source: *Authors' work*

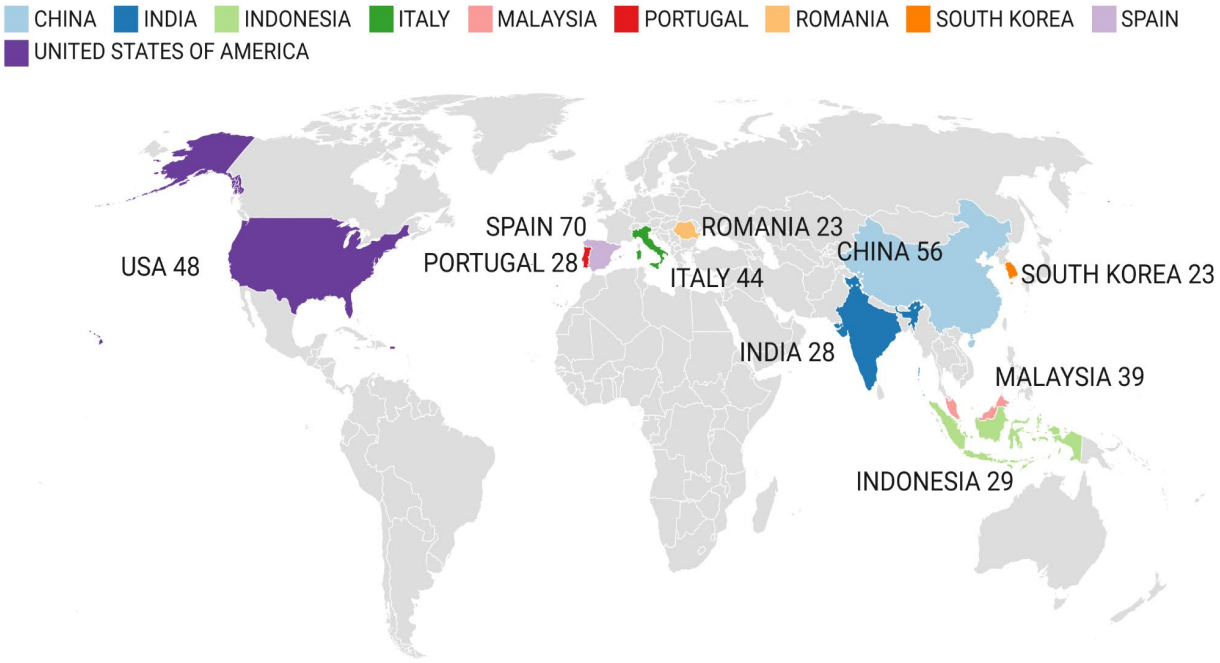

Figure 3: *Countries' scientific production.*
Source: *Authors' work.*

Table 1: *Demographic information.*
Source: *Authors' work.*

Main Information About Data	
Timespan	1992:2024
Sources (Journals, Books, etc)	121
Documents	205
Annual Growth Rate %	12.86
Document Average Age	6
Average citations per doc	22.77
References	12376
Document Contents	
Keywords Plus (ID)	551
Author's Keywords (DE)	748
Authors	
Authors	615
Authors of single-authored docs	15
Authors Collaboration	
Single-authored docs	16
Co-Authors per Doc	3.18
International co-authorships %	30.73
Document types	
Article	205

Average citations and most cited countries

Between 1992 and 2024, research on tourists' perceptions of sustainable tourism has seen significant growth in scholarly interest, with variations in the average number of citations per article. Figure 5 shows that the year 2000 had the highest average citations per article (130.00), followed by 2006 (89.00) and 1995 (87.00). Meanwhile, the number of publications has risen sharply in recent years. It increased from just 1 article in 1992 to 48 articles in 2024, reflecting growing research interest in the field. However, the average number of citations per article was lower in 2023 and 2024, at 11.87 and 2.81, respectively. This is expected because newer articles have had less time to gather citations. In general, this data helps identify impactful research areas and guides researchers on where to concentrate their efforts for meaningful contributions. Figure 4 highlights the ten most impactful and influential countries in this research field. In terms of total citations, the United States leads with 453 citations, followed by Spain (389) and China (339). When considering average citations per article, Canada (151.00) and France (141.00) are the most impactful nations in the area. It is highlighted that, although their total number of publications is lower, their research has a significant impact. Sweden also showed strong research quality, with an average of 94.50 citations per article. This indicates that smaller research communities can produce highly influential work. The United Kingdom and Cyprus further follow with 43.90 and 51.50 citations per article, respectively. While China and Korea have contributed a large volume of publications, their average citations per article are relatively low, at 17.00 and 17.80, respectively. This demonstrates that publishing many articles does not always mean the research has a strong impact, so more high-quality, influential studies are

needed. Overall, this data provides important insights to support future collaborations, funding choices, and policy development.

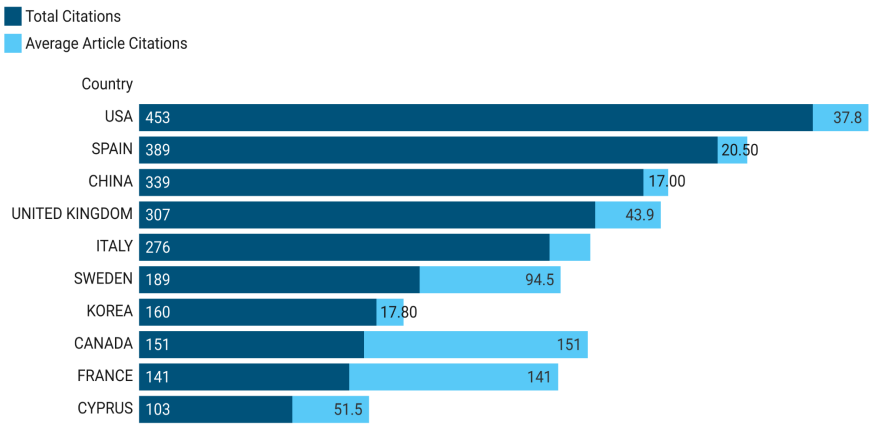

Fig. 4: *Top 10 cited countries.*
Source: *Authors' work.*

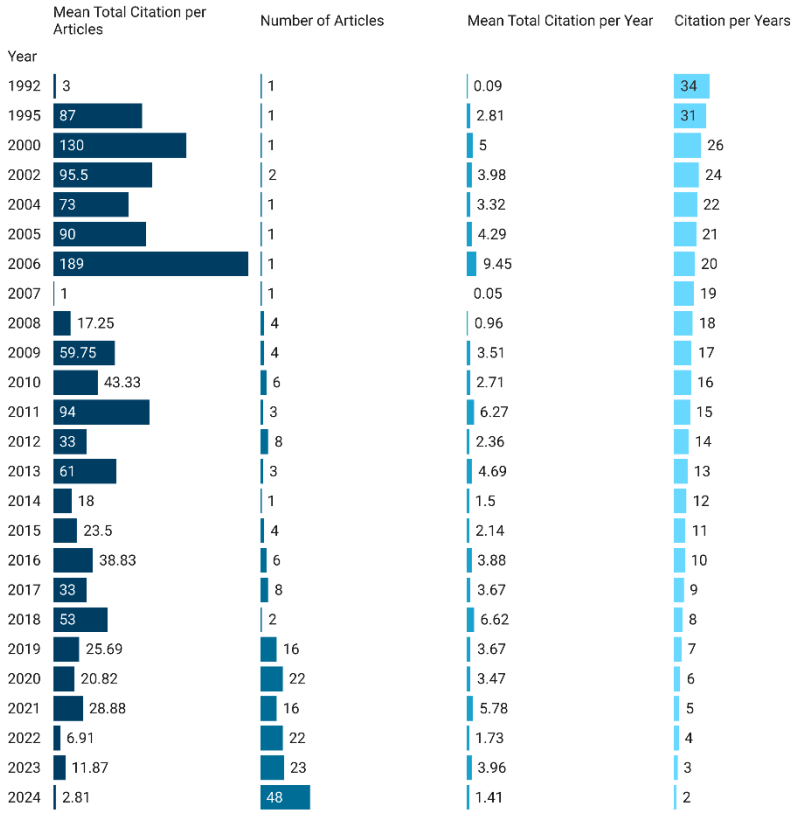

Figure 5: *Average citations per year.*
Source: *Authors' work.*

Most cited documents and impact

Table 2 presents a descriptive overview of the top 10 most-cited documents in the Tourists' Perceptions of Sustainable Tourism study field. Among them, "*Prospective tourist preferences for sustainable tourism development in Small Island Developing States*" stands out with 200 total citations. It reflects significant academic interest, with an average of 40 citations per year and the highest normalised citation score of 6.93. Researchers frequently cite this paper because it addresses policy needs, focuses on global sustainability, uses innovative methods, explores tourist behaviour, and is applicable to many contexts. Another widely cited and highly impactful work is '*Tourist perceptions of climate change: A study of international tourists in Zanzibar*,' which has received 189 citations globally. The study is widely cited for its investigation of climate change impacts on tourists, its provision of actionable insights for policymakers, and its well-structured case study with rigorous methods. Concurrently, *the impact of values, environmental concern, and willingness to accept economic sacrifices to protect the environment on tourists' intentions to buy ecologically sustainable tourism alternatives* (169 citations), and *the use of choice experiments in the analysis of tourist preferences for ecotourism development in Costa Rica (167 citations),* highlights tourists' growing inclination toward sustainable options. Meanwhile, with 151 total citations and an average of 9.44 per year, "*Does the tourist care? A comparison of tourists in Koh Phi Phi, Thailand and Gili Trawangan, Indonesia"* highlights scholars' interest in tourists' responses towards sustainability. In parallel, "*The Case for Offshore Wind Farms, Artificial Reefs and Sustainable Tourism in the French Mediterranean*" and "*Tourist and Resident Perceptions of the Physical Impacts of Tourism at Lake Balaton, Hungary*" address sustainability challenges in tourism and provide practical, policy-relevant insights. These studies examine tourist behaviour, environmental management, and policy frameworks, influencing multiple research areas and earning 141 and 130 citations, respectively. The findings reflect growing academic interest in understanding the psychological dimensions of sustainability perceptions. The studies titled "*Tourists' Perceptions of Responsibility: An Application of Norm-Activation Theory"* and *"Sustainability of Green Tourism Among International Tourists* and *Its Influence on the Achievement of a Green Environment: Evidence from North Cyprus"* have comparatively lower total citations because they are recent, focus on specific topics, and target a smaller audience. However, they introduce new theories, explore niche destinations, reveal tourist behaviour, and provide useful policy insights, making them influential in their fields. Overall, the table highlights scholars' growing interest in a wide range of studies and maps out the intellectual structure and evolution of the research field.

Table 2: *Ten most cited articles.*
Source: *Authors' work.*

Article	Sources	TC	TC per Year	Normalized TC
• Prospective tourist preferences for sustainable tourism development in Small Island Developing States	(Grilli et al., 2021)	200	40.00	6.93
• Tourist perceptions of climate change: A study of international tourists in Zanzibar	(Gössling et al., 2006)	189	9.45	1.00

• The impact of values, environmental concern, and willingness to accept economic sacrifices to protect the environment on tourists' intentions to buy ecologically sustainable tourism alternatives	(Hedlund, 2011)	169	11.27	1.80
• The use of choice experiments in the analysis of tourist preferences for ecotourism development in Costa Rica	(Hearne & Salinas, 2002)	167	6.96	1.75
• Does the tourist care? A comparison of tourists in Koh Phi Phi, Thailand and Gili Trawangan, Indonesia	(Dodds et al., 2010)	151	9.44	3.48
• The case for offshore wind farms, artificial reefs and sustainable tourism in the French Mediterranean	(Westerberg et al., 2013)	141	10.85	2.31
• Tourist and resident perceptions of the physical impacts of tourism at Lake Balaton, Hungary: Issues for sustainable tourism management	(Puczko & Ratz, 2000)	130	5.00	1.00
• Tourists' perceptions of responsibility: an application of norm-activation theory	(Gao et al., 2017)	124	13.78	3.76
• Tourists' perceptions of environmentally responsible innovations at tourism businesses	(Andereck, 2009)	102	6.00	1.71
• Sustainability of green tourism among international tourists and its influence on the achievement of green environment: Evidence from North Cyprus	(Ibnou-Laaroussi et al., 2020)	98	16.33	4.71

Note: (TC = Total Citation).

Most relevant sources and impact

Based on the number of publications and significant academic influence, the data in Figure 6 and Table 3 highlight the most relevant and impactful sources in the field of tourists' perceptions of sustainable tourism. The h-index shows the number of papers a researcher or journal has that are cited enough to reflect their impact (Wykes et al., 2013). The g-index examines the most cited papers and gives greater weight to highly cited ones to reflect overall impact (Ali, 2021). The m-index divides the h-index by the number of years they have been publishing to show how quickly their work gains impact (Nocera et al., 2024). *Sustainability (Switzerland)* stands out as the most productive journal, publishing 27 articles since 2016. With an h-index of 15, g-index of 25, and m-index of 1.5, this journal exhibits a strong academic impact. It has also accumulated 659 citations, reflecting its continued relevance and influence in the field. However, its prominence seems more due to publishing many papers across a wide

range of topics than to consistently influential contributions. In contrast, although the *Journal of Sustainable Tourism* has published only 15 articles, it demonstrates the greatest impact with 988 total citations and an h-index of 13. Since 1995, the journal has demonstrated a consistent scholarly impact, reflected by its m-index of 0.419. This comparison highlights an important issue in the literature. Publishing many articles does not always make a journal highly influential. Instead, a journal's reputation, thematic focus, and the quality of its research are what determine its impact. The performance of emerging journals such as *Tourism Review* shows that newer journals can quickly become influential, as seen in their high m-index (0.714). *Tourism Management* and *Environment, Development and Sustainability* have each published four articles. However, they have received 363 and 50 citations respectively, highlighting a significant difference in impact and emphasising the importance of quality over quantity.

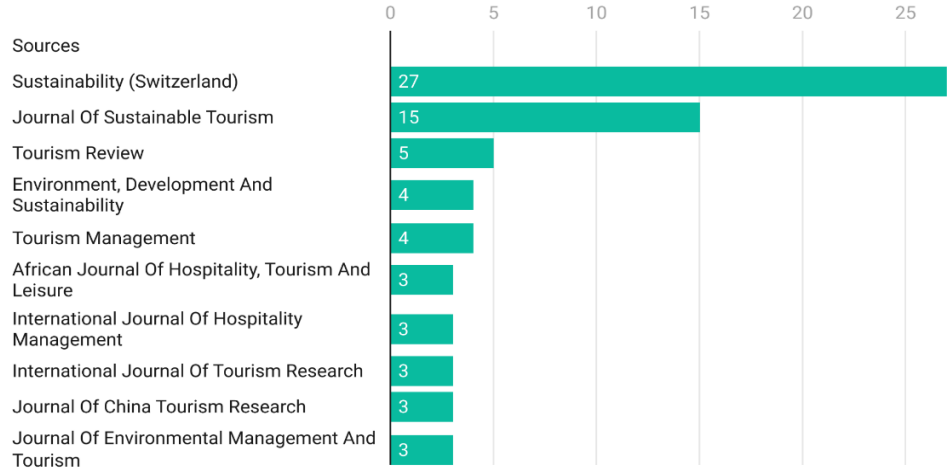

Figure 6: *Top 10 relevant sources.*
Source: *Authors' work.*

A journal's discipline and the audience it reaches strongly influence research visibility. Additional Regional and specialised journals, such as the International Journal of Hospitality Management, the Journal of Environmental Management and Tourism, and the African Journal of Hospitality, Tourism and Leisure, have published a modest number of articles. However, they show consistent academic influence, especially within their regional contexts. Moreover, emerging journals such as *the Asia Pacific Journal of Tourism Research* and the *Asia Pacific Journal of Marketing and Logistics* have recently gained attention. This indicates an increasing academic and regional engagement with sustainable tourism research. In summary, the discussion reveals a diverse mix of high-output and high-impact journals that significantly shape the academic landscape of sustainable tourism. Researchers can target high-impact journals to increase the visibility of their work. They should also contribute to a variety of journals to bring in diverse perspectives and make sustainable tourism research more inclusive.

Table 3: *Most relevant sources.*
Source: *Authors' work.*

Sources	h_index	g_index	m_index	TC	NP	PY_start
Sustainability (Switzerland)	15	25	1.5	659	27	2016
Journal of Sustainable Tourism	13	15	0.419	988	15	1995
Tourism Review	5	5	0.714	110	5	2019
Tourism Management	4	4	0.308	363	4	2013
Environment, Development and Sustainability	3	4	0.125	50	4	2002
International Journal of Hospitality Management	3	3	0.3	29	3	2016
Journal of Environmental Management and Tourism	3	3	0.5	18	3	2020
African Journal of Hospitality, Tourism and Leisure	2	3	0.222	9	3	2017
Asia Pacific Journal of Marketing and Logistics	2	2	0.125	12	2	2010
Asia Pacific Journal of Tourism Research	2	2	1	12	2	2024

Note: (TC = Total Citation, PY = Publication Year, NP = Number of Publication).

Bradford's Law states that in any research field, most research articles are published in a small group of core journals (Desai et al., 2018). These core sources produce the majority of the scholarly literature, while other journals publish fewer articles. In the shaded core area of Figure 7, several journals stand out for publishing the most articles. These core journals, such as *Sustainability (Switzerland), Journal of Sustainable Tourism, Tourism Review, Environment, Development and Sustainability, and Tourism Management,* are key sources in the field's literature. Overall, this discussion highlights a rich blend of high-output and high-impact journals that collectively shape the scholarly landscape of sustainable tourism. Further, this plays a key role in guiding scholars and researchers to identify key research trends and shape the future directions of this field of study. Conversely, reliance on core journals could create a

publication bias, where certain methodologies, regions, or theoretical approaches dominate the field.

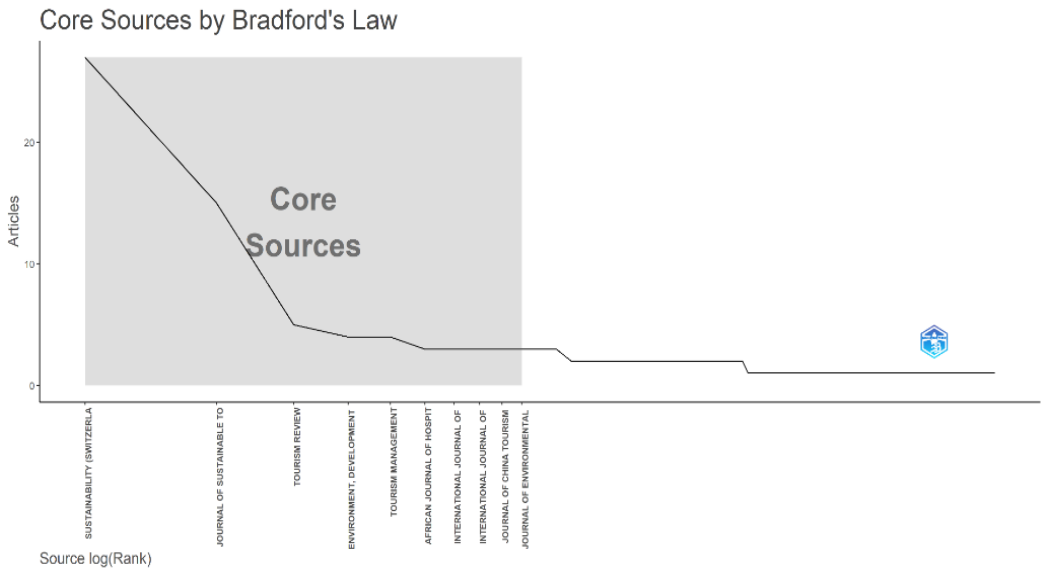

Figure 7: *Core sources by Bradford's Law.*
Source: *Authors' work.*

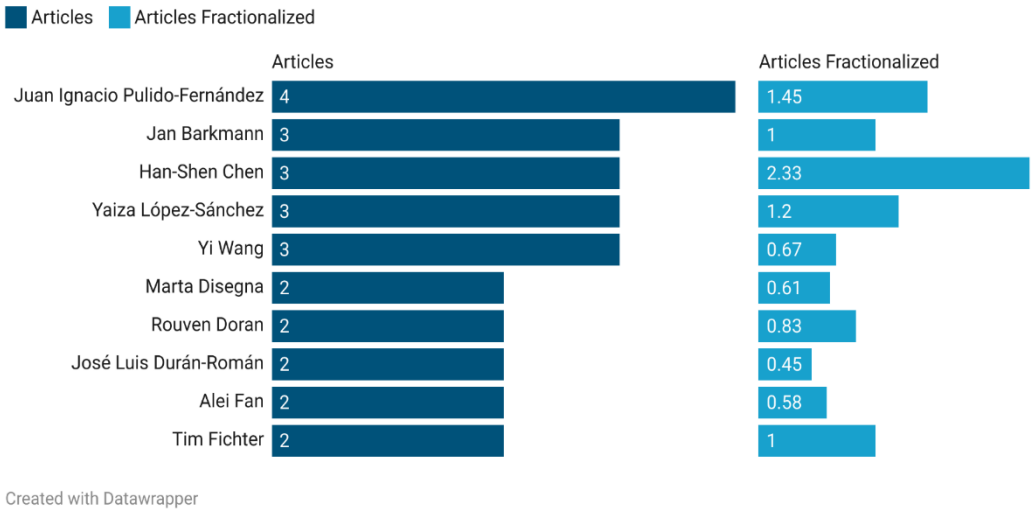

Fig. 8: *Most contributing authors.*
Source: *Authors' work.*

Most contributing authors

Figure 8 presents the top ten contributing authors in the field of tourists' perceptions of sustainable tourism. Among them, Juan Ignacio Pulido-Fernández stands out with 4 published articles. His fractionalized contribution score of 1.45 shows that he made a strong individual contribution to the field. Simultaneously, Han-Shen Chen has made a notable impact by contributing three articles to the field. His impressive fractionalized score of 2.33 highlights his active role in collaborative research efforts. In contrast, Jan Barkmann and Yaiza López-Sánchez each wrote 3 articles, with contribution scores of 1.00 and 1.20. Yi Wang also has 3 articles but a lower score of 0.67, suggesting the author had a smaller share per publication. Table 4 shows the influence of authors whose research has significantly shaped the field of tourists' perceptions in sustainable tourism. In terms of author impact, Han-Shen Chen stands

out with an h-index of 3, a g-index of 3, and a total of 35 citations. Since his first research was published in 2019, he has shown an emerging influence in the field. Rouven Doran and Svein Larsen each have an h-index and g-index of 2. They have also accumulated 87 total citations each, showing consistent research activity since 2014. Marta Disegna, with 2 articles and 44 citations, also demonstrates a continued scholarly contribution since 2012. Notably, Stefan Gössling has published only 2 articles but has a high total citation count of 218. This indicates that his work has had a strong impact since 2006. Meanwhile, Alei Fan is a newer contributor who started publishing in 2023. Despite this, she has shown promise with a strong fractionalized score and 23 citations. Overall, these metrics show that a wide range of scholars are contributing to the field. They are making an impact not only through the number of publications but also through the quality of their research. This influence will guide and inspire future research in the field and also create opportunities for potential collaboration. However, a small group of researchers contributes most of the research, which means their perspectives may strongly influence the field's topics and direction. Additionally, new researchers like Alei Fan are beginning to make a mark in the field. Even so, the small number of highly cited recent publications shows there is still a lack of diverse voices and global representation.

Thematic analysis

The tree map (Figure 9) and word cloud (Figure 10) illustrate the most frequent keywords in the literature on tourists' perceptions of sustainable tourism. These visual tools help identify key themes and recurring topics within the research field. The keyword "ecotourism" stands out as the most frequently used term, appearing 63 times and representing about 11% of all keywords in the study. This highlights its central role in the research on tourists' perceptions of sustainable tourism. Researchers focus on ecotourism because it covers many aspects of sustainable tourism and clearly represents environmentally responsible travel. Next is "willingness to pay," which appears 47 times (8%), showing a strong research focus on how much tourists are willing to spend on sustainability. Keywords like "perception" and "tourist destination" both appear 31 times, each at 5%. This highlights a clear focus on how tourists see and experience different places. Other important keywords are "tourism development" with 25 mentions (4%), "sustainability" with 20 mentions (3%), "tourism management" with 17 mentions (3%), and "environmental protection" with 16 mentions (3%). Geographic and thematic keywords such as "Spain," "Taiwan," "climate change," "biodiversity," and "public attitude" highlight the wide-ranging, global nature of this research area. These frequency percentages reveal the main topics in sustainable tourism research. They indicate the areas receiving the most attention from researchers and help guide future investigations. Overall, this tree map and word cloud reveal the most dominant themes in sustainable tourism research, while also making less frequent topics visible. These underrepresented areas highlight potential gaps in the literature and suggest opportunities for further study. In this way, the visualisations not only summarise existing knowledge but also provide a roadmap for shaping future research directions.

Table 4: *Authors' impact.*
Source: *Authors' work.*

Author	h_index	g_index	m_index	TC	NP	PY_start
Han-Shen Chen	3	3	0.429	35	3	2019
Jan Barkmann	2	3	0.111	16	3	2008
Marta Disegna	2	2	0.143	44	2	2012
Rouven Doran	2	2	0.167	87	2	2014
Alei Fan	2	2	0.667	23	2	2023
Stefan Gössling	2	2	0.1	218	2	2006
Colin Michael Hall	2	2	0.133	54	2	2011
Mastura Jaafar	2	2	0.182	12	2	2015
Carlos Jurado-Rivas	2	2	0.286	45	2	2019
Svein Larsen	2	2	0.167	87	2	2014

Note: (TC = Total Citation, PY = Publication Year, NP = Number of Publication).

The thematic map (Figure 11) provides a clear overview of the key themes within the research area of tourists' perceptions of sustainable tourism. On the map, centrality indicates how important each theme is, while density indicates how much it has been studied or developed. The upper-right quadrant, known as Motor Themes, contains themes such as tourism, environmental protection, and conservation that are well-developed and highly relevant to the research area's structure. Still, researchers focus heavily on environmental topics, which can lead to the neglect of social and cultural aspects of sustainable tourism. In contrast, the upper-left quadrant, known as Niche Themes, includes topics such as contingent valuation, economic analysis, and investment. These themes are well-developed but less relevant to the main field and may not be widely discussed in academic research. These areas mainly matter for policy and economic planning, but their low centrality shows they are not well connected to core environmental and behaviour-focused research. Meanwhile, the lower-right quadrant shows Basic Themes, which include keywords such as ecotourism, willingness to pay, and tourist destination. These themes are highly relevant because they help researchers understand how tourists think, decide, and act regarding sustainable tourism, yet they remain underdeveloped. Marzo-Navarro et al. (2024) examined memorable tourism experiences in the Aragon River Valley and found that activities combining novelty, co-creation, and contact with nature encourage tourists to behave in environmentally responsible ways. Such experiences also contribute to the development of sustainable rural tourism. Therefore, future studies should explore and develop these areas further. Finally, the lower-left quadrant, Emerging or Declining Themes, includes coastal zone, Europe, animal welfare, animalia, and wildlife management. Their low centrality and density suggest that these topics may be either new areas of exploration or losing traction within the broader research landscape. Overall, the thematic map shows that environmental and conservation issues are central to tourists' views on sustainable tourism. Meanwhile, economic and behavioural topics are becoming more important, helping researchers identify main focus areas, spot new trends, and find gaps for future study.

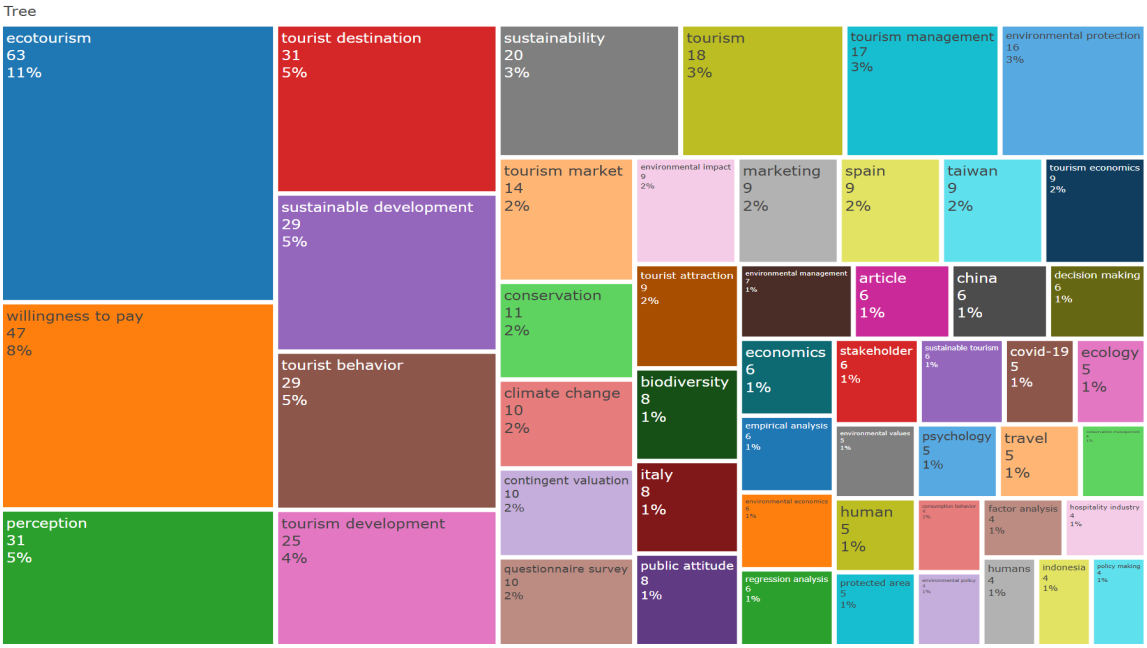

Fig. 9: *Tree map.*
Source: *Authors' work*

Fig. 10: *Word cloud.*
Source: *Authors' work.*

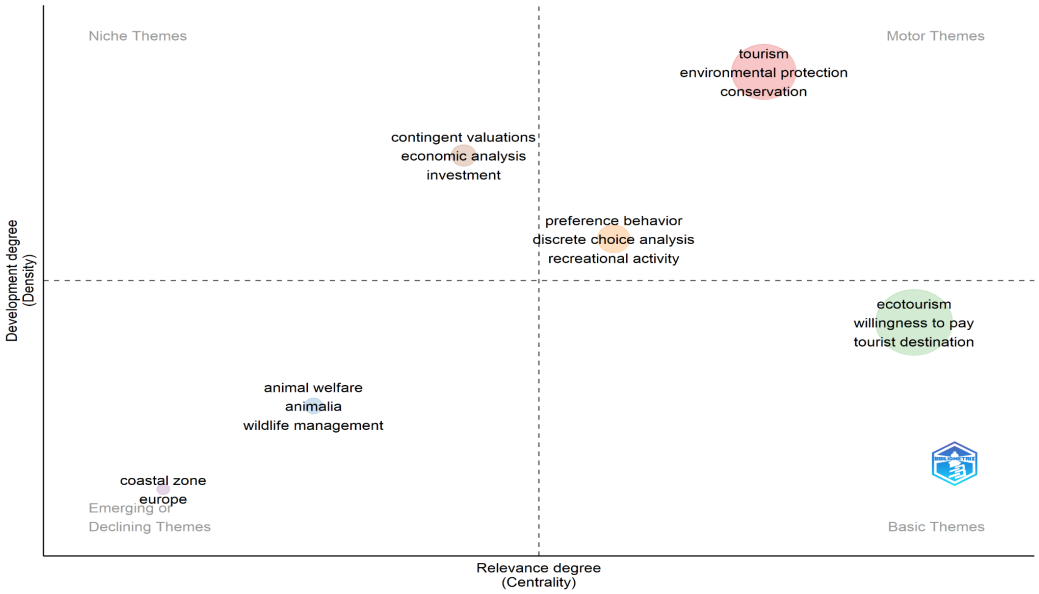

Fig. 11: *Thematic map.*
Source: *Authors' work.*

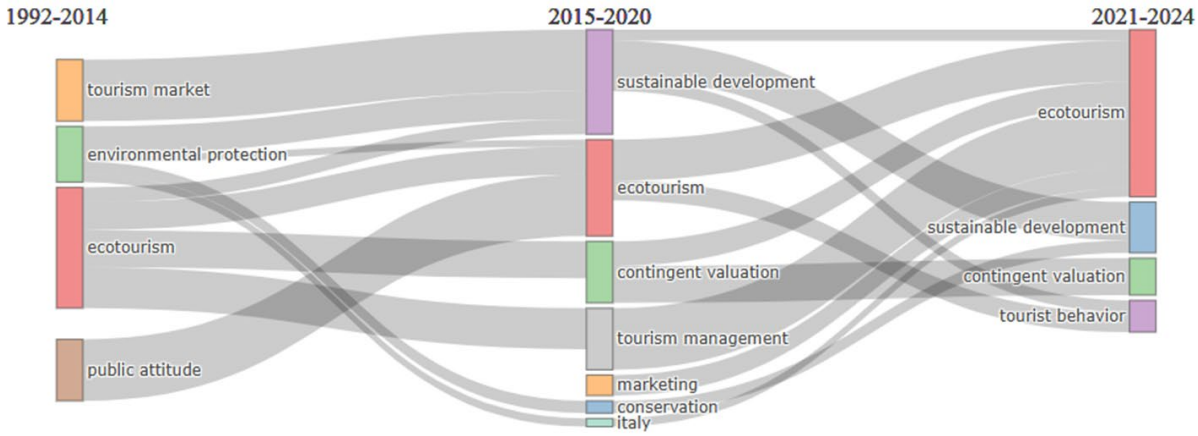

Fig. 12: *Thematic evaluation.*
Source: *Authors' work.*

The thematic evaluation map (Figure 12) illustrates how academic focus on tourists' perceptions of sustainable tourism has evolved in response to global sustainability goals and the COVID-19 pandemic. During the pre-Sustainable Development Goals (SDGs) era (1992–2014), scholarly attention was largely directed toward foundational topics such as the tourism market, environmental protection, ecotourism, and public attitudes. As people became more aware of the environment and ecotourism grew, policymakers and researchers started studying how tourism affects sustainability. During this time, the main concern was understanding how tourism affects the environment and what people think about it. At the same time, ecotourism emerged as a significant area of interest, emphasising nature-based and environmentally responsible travel practices. While ecotourism dominates, other dimensions of sustainability (social equity, cultural preservation, and economic resilience) are less studied. With the launch of the United Nations Sustainable Development Goals in 2015, the post-SDGs period (2015–2020) marked a shift toward more structured and globally aligned research. Alongside

ecotourism, researchers paid more attention to incorporating SDG goals into tourism to promote sustainable development. Other themes like contingent valuation, tourism management, marketing, and conservation also started to be focused. Researchers studied these topics to gain a clearer, more practical understanding of tourists' views on sustainable tourism. However, researchers focus mostly on Europe, North America, and East Asia, leaving developing regions underrepresented. In the post-COVID era (2021–2024), research shifted again to examine how the COVID-19 pandemic affected tourism and to address the resulting challenges. Ecotourism and sustainable development continued to be key areas of focus. In the meantime, tourist behaviour also emerged as an important theme, showing increased interest in how global crises affect travel attitudes and decisions. Researchers also showed a similar interest in contingent valuation, particularly in understanding the economic aspects of sustainable tourism. Post-COVID studies basically focus on short-term behavioural shifts, but researchers need to critically examine long-term impacts on sustainable tourism practices. Overall, the thematic progression reveals a shift from basic environmental and market concerns to more integrated and behaviour-focused research. It will also guide future researchers to focus on emerging themes and make meaningful contributions.

Using Multiple Correspondence Analysis (MCA), the Conceptual Structure Map (Figure 13) provides a clear visualisation of the thematic structure within the literature on tourists' perceptions of sustainable tourism. The most significant cluster (red) focuses on broad themes related to environmental and policy issues. Key terms such as environmental management, sustainable tourism, climate change, environmental impact, and economics highlight the broad environmental effects of tourism. These terms also stress the importance of protecting and managing the environment effectively. Though Scholars often propose frameworks and policies, few test whether they actually change tourist behaviour or destination outcomes. Güzel et al. (2020) show that tourist guides actively shape how tourists perceive and behave regarding sustainability. Future research could include such qualitative perspectives to better understand how sustainable tourism behaviours develop in practice. In contrast, the blue cluster highlights key themes such as ecotourism, tourist attraction, tourism management, willingness to pay, and stakeholder, reflecting a more empirical and behaviour-focused perspective. This cluster also focuses on using quantitative techniques like regression analysis and contingent valuation to explore individual attitudes, preferences, and behaviours. Regression and contingent valuation are common in behaviour-focused studies, but they cannot capture the cultural or emotional side of tourist perceptions. So, Future studies need to place greater emphasis on qualitative or mixed-method approaches.

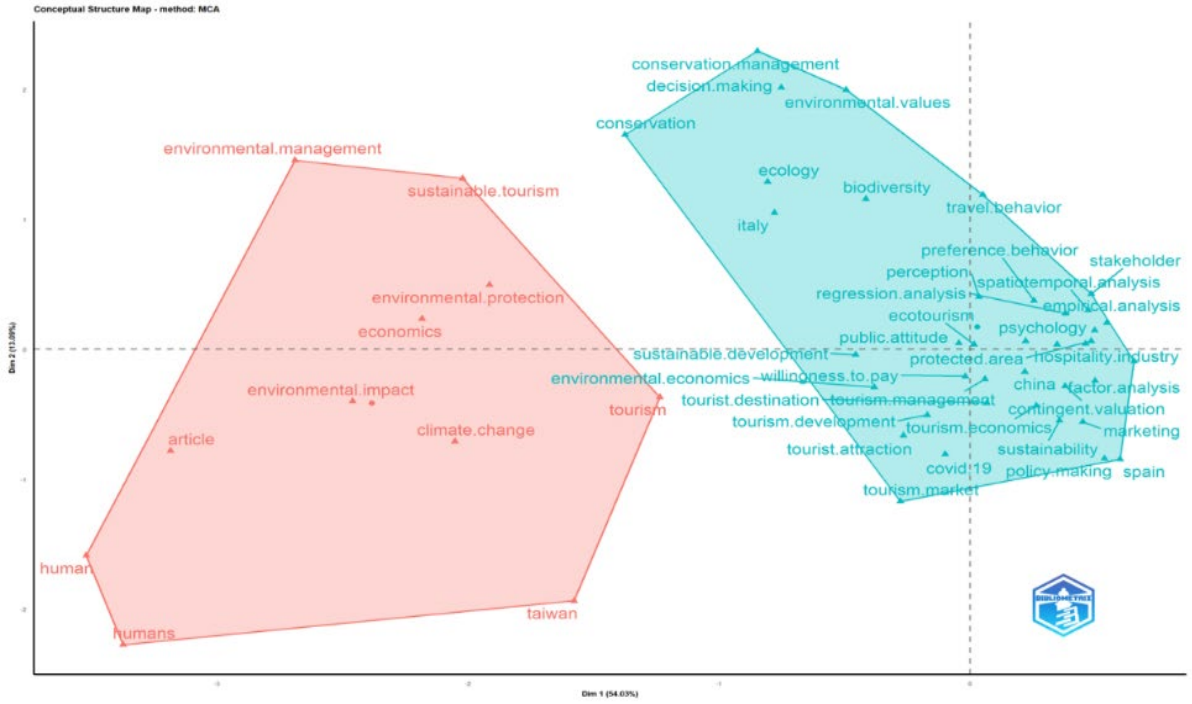

Fig. 13: *Conceptual structure map.*
Source: *Authors' work.*

Simultaneously, keywords such as public attitude, decision making, and perception reflect scholarly interest in how tourists respond to sustainability issues. The research field encompasses many areas, including economics, management, environmental science, and social science. Still, most studies remain in isolation, so integrating disciplines is needed to understand sustainable tourism fully. Overall, the map reveals a clear thematic division between policy-oriented research and behaviour-oriented studies. This highlights how sustainable tourism research draws on many disciplines. It also shows promising chances to link these areas for better understanding and progress.

Co-occurrence and bibliometric coupling

The Keyword Co-occurrence Map (Figure 14) provides a comprehensive overview of the thematic landscape in research on tourist perceptions and sustainable tourism. Table 5 highlights six main keyword clusters, showing the key research themes. First cluster (Red) focuses on the environmental and economic foundations of sustainable tourism. Key terms like biodiversity, climate change, conservation, environmental management, environmental protection, and tourism emphasise the main concerns of environmental sustainability. They also stress the need to include ecological factors in tourism planning and development. Even though environmental issues are well studied, research often ignores the social and cultural side of sustainable tourism. Future studies should combine environmental, economic, and social perspectives to provide a more complete understanding of sustainable tourism impacts. The second cluster (Green) focuses on strategic and policy perspectives. Keywords like sustainability, policymaking, stakeholders, COVID-19, tourism economics, and tourism market highlight the broader, macro-level issues of sustainable tourism, including how policies respond to crises like COVID-19 and strategies for developing tourism markets with sustainability in mind. Although research often focuses on policies and crisis management, it rarely shows how these policies influence what tourists actually do. There is a clear literature gap to connect

policy with tourist behaviour to improve sustainable tourism. The third cluster (blue) emphasises tourist experience and perceptions. Keywords like tourist behaviour, perception, visitor attitudes, and responsible tourism help explain how tourists view sustainability. Altamira et al. (2024) studied walking tours in Jakarta and found that tourists who participate develop more environmentally friendly attitudes. These tours also help tourists better appreciate the city's culture and history. The majority of studies ask tourists about their perceptions, but these responses may not match their actual behaviour. This highlights a lack of research that observes or measures real tourist actions. The fourth cluster (Yellow) also focuses on the psychological factors and consumer perspectives in tourism. Key themes such as consumption behaviour, ecotourism, marketing, psychology, and public attitude bridge marketing strategies with psychological factors that shape tourists' decision-making and their attitudes toward sustainable practices. But tourist psychology and marketing knowledge are not used enough to create strategies that encourage sustainable tourism. The fifth cluster (Purple) is defined by its focus on economic valuation and decision-making tools. Keywords, including choice experiment, contingent valuation method, and willingness to pay, reflect how tourists value sustainable tourism and their readiness to support it financially. Many studies ask tourists how much they would pay for sustainable tourism, instead of looking at what they actually spend. This means the results may not fully reflect real-world behaviour. Finally, the sixth cluster (Pink) addresses the media, branding, and communication aspects of tourism. Terms such as destination image, green tourism, social media, hotels, and tourist perception highlight how destinations are perceived and marketed, as well as the role of social media in shaping sustainable tourism narratives. Overall, the map illustrates the interdisciplinary nature of sustainable tourism research by linking environmental science, economics, psychology, marketing, and policy studies, and helps identify key themes, trends, and gaps for future studies. By linking these fields, researchers can create more comprehensive and effective strategies for sustainable tourism. This approach helps tackle complex challenges from various angles and discover innovative solutions that balance environmental, economic, and social objectives.

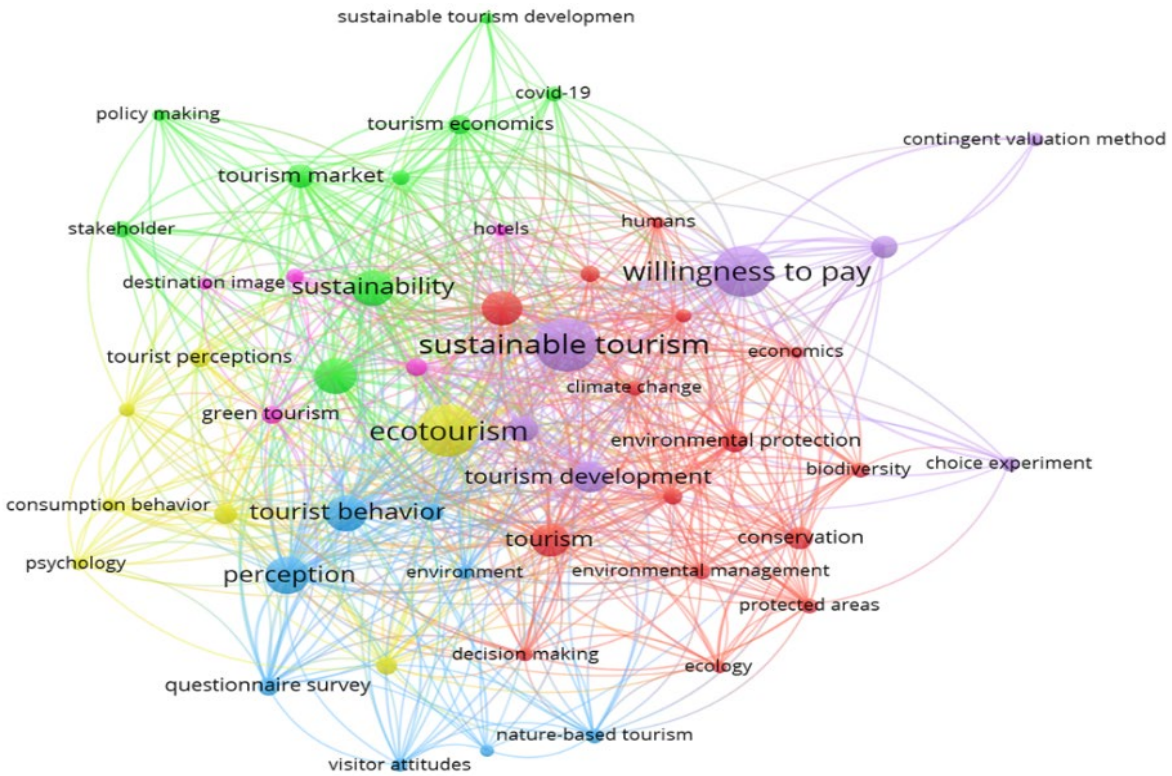

Figure 14: *Keyword's co-occurrence map.*
Source: *Authors' work.*

Table 5: *Clusters of keywords co-occurrence.*
Source: *Authors' work.*

Cluster	Number of Keywords	Keywords
Cluster 1 (Red) Environmental and Economic Foundations of Sustainable Tourism	15	Biodiversity, Climate Change, Conservation, Decision Making, Eco-Tourism, Ecology, Economics, Environmental Impact, Environmental Management, Environmental Protection, Human, Humans, Protected Areas, Sustainable Development, Tourism
Cluster 2 (Green) Strategic and Policy Perspectives	9	COVID-19, Environmental Economics, Policy Making, Stakeholder, Sustainability, Sustainable Tourism Development, Tourism Economics, Tourism Market, Tourist Destination
Cluster 3 (Blue) Tourist Experience and Perceptions	8	Environment, Nature-Based Tourism, Perception, Questionnaire Survey, Responsible Tourism, Tourist Attraction, Tourist Behaviour, Visitor Attitudes
Cluster 4 (Yellow) Psychological Factors and Consumer Perspectives in Tourism	7	Consumption Behaviour, Ecotourism, Hospitality Industry, Marketing, Psychology, Public Attitude, Tourist Perceptions
Cluster 5 (Purple) Economic Valuation and Decision-Making	7	Choice Experiment, Contingent Valuation, Contingent Valuation Method, Sustainable Tourism, Tourism Development, Tourism Management, Willingness to Pay
Cluster 6 (Pink) Media, Branding, And Communication Aspects of Tourism	5	Destination Image, Green Tourism, Hotels, Social Media, Tourist Perception

Based on the number of shared references cited, the bibliometric coupling network (Figure 15) illustrates the structural relationships among academic publications focusing on tourist perceptions in the context of sustainable tourism. In this network, each node represents a scholarly publication. Larger nodes, such as those of Gössling et al. (2006), Grilli et al. (2021), and Hedlund (2011), indicate greater influence, as evidenced by higher levels of citation coupling and centrality within the field. Conversely, smaller nodes, such as those by Wibawa et al. (2023) and Hossain et al. (2024), reflect newer or more peripheral contributions. The network is also divided into different colour groups, each of which represents a particular topic or theme. The red cluster, based on studies such as Hearne & Salinas (2002), Craik (1995), and Dodds et al. (2010), primarily focuses on environmental awareness and ecotourism behaviour. The research shows that environmental values affect sustainable tourism actions, but most studies are theoretical and few test whether these values actually lead to real behaviour. The

green cluster, highlighted by important research such as Hedlund (2011), Grilli et al. (2021), and Kleinrichert et al. (2012), emphasises tourists' values and environmental concerns. It highlights people's willingness to pay extra for sustainability and explains their choice of sustainable tourism. Many tourists are willing to spend extra for sustainable options. Most studies, however, focus on this willingness rather than examining how it influences their real-world behaviour. The blue cluster includes recent studies such as Teeroovengadum (2019), Chi & Han (2020), and Hossain et al. (2024). These works focus on tourists' environmental values and intentions, emphasising their behaviour through data-driven analysis. However, these studies mainly look at what tourists say they intend to do, so we still don't fully understand their actual behaviour. The yellow cluster includes important studies like Gössling et al. (2006) and Lopez-Sanchez & Pulido-Fernández (2017). It focuses on economic factors, particularly those that affect tourists' willingness to pay for sustainability in popular tourist destinations. Even so, without considering other key aspects, such as social, psychological, and environmental factors, it is harder to fully understand sustainable tourism behaviour. The purple cluster includes authors like Doran et al. (2015) and Pulido-Fernández & López-Sánchez (2016). It explores the psychological and economic factors that influence responsible travel behaviours and choices related to sustainable tourism. The research gives useful insights, but it doesn't fully explain how tourists' thoughts and finances influence their real-world travel choices. Overall, this network highlights a growing and active field of study. By understanding how various topics and approaches are linked, researchers can build on existing knowledge, avoid duplication, and explore new areas that need more attention. It also encourages interdisciplinary collaboration and guides the development of more focused, relevant research questions in sustainable tourism.

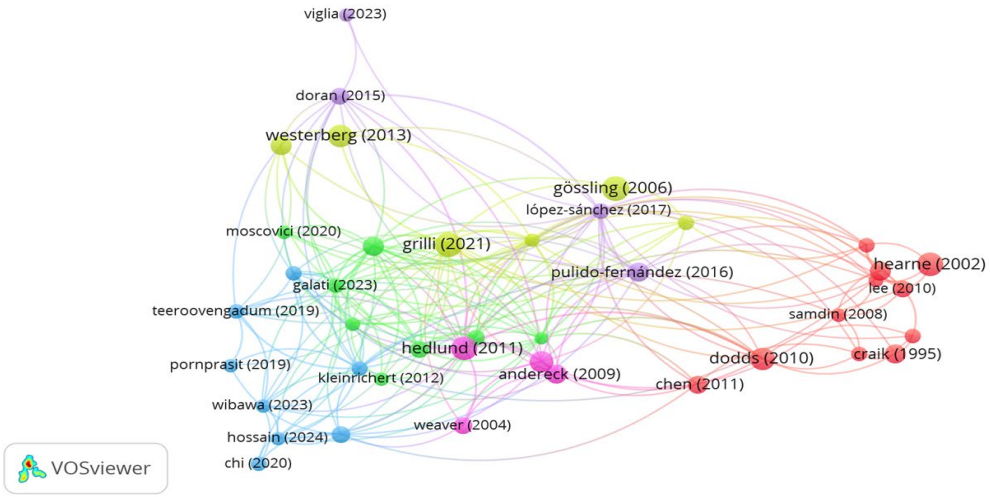

Figure 15: *Bibliometric coupling network.*
Source: *Authors' work.*

Discussion

This bibliometric analysis provides a comprehensive examination of the evolution of research on tourists' perceptions of sustainable tourism from 1992 to 2024. The increasing volume of publications each year indicates a strong and growing scholarly focus on sustainable development and tourist responsibility. Geographically, Spain leads with 70 publications, followed by China with 56 and the USA with 48. This shows that these countries play a key role in advancing research on tourists' views about sustainability. About 30.73% of the publications involve international collaboration, showing that researchers from different

countries often work together. This is important because sustainable tourism involves shared challenges and goals across countries. This collaboration and publication trend helps future scholars recognise emerging research patterns, identify gaps, and prioritise key topics for further study. Journals are key to spreading research findings, and since 2016, Sustainability (Switzerland) has been the leading journal, publishing 27 articles in this area. In terms of impactful contributors, Juan Ignacio Pulido-Fernández stands out with four published articles in this field. These impactful contributions set high standards for research quality and help guide the direction of the field. Influenced by global sustainability goals and the impact of the COVID-19 pandemic, the thematic evaluation map highlights how research focus has shifted over time. Using the keywords from existing literature, the tree map and word cloud identify the main research themes. Moreover, the thematic map provides a clear view of key topics and areas of interest, including ecotourism, behavioural intentions, economic valuation, and sustainability policy. The Keyword Co-occurrence Map further provides a detailed view of the connections between key concepts in sustainable tourism research. It highlights the interdisciplinary nature of the field, including environmental, economic, psychological, and policy-related topics. Beyond that, the bibliometric coupling network illustrates the structural relationships among academic publications. It reveals how research communities are connected through shared references. Overall, this study not only maps the current state of knowledge on tourists' perceptions of sustainable tourism but also identifies key gaps and opportunities. It guides future research toward more integrated, context-sensitive, and impactful work.

Limitations of the study

Although the study contributes significantly to the field, it has some limitations. First, the analysis relies solely on literature indexed in Scopus. This means it may miss relevant studies found in other databases, such as Web of Science, Google Scholar, or PubMed. Secondly, bibliometric analysis primarily examines citation and co-citation patterns to assess impact. However, it does not assess the quality or depth of the articles, which may limit the understanding of their actual scholarly impact. The study includes only English-language articles published between 1992 and 2024, which may introduce a language bias. At the same time, the study excludes other types of publications, such as books, conference papers, and reports. This may result in missing important regional or local studies published in different formats or languages. Bibliometric coupling and keyword analysis help identify main themes and trends in the research. However, they might miss new or interdisciplinary topics that are not yet well represented but could be important in the future. Acknowledging these limitations offers important context for interpreting the results. This also highlights the need to include qualitative reviews and a wider range of data sources in future research.

Implications and future research directions

This bibliometric analysis offers valuable insights for both researchers and practitioners involved in sustainable tourism development. The different themes identified in the research show that tourists' perceptions are complex, encompassing environmental identity, economic willingness, psychological motivations, and behaviour. Understanding these diverse perspectives can help scholars and policymakers develop more effective strategies that resonate with different tourist segments. At the same time, tourism professionals can redesign marketing strategies to better attract tourists by aligning with their perspectives on sustainable tourism.
However, based on the study findings, several research gaps remain that future studies should explore. Prospective studies should include a more diverse range of geographic contexts, especially from regions that are currently underrepresented. This approach will help capture a broader range of tourist perceptions and address various sustainability challenges more

effectively. In recent times, the world has faced different crises such as the COVID-19 pandemic, climate change, and economic instability. Future research could further explore how these crises reshape tourist attitudes and behaviours towards tourism sustainability. Quantitative methods such as contingent valuation and regression analysis are often used in research. However, more mixed-methods and qualitative studies are needed to understand better the deeper motivations and cultural factors shaping tourists' perceptions. Recently, emerging technologies, social media, and digital communication have become major influences across different sectors. These research areas hold great potential for future exploration, especially in understanding how they shape sustainable tourism and affect consumer behaviour. Finally, future studies can follow the findings of this research. The thematic analysis highlights key research areas and provides clear direction for future exploration in the field.

Conclusion

In recent times, sustainability has become a key global concern. Understanding tourists' perceptions helps tourism planners and business developers create better strategies to promote responsible travel and tourism destinations. This bibliometric study offers a comprehensive overview of research on tourists' perceptions of sustainable tourism from 1992 to 2024. The study identifies key journals, influential authors, and emerging research topics, providing valuable insights for both scholars and practitioners. The analysis reveals important themes, including environmental awareness, economic willingness, and psychological motivations. These themes underscore the complexity of tourists' attitudes and the multifaceted factors driving sustainable tourism behaviour. It also emphasises the role of international cooperation and diverse geographic contributions in shaping the research landscape. This global perspective enriches the understanding of sustainable tourism by incorporating varied contexts and challenges. By mapping the thematic structure and publication trends, this research lays a strong foundation for future studies aimed at advancing sustainable tourism by improving the understanding of tourist attitudes. Overall, this study provides useful insights, offers a clear direction for future research, and supports real-world efforts in sustainable tourism.

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The role of IT in ESG and CSRD compliance – A perspective from small and medium-sized enterprises

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Abstract

In recent years, sustainability has gained increasing significance in corporate operations – not only as an expectation, but also as a regulatory requirement. While small and medium-sized enterprises were previously affected mainly indirectly – for example, through supply chains – newer European Union regulations, particularly the Corporate Sustainability Reporting Directive, are beginning to impose direct reporting obligations on them as well. Sustainability reporting is becoming unavoidable for a growing number of companies; however, meeting these requirements poses significant challenges, especially for small and medium-sized enterprises that have not previously prepared environmental reports. Complying with these regulations requires structured, reliable, and well-managed data, which in turn demands a solid and efficient information technology infrastructure. This presentation will explore the emerging sustainability reporting obligations relevant to small and medium-sized enterprises, how these affect business operations, and which information technology tools and systems can support companies in preparing for the new reporting expectations. It is essential that small and medium-sized enterprises prepare their internal information technology systems in time in order to meet these obligations and carry out effective reporting.

Keywords: CSRD, Sustainability, SME, EU Sustainability Regulations

JEL Classification: Q56, Q01, Q58,K32

Introduction

In recent years, sustainability has become increasingly important in corporate operations. While in previous periods sustainability reporting was primarily a voluntary practice, it has now become a legal obligation, particularly in the European Union. As a result, a significant number of companies are now required to prepare sustainability reports, a process that demands substantial resources. In addition to ensuring adequate human resources, companies must also possess the necessary theoretical knowledge, which makes the acquisition of intellectual capacity a critical requirement. Moreover, physical and digital infrastructure is essential to enable the continuous provision of sustainability-related data. A key milestone in this shift is the Corporate Sustainability Reporting Directive (CSRD), which substantially expands the scope of existing reporting obligations and now includes small and medium-sized enterprises (SMEs) as well. The CSRD aims to strengthen environmental, social, and governance (ESG) considerations alongside enhancing corporate transparency. However, given the resource-intensive nature of sustainability reporting, many obligated SMEs lack the expertise, financial capacity, or digital infrastructure necessary to fully comply with the directive. The objective of this study is to examine the impact of the CSRD and related sustainability regulations on SMEs, and to identify the primary challenges these enterprises face in meeting reporting requirements—with particular attention to the Hungarian regulatory context. The study pays special attention to how EU-level obligations are interpreted and implemented within Hungary's institutional framework, including through the regulatory roles of the Hungarian

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National Bank (Magyar Nemzeti Bank, MNB) and the Supervisory Authority for Regulated Activities (Szabályozott Tevékenységek Felügyeleti Hatósága, SZTFH).

Sustainability regulations and data reporting obligations for businesses

In recent years, the issue of sustainability has taken on an increasingly prominent role in the operations of businesses. Significant progress has been made at both the European Union and member-state levels in the development and expansion of sustainability-related regulations. These expanding regulatory frameworks are intended to encourage companies to report on their ESG performance in a structured and transparent manner. The aim of this chapter is to provide an overview of the key sustainability obligations currently applicable to businesses, with a focus on both the EU-wide regulatory framework and the national-level implementation in one selected member state—Hungary. The chapter presents the most important reporting obligations that have recently been expanded, and explores their practical implications for corporate operations, with particular attention to issues of transparency, regulatory compliance, and administrative burden.

The European Union's sustainability regulatory framework for businesses

In recent years, corporate sustainability reporting has become a key policy priority within the European Union. The aim of reporting obligations is to ensure that companies provide transparent disclosures not only on financial matters, but also on ESG dimensions. To achieve this, the European Union has introduced a set of interrelated legislative instruments, among which the CSRD represents the most comprehensive and structured regulatory approach. The CSRD seeks to establish a unified reporting framework that enhances the comparability, reliability, and transparency of sustainability-related information disclosed by companies operating within the EU.

The Scope and Reporting Obligations of the CSRD

The CSRD aims to standardise and make ESG-based reporting mandatory across the European Union (European Parliament and Council, 2022). The directive significantly broadens the scope of sustainability reporting obligations by encompassing the full spectrum of ESG factors. It not only expands the categories of companies subject to reporting but also deepens the content requirements, placing particular emphasis on the reliability, auditability, and comparability of disclosed data. From 2025 onwards, the directive applies to large companies and listed SMEs, mandating detailed disclosures on sustainability impacts, risks, and corporate strategies. The overarching objective of the regulation is to enhance transparency, facilitate comparability across companies, and provide investors and other stakeholders with reliable, consistent data. However, the expansion and intensification of reporting requirements pose significant challenges, especially for smaller market participants, who often lack the resources, expertise, or internal systems needed to meet these complex compliance expectations.

The CSRD requires sustainability reporting from large undertakings that meet at least two of the following three criteria for two consecutive financial years:

- The company has more than 250 employees;
- Its annual net turnover equals or exceeds EUR 40 million;
- Its total assets amount to at least EUR 20 million.

In addition to large companies, the CSRD extends the reporting obligation to listed SMEs, with the exception of micro-enterprises. It also applies to certain non-EU companies that generate more than EUR 150 million in annual turnover within the EU and have at least one subsidiary or branch in an EU Member State.

Listed SMEs will be required to publish their first sustainability report in 2026, covering the 2025 financial year. However, they are eligible to opt for a one-time deferral, which allows them to postpone the reporting obligation until 2028.

The Corporate Sustainability Due Diligence Directive

The Corporate Sustainability Due Diligence Directive (CSDDD) represents a key pillar of the European Union's efforts to promote responsible corporate conduct and ensure that companies manage the external impacts of their operations (European Parliament and Council, 2024). While the CSRD focuses on the measurement and disclosure of sustainability performance, the CSDDD emphasises active corporate responsibility for identifying, mitigating, and managing human rights and environmental risks across global supply chains. The directive was adopted by the European Parliament in the spring of 2024, with transposition into national legislation expected around 2025. At its core, the CSDDD aims to reinforce corporate accountability, requiring companies to assess and manage risks throughout their entire value chain. It plays a critical role in advancing ethical business practices and enhancing supply chain transparency. To ensure compliance, companies are expected to establish comprehensive due diligence procedures and engage with stakeholders actively. The directive applies primarily to large companies—and, in some cases, to medium-sized enterprises—and obliges them to identify, prevent, mitigate, and address adverse human rights and environmental impacts that may arise from their own operations or those of their subsidiaries and business partners. Importantly, the obligations extend not only to direct operations but also across the entire supply chain, including indirect business relationships, which may indirectly affect SMEs as well.

The CSDDD specifically applies to EU-based companies that meet the following thresholds:

- At least 500 employees and EUR 150 million in annual global turnover,
- Or at least 250 employees and EUR 40 million in turnover, if operating in high-risk sectors.

For non-EU companies, the directive applies if:

- Their EU-based turnover meets the thresholds above, and
- They have a significant economic presence within the EU.

Although most SMEs are not directly subject to the CSDDD, they may come under indirect pressure through supply chain expectations, as larger companies will be required to collect data and assess risks related to their suppliers' practices.

The CSDDD sets out a range of compliance obligations that companies must fulfil in a documented and transparent manner, including:

- The development of a due diligence policy detailing the processes for managing sustainability risks;
- Risk mapping and assessment covering the full scope of the company's operations and supply chain;
- The implementation of preventive and corrective measures where violations or risks are identified;
- The establishment of a complaints mechanism that allows stakeholders (e.g., workers, communities) to raise concerns;
- Reporting and public accountability, including the publication of relevant information on the company's website and through other accessible channels.

In addition, Member States are required to designate supervisory authorities responsible for monitoring compliance and, where necessary, enforcing the directive through sanctions. While the CSDDD aims to strengthen corporate responsibility, its implementation presents significant challenges—especially for SMEs embedded in lower tiers of global supply chains.

These smaller actors often lack the legal or environmental expertise needed to respond to due diligence requests from larger corporations. Many are also unprepared to meet data collection and documentation expectations, leading to capacity gaps. Even though the CSDDD does not formally impose obligations on SMEs, it exerts a practical impact on them through the extended responsibilities of large corporations. As such, compliance-related costs and administrative burdens may arise for SMEs without direct legal accountability—demonstrating how the directive's reach extends beyond its formal scope to influence the entire business ecosystem.

The EU Taxonomy Regulation

The EU Taxonomy Regulation, encompassing Regulations (EU) 2019/2088 and 2020/852, is a cornerstone of the European Union's sustainability regulatory framework (European Parliament and Council, 2020). It establishes a common classification system to define which economic activities can be considered environmentally sustainable. The taxonomy creates a unified framework for determining the environmental sustainability of business activities, with the overarching aim of steering companies and investors toward green initiatives and thereby supporting the EU's long-term goal of achieving climate neutrality. Whereas the CSRD and CSDDD aim to enhance corporate transparency and accountability, the taxonomy introduces a science-based, objective standard to assess and quantify what qualifies as "green." By defining sustainable activities and establishing clear, verifiable criteria, the regulation contributes to greater transparency and reduces the risk of greenwashing—the practice of making misleading sustainability claims. The EU Taxonomy thus serves both as a regulatory tool and a market signal, guiding financial flows toward environmentally responsible projects and enabling stakeholders to make better-informed decisions aligned with Europe's climate objectives.

Sustainability compliance obligations for companies in Hungary

In addition to the European Union's regulatory framework, individual member states have also introduced a range of sustainability-related compliance obligations for businesses, many of which have undergone significant changes in recent years (Hungarian Parliament, 2023). New sustainability requirements have been introduced, while existing regulations have been expanded—posing considerable challenges for companies across sectors. These growing obligations, particularly in the form of data reporting requirements, demand a high level of expertise as well as the implementation of robust digital systems to support ongoing data collection and processing. Frequent and structured data submissions require an integrated information technology (IT) infrastructure capable of supporting sustainability-related operations. This subsection presents the main sustainability compliance requirements in Hungary, focusing on those obligations that represent a substantial burden on companies, especially in terms of the resources and capacities needed to ensure full compliance.

Reporting and data provision obligations imposed by the Supervisory Authority for Regulated Activities

In Hungary, one of the most significant sustainability-related regulatory measures is the ESG reporting obligation introduced by the SZTFH. According to Government Decree 13/2024 (VIII.15.), companies falling within the scope of the regulation are required to prepare an ESG report.

Starting from 2025, ESG reporting will be mandatory for large companies that, in relation to the 2024 financial year, meet at least two of the following criteria:

- a balance sheet total of at least 10 billion HUF,
- a net annual turnover of at least 20 billion HUF,
- or an average number of 500 employees.

From 2026, the scope of the obligation will be extended to include companies with at least 250 employees, and by 2027, SMEs will also be subject to reporting requirements. The objective of the ESG report is to ensure the objective comparability of corporate sustainability performance and accountability. The reporting framework comprises three pillars—Environmental (E), Social (S), and Governance (G)—and includes a 151-question questionnaire, with the number and types of questions tailored to the company's size and sector. To support completion of the report, the SZTFH has developed an online ESG calculator. It is important to note that if a large enterprise is required to complete the ESG questionnaire, its suppliers may also be subject to the same obligation, due to the cascading nature of reporting requirements within the supply chain. The questionnaire includes general corporate data, sustainability performance indicators, business ethics and transparency data, risk management and data governance aspects. It also covers environmental impacts, biodiversity and ecosystem protection, supply chain sustainability, ESG indicators and targets. The actual questions and response requirements depend on company size and business activity, ensuring sector- and scale-appropriate reporting (Supervisory Authority for Regulated Activities, 2024).

ESG requirements and sustainability data reporting obligations imposed by the Hungarian National Bank

In recent years, the Hungarian National Bank (MNB) has increasingly emphasised integrating sustainability into the financial system. The MNB has formulated specific expectations for market participants, which also affect corporate borrowers through sustainability-related obligations. In its Recommendation No. 10/2021, the MNB outlined how financial institutions should incorporate sustainability considerations into their operations. Then, the MNB's ESG Guidelines provided detailed instructions on how financial institutions are expected to assess their clients' ESG exposure. As a result, from 2024 onwards, any company applying for a loan exceeding HUF 500 million is required to submit ESG-related information to the lending institution. While this requirement initially applies to loans above HUF 500 million, the threshold will gradually decrease: from 2026, it will apply to loans of HUF 350 million or more; from 2027, to loans of HUF 200 million; and from 2028, to loans of HUF 100 million or more. The objective of the questionnaire is to standardise ESG data collection across financial institutions, enabling more accurate credit risk assessment and supporting the integration of sustainability considerations into lending processes. The ESG disclosure requirement thus serves as an important mechanism for embedding sustainability in corporate financing decisions (Hungarian National Bank, 2021).

Challenges of compliance for business

The expansion of sustainability reporting obligations and the increasing stringency of both EU-level and national regulations place a substantial burden on businesses. Although the core objectives of these regulations—such as improving transparency, mitigating ESG-related risks, and promoting environmental sustainability—are well-founded, the practical implementation poses numerous compliance challenges, particularly for SMEs.

Lack of resources and expertise

Until recently, sustainability reporting requirements primarily affected companies directly engaged in regulated sectors. However, the broadening of the regulatory scope now extends these obligations to smaller enterprises as well. Most SMEs do not employ dedicated sustainability professionals and often rely on external consultants even for fulfilling legal and financial obligations. Complying with sustainability regulations—interpreting the rules, applying them correctly, and generating the required data—demands interdisciplinary

knowledge and expertise, which smaller companies typically lack in-house. The complexity of ESG-related requirements can exceed the operational and human resource capacities of these firms, creating a significant compliance barrier (Wang & Esperança, 2023).
Empirical findings provide further evidence of these challenges. A recent study among SMEs in the V4 region revealed that only 53.8% of owners or top managers reported familiarity with ESG and believed it could enhance their company's image (Kozubíková et al., 2023). Prior engagement in CSR has been shown to significantly increase acceptance of ESG, suggesting that earlier sustainability practices act as a stepping stone for compliance (Al-Issa et al., 2022; Rossi et al., 2021). Furthermore, participatory leadership styles and human resource management practices positively influence ESG awareness and acceptance (Zhu & Huang, 2023; Berber et al., 2014), highlighting that managerial culture is as important as financial and technological readiness. Finally, transparent anti-corruption measures strongly correlate with more favourable attitudes toward ESG (Santana et al., 2020), underlining that governance and ethical standards are integral components of successful ESG adoption. Taken together, these results confirm that limited expertise, lack of organisational preparedness, and weak governance practices represent structural barriers that hinder SMEs' ability to meet sustainability reporting obligations.

Administrative and reporting burden

The European Union's regulatory instruments (CSRD, CSDDD, and the EU Taxonomy), along with national-level regulations in Hungary (issued by the MNB and SZTFH), impose extensive data provision and reporting obligations on businesses. These obligations often involve new categories of data that companies have not previously collected—such as carbon footprints, employee diversity, or ESG-related supply chain risks. Generating such information in a structured and auditable format presents a considerable challenge. While larger companies may already have experience complying with various sustainability reporting requirements, the expansion of reporting obligations creates disproportionate burdens on SMEs. For SMEs, building the necessary infrastructure—including reporting templates, data management software, and internal procedures—can be time-consuming and costly. Moreover, the production of ESG reports may lack immediate financial return, particularly for management teams focused on short-term profitability. As a result, SMEs often perceive these obligations as compliance-driven costs, rather than as strategic investments, further complicating adoption and implementation.

Research has shown that SMEs frequently lack awareness of ESG processes and disclosed information (Shalhoob & Hussainey, 2023), remain concerned about the costs and administrative burdens of compliance (Yip & Yu, 2023; Gjergji et al., 2021), face difficulties in implementing ESG rating schemes (Tsang et al., 2023), and struggle with resource limitations that undermine the reliability of reporting (Gholami et al., 2022).

Lagging digitalization

One of the key foundations of sustainability compliance is the availability of a reliable and digitised data management system. In order to efficiently prepare the required sustainability reports and disclosures, companies must have a well-functioning IT infrastructure. However, this is often lacking in SME operations, placing them at a considerable disadvantage. Many SMEs are not yet equipped to track relevant ESG indicators within integrated digital systems. The continued reliance on manual data collection and Excel-based reporting is not only time-consuming but also poses serious auditability risks. Furthermore, ESG reporting is typically an annual and ongoing process, which requires the continuous updating, verification, and archiving of data. Most SMEs do not currently operate with the internal systems necessary to

support such demands. As a result, the digital readiness gap significantly hinders SMEs' ability to meet sustainability compliance requirements reliably and at scale (Burinskienė & Nalivaikė, 2024).

Indirect pressure through corporate supply chains

As large enterprises have long been required to prepare sustainability reports, these obligations are increasingly extending to their suppliers, thereby indirectly affecting SMEs. While many small and medium-sized enterprises are not directly subject to formal ESG regulations, their corporate partners increasingly request ESG reports, self-assessments, or data sheets as a condition of ongoing business relationships. The impact of the CSDDD further reinforces this trend, as ESG due diligence obligations extend deep into supply chains, including the smallest entities. This means that even micro- or small enterprises may be required to provide ESG-related data, despite not being formally regulated under existing sustainability laws. This phenomenon creates a de facto obligation for SMEs, emerging as a form of market pressure. Non-compliance or the lack of ESG preparedness may result in the loss of key partnerships or reduced access to financing, placing SMEs at a competitive disadvantage—even in the absence of direct legal mandates.

Limited preparation time and lack of information

Although the rollout of sustainability regulations is gradual, many businesses become aware of the changes too late or fail to recognise that these obligations may also apply to them. Due to this lack of awareness, numerous companies begin preparing for compliance only at the last minute, increasing the risk of non-compliance or superficial reporting. Moreover, the available resources—such as academic literature, regulatory guidelines, and consultancy materials—are often geared toward large corporations. These materials frequently use examples, terminology, or frameworks that do not translate well to the operational realities of SMEs. As a result, small and medium-sized enterprises may struggle to access practical, tailored guidance, making it difficult to understand what is required of them and how to meet reporting expectations effectively.

The role of digitalisation in supporting sustainability compliance

The administrative and data-related challenges associated with preparing sustainability reports and disclosures impose a significant burden on businesses. These challenges increasingly highlight that, without digitalisation, long-term compliance with sustainability reporting requirements is difficult to maintain. Beyond serving a purely technical function, IT systems can become strategic tools in supporting compliance processes. For companies—particularly SMEs—it is crucial to develop digital capabilities, as the right technological solutions can save time, reduce resource demands, and minimise risks associated with manual processes.

Automation of data collection and management

One of the most difficult aspects of sustainability reporting is generating relevant data. ESG indicators—environmental, social, and governance-related—are often drawn from multiple departments within a company and in various formats, making data harmonisation a complex task. Replacing manual data collection with automated digital systems, such as corporate carbon footprint calculators or ESG dashboards, can provide real-time and consistent data management. Although implementing digital infrastructure may require substantial investment, it leads to fewer errors, greater transparency, and easier auditability of sustainability data.

Digital transformation, therefore, is not merely an operational upgrade—it is a critical enabler of efficient, scalable, and credible ESG compliance. (Akhtar et al., 2025)

Sustainability software and reporting templates

As ESG reporting obligations have increased significantly in recent years, the market has responded with a growing number of digital solutions designed to support ESG reporting. These software tools typically include predefined reporting templates, and many can be integrated with existing enterprise systems to enable automated data handling. It is important to note that many SMEs have only recently become subject to sustainability regulations due to the expansion of legal requirements. As a result, these companies often lack dedicated ESG experts or internal compliance teams, making off-the-shelf software solutions especially valuable for streamlining the reporting process.

Data visualisation and reporting

The advantages of digital tools go beyond data collection; they also facilitate the formatting and presentation of ESG reports. Visualisation solutions—such as graphs, infographics, and interactive dashboards—not only help regulatory authorities interpret the information more easily but also enhance transparency and credibility for internal management and external stakeholders alike. Regular ESG data submissions can be generated more quickly and cost-effectively with a well-functioning reporting solution. By leveraging digital platforms, companies can turn reporting from a compliance obligation into a strategic communication tool.

The path toward digitalisation: challenges and opportunities

While the implementation of digital solutions offers clear advantages for businesses, it still poses significant challenges for SMEs. Digitalisation projects often require substantial investment, which can strain limited financial resources. In addition, for companies with low digital maturity, choosing the right software or tools may be a source of uncertainty and hesitation. However, organisational digitisation has been shown to improve ESG performance through enhanced data management and transparency (Zhao, Han, & Wang, 2024). Despite these challenges, a range of support mechanisms and recognising and acting on this opportunity in a timely manner can not only fulfil regulatory requirements, but also provide resources available in Hungary to assist businesses, including EU-funded and national grant schemes (e.g., the Digital Welfare Program and the Economic Development and Innovation Operative Program Plus). Financial institutions and industry organisations are also offering ESG-related digital services, which can help companies take the first steps toward digital integration. In this context, digitalisation should not be viewed merely as a technical upgrade, but rather as a critical enabler of sustainability compliance. Businesses that recognise and act on this opportunity in a timely manner can not only fulfil regulatory requirements but also gain a competitive advantage in terms of transparency, operational efficiency, and ESG performance.

Recognising the tight reporting deadlines imposed on newly obligated companies, regulatory authorities have also started to respond. In 2024, the European Commission announced the preparation of an omnibus amendment package, aimed at harmonising and simplifying the EU's three core ESG regulations—the CSRD, the CSDDD, and the EU Taxonomy.

Although the final details are still under development, the proposed changes are intended to reduce the administrative burden on companies, especially for SMEs, and to enhance clarity in digital reporting requirements. As such, the omnibus package represents not only a regulatory streamlining effort but also a practical support mechanism to facilitate the digital transition of ESG compliance. Regulators have also recognised that the fragmented and

complex reporting obligations place a disproportionate burden, particularly on SMEs; therefore, in February 2025, the European Commission introduced the so-called Omnibus legislative package, which aims at comprehensive simplification and harmonisation

The EU Omnibus Package and its potential impact on SMEs

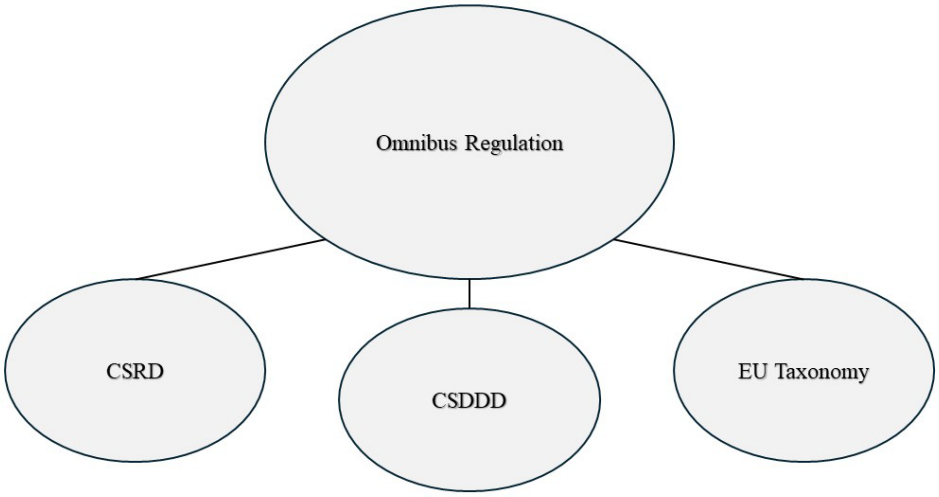

Figure 1*: The EU Omnibus package and its main regulatory pillars (CSRD, CSDDD, EU Taxonomy)*
Source: *Own elaboration based on European Commission (2025)*

In February 2025, the European Commission published the so-called Omnibus legislative package, which aims to streamline and harmonise the EU's sustainability framework. The proposal seeks not only to simplify regulatory requirements but also to strengthen competitiveness and provide a more practical reporting environment for businesses. The Omnibus package introduces targeted amendments to several key instruments, including the CSRD, the CSDDD, the Carbon Border Adjustment Mechanism (CBAM), and the EU Taxonomy Regulation. Among the most relevant changes, the scope of CSRD reporting obligations would be narrowed, with voluntary reporting options offered for smaller enterprises, alongside a two-year postponement of reporting deadlines for large companies. Similarly, the CSDDD modifications propose reducing supply chain due diligence requirements, such as extending the review period for supplier risk assessments from 1 to 5 years. For CBAM, the package would exempt small-volume importers from reporting obligations while maintaining stricter requirements for large emitters. Under the EU Taxonomy, the scope of mandatory disclosures would be limited to very large firms (with more than 1,000 employees and €450 million in turnover), leaving smaller companies with voluntary options. Although the legislative negotiations are ongoing, the package represents a significant attempt to reduce administrative burdens, particularly for SMEs, while maintaining the EU's overall commitment to sustainability objectives. For Hungarian enterprises, the proposal may provide much-needed relief in adapting to complex ESG regulations, although the long-term emphasis on sustainability performance and ESG integration remains unchanged.

Table 1*: Annex I: New initiatives*
Source*: European Commission (2025), Commission Work Programme 2025.*

No.	Policy objective	Initiatives
A new plan for Europe's sustainable prosperity and competitiveness		
1.	**Competitiveness**	**Competitiveness Compass** (non-legislative, Q1 2025)
2.	**Competitiveness**	**Single Market Strategy** (non-legislative, Q2 2025)
3.	**Simplification**	**First Omnibus package on sustainability** (legislative, Q1 2025)
4.	**Simplification**	**Second Omnibus package on investment simplification** (legislative, Q1 2025)
5.	**Simplification**	**Third Omnibus package, including on small mid-caps and removal of paper requirements** (legislative, Q2 2025)
6.	**Simplification**	**Revision of the Sustainable Finance Disclosure Regulation** (legislative, incl. impact assessment, Article 114 TFEU, Q4 2025)
7.	**Simplification**	**Digital package** (legislative, incl. impact assessment, Q4 2025)
8.	**Simplification**	**European Business Wallet** (legislative, incl. impact assessment, Article 114 TFEU, Q4 2025)
9.	**Competitiveness and Decarbonisation**	**Clean Industrial Deal** (non-legislative, Q1 2025)
		Action plan on affordable energy (non-legislative, Q1 2025)
10.	**Competitiveness and Decarbonisation**	**Industrial Decarbonisation Accelerator Act** (legislative, incl. impact assessment, Article 114 TFEU, Q4 2025)

According to the Commission Work Programme 2025, the legislative process is scheduled for the first quarter of 2025 (European Commission, 2025, published on 11 February 2025).

Conclusions and recommendations for advancing sustainability compliance

Conclusions

Sustainability has evolved beyond a strategic priority and has now become a regulatory and operational obligation for businesses. The European Union's key sustainability regulations—namely the CSRD, CSDDD, and the EU Taxonomy Regulation—have introduced new legal and administrative frameworks that require companies to deliver transparent and measurable ESG disclosures. Hungary has actively aligned with these frameworks, particularly through the expectations set by the SZTFH and the Hungarian National Bank (MNB). As the findings of this study show, the most pressing compliance challenges are faced by the newly obligated segment—SMEs. A lack of resources and expertise, digital underdevelopment, and the complexity of administrative requirements all contribute to the difficulty many companies face in meeting these new expectations. Digitalisation plays a crucial role in this process: not only does it improve the efficiency of data collection and management, but it also enhances the transparency and credibility of sustainability reports. However, the implementation, maintenance, and effective use of digital tools require financial and professional support, particularly for SMEs, which typically lack internal ESG capacity.

Recommendations and final remarks

Regulatory expectations should be tailored to the size and operational characteristics of companies. SMEs do not have the same capacities as large corporations, so it is essential to introduce phased timelines and regulatory simplifications for them. For newly affected businesses, sustainability obligations present a considerable burden, as they often lack the necessary resources and knowledge. Therefore, extending compliance deadlines and supporting their preparedness are key. There is a clear need for simplified guides, templates, case studies, and practical examples tailored to the context and needs of SMEs. Many companies are unaware

of the specific sustainability obligations that apply to them and, as a result, fail to begin preparation in time. The creation of clear and accessible resources—such as explanatory guides, webinars, case studies, and step-by-step reporting tools—could greatly facilitate timely compliance. The introduction of multiple sustainability-related reporting obligations has placed significant demands on companies' capacities. To meet these requirements effectively, firms must build robust IT systems, which can save time, energy, and resources in the long run. Access to digital ESG tools—including reporting software, data warehouses, and compliance dashboards—is essential. Public support mechanisms, such as targeted grants or funding programs, would be highly beneficial in promoting this transition for SMEs. It is also crucial to eliminate overlaps and contradictions among different reporting frameworks. Harmonisation between SZTFH, MNB, and EU-level regulations would ensure that companies are not subject to redundant or incompatible obligations. In response to these challenges, the European Commission published a proposal on February 26, 2025, for the First Omnibus Package, which would amend key directives, including the Accounting Directive (2013/34/EU), Audit Directive (2006/43/EC), the CSRD, and the CSDDD. This package, first announced in November 2024 by Commission President Ursula von der Leyen, seeks to streamline overlapping ESG requirements into a single, simplified framework. The legislative proposal—expected in the first quarter of 2025—aims not to reduce content, but to alleviate bureaucratic burdens, allowing companies to focus on genuine compliance and sustainability outcomes, rather than excessive administrative tasks. This initiative may bring tangible relief to SMEs, contributing to more proportionate and practical application of sustainability regulations. The findings of this study confirm that the EU's planned omnibus legislative package is both justified and timely. By promoting the simplification, alignment, and digital compatibility of the CSRD, CSDDD, and the EU Taxonomy Regulation, the proposal presents a real opportunity to reduce the administrative burden on SMEs. The proposed measures could enable businesses to comply with ESG obligations under a more proportionate, transparent, and technologically manageable system. The omnibus package is currently under legislative review at the EU level and must be adopted by both the European Parliament and the Council (European Commission, 2025). Its provisions will only enter into force once transposed into national law by Member States.

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Sustainability and ethical responsibility in the semiconductor industry: A comparative case study of TSMC and SMIC

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Abstract

The study offers a comparative analysis of sustainability, ethical responsibility and environmental performance in the semiconductor industry, focusing on Taiwan Semiconductor Manufacturing Company (TSMC) and Semiconductor Manufacturing International Corporation (SMIC). The research contributes to the growing discourse on green transformation in high-tech manufacturing by assessing how these two leading Asian foundries respond to global sustainability challenges and align their strategies with the United Nations Sustainable Development Goals (SDGs). The study is grounded in a multidimensional framework that incorporates industry-specific sustainability challenges, ethical risks, alignment with the SDGs, and corporate ESG strategies. Secondary data from corporate disclosures, academic literature and industry reports underpinned the analysis. Preliminary analysis reveals that TSMC has made stronger commitments to carbon neutrality and water recycling, while SMIC's approach aligns with national policy and reflects progressive ESG integration. Both companies face challenges in transparency; however, they are demonstrating emerging good practices by adopting green innovations. The findings offer both a theoretical and a practical overview by integrating global policy goals with firm-level behaviour. They highlight the role of national policy, technological innovation, and supply chain governance in shaping corporate sustainability outcomes. The research provides actionable recommendations to align industry practices with circular-economy principles and to improve cross-border sustainability standards in the semiconductor sector.

Keywords: Semiconductor industry, sustainability. TSMC. SMIC. ESG. SDG's.

JEL codes: L63, Q56, M14, Q01, O32

Introduction

The global semiconductor industry is at the core of technological innovation, yet it faces mounting scrutiny regarding its environmental footprint and social responsibilities. As digital infrastructure expands, the need for sustainable semiconductor manufacturing intensifies. Two key players, Taiwan Semiconductor Manufacturing Company (TSMC) and Semiconductor Manufacturing International Corporation (SMIC), have adopted different trajectories in addressing Environmental, Social, and Governance (ESG) challenges. This essay explores how these firms align with the United Nations Sustainable Development Goals (SDGs) and compares their environmental and ethical strategies. The relevance of the semiconductor industry was highlighted by the COVID-19 crisis that broke out in 2020, at the same time as the looming chip shortage, which for many people in the automotive, consumer electronics, or computing industries immediately materialised. It has been undisputed for decades that 'chips have become a more important raw material than oil in terms of economic growth, and Goldman Sachs estimates that up to 169 industries could be affected by the negative developments. The unfolding shortage in 2020 has shaken markets, highlighting significant global economic exposure. The situation was quickly brought to everyone's attention by the surge in home working and the introduction of distance learning due to the coronavirus, which made a

significant amount of computing and other electronic equipment a necessity for the population almost immediately. (Al-Habaibeh et al.,2021)

This issue is also practically important because it enhances our understanding of one of the fiercest technological races of our lifetimes. Furthermore, the emergence of trends in microchip manufacturing illustrates the weaknesses of the globalised world. The practical significance of the issue is further underscored by the Semiconductor Industry Association (SIA) summary of the CHIPS Act, which said, "America's future will be built on semiconductors, " while also positing that some sources foresee the future of mankind as chip-based. Awareness of climate change and growing societal expectations of business roles have driven semiconductor companies to align their operations with the United Nations Sustainable Development Goals (SDGs) and Environmental, Social, and Governance (ESG) criteria (Li et al., 2024). For TSMC and SMIC, being front-runners in the Asian region, there is particular scrutiny regarding commitment, accountability, and sustainability within their operations (which involves ethical behaviour). This is a comparative study that identifies how these companies have manifested sustainability within their corporate strategies, and it exemplifies more globalised changes in the High-Tech and Electronics/Microprocessing sector (Zhang, 2024)

In addition, the semiconductor industry is critical to global supply chains. It is considered the backbone of modern digital infrastructure, as evidenced by severe interruptions during the COVID-19 pandemic and subsequent chip shortages (Galimberti, 2024). The disruptions highlighted the vulnerability of semiconductor supply chains and emphasised the need for more sustainable and resilient production models, thus bolstering the rationale for rigorous investigation into the sustainability and ethical responsibility of the foremost manufacturers.

TSMC has been widely regarded as environmentally proactive, most notably in its commitments to carbon neutrality and water recycling (Wang, 2024). SMIC, on the other hand, has aligned its actions with Chinese national policies and demonstrated ESG integration through compliance with government-directed sustainability targets (Zhang, 2024). The distinction offers an opportunity to compare strategies driven by market forces with those driven by national policies.

Furthermore, the subject matter is justified by increasing global regulatory pressures on governments to ensure transparency and accountability in corporate ESG obligations. The European Commission, for example, now has regulations in place requiring companies to demonstrate respect for human rights and the environment within their global value chains (Stückelberger, 2022). The regulatory landscape will elevate the relevance of studying TSMC's and SMIC's disclosures and sustainability initiatives. Moreover, the comparative analysis indicates the role of technological innovation in achieving sustainability goals. For example, both companies are investing in advanced manufacturing technologies that reduce their environmental footprint and advance the SDGs' vision to reduce the environmental impacts of consumption and production practices (Leandro, 2025). Additionally, this technological innovation improves sustainability and serves as a differentiator against each of their competitors in the global marketplace.

The significance of the topic is compounded by the geopolitical context of semiconductor production. The national positioning of TSMC and SMIC may reflect broader geopolitical concerns regarding technological sovereignty and redundancy in critical supply chain commodities amid escalating US-China trade tensions and regional tech dependencies (Numa, 2024.

The comparative analysis of TSMC and SMIC's sustainability policies aims to provide guidance to policymakers, incentives and endorsements to stakeholders, and spirit and vision to executives to enhance ethical responsibility in high-tech manufacturing. Moreover, the

comparative analysis seeks to highlight the need for consistency between practice and global structures, both regulatory and voluntary, to help structure ethical corporate sustainability discussions in science and technology-rich sectors.
Semiconductors are fundamental to every aspect of modern living, from mobile phones to artificial intelligence. Along with climate change and social equity, pressing on. Examination of how leading semiconductor firms are mobilising sustainability in all its manifestations warrants attention. TSMC and SMIC, as regional foundries, represent diverse political, regulatory, and corporate governance ecosystems, making them difficult to compare (Li et al., 2024).

Literature review and theoretical context

As such, the focus on sustainability and ESG (Environmental, Social, and Governance) practices has been prevalent, especially among leading manufacturers such as Taiwan Semiconductor Manufacturing Company (TSMC) and Semiconductor Manufacturing International Corporation (SMIC), which have led the initiative. This literature review examines and synthesises the existing academic literature and discourse on sustainability strategies, ESG practices, and alignment with the United Nations Sustainable Development Goals in the semiconductor industry.

Sustainability has increasingly come to be viewed as an imperative for semiconductor manufacturers, driven by regulatory pressures and global climate goals. Li et al. (2024) indicate that TSMC has proactively adopted sustainability as a core business strategy. TSMC has prioritised reducing carbon footprint, enhancing water recycling and improving energy efficiency. Furthermore, TSMC, in its ESG reporting, asserts strong commitments to sustainable development through SDGs 12 (Responsible Consumption and Production) and 13 (Climate Action), as evidenced by TSMC's disclosure and policy framework for measuring environmental sustainability (Li et al., 2024).

Similarly, SMIC has incorporated sustainability policies into its planning framework, though its sustainability strategies are more aligned with China's national scheme. Zhang (2024) reported that SMIC's sustainability initiatives have reached legislation and are able to be influenced by policies and state-led innovation, so SMIC is more concerned about prioritising energy efficiency and minimising negative impacts. In contrast to TSMC, SMIC's position seems to have less independent corporate governance and a greater need to link sustainability and ESG reports with government directives (Zhang, 2024). ESG integration has been a major priority for both companies to meet global targets and remain competitive. TSMC's ESG strategy focuses on enhanced Environmental risk assessments, ethical labour practices, governance that is transparent while engaging stakeholders (Stückelberger et al., 2022.) TSMC has the positioning of industry leader in the semiconductor industries on ESG performance (Stückelberger et al., 2022.) SMIC on the other hand, strives to meet ESG expectations placed on them by regulatory bodies in China, as Galimberti (2024) point out SMIC's environmental responsibility is determined largely by government priorities, but especially around the issues of sustainable resources use and something concerning emissions (Galimberti, 2024). While SMIC continues to show improvements in its ESG performance, its reliance on state policies indicates less independence in sustainability governance than TSMC.

The United Nations Sustainable Development Goals offer an overarching approach for sustainability, and both TSMC and SMIC have varying commitments to the goals. TSMC's efforts are closely aligned with SDG 9 (Industry, Innovation, and Infrastructure), SDG 12, and SDG 13, with established foci on investments in green technologies and sustainable production processes (Li et al., 2024). SMIC's sustainability goals are more aligned with the Chinese government's sustainability goals; however, those goals are still given categorically, as with how the SDGs are assigned in China. Zhang (2024) suggests that SMIC's sustainability reports

reflect compliance narratives with top emphasis placed on SDG 9 and SDG 12, with a focus on resource efficiency and sustainable manufacturing (Zhang, 2024).

There are also pronounced differences between TSMC and SMIC in sustainability disclosures and innovation. TSMC's sustainability disclosures are internationally acclaimed for their transparency and detail in documenting environmental impacts and ESG-related measurements (Stückelberger et al., 2022). In contrast, SMIC's disclosures are governed by Chinese domestic regulations that dilute the depth of environmental impact assessments and reporting standards, often reflecting compliance rather than substance (Galimberti, 2024).

Additionally, the technological developments differ widely between the two. TSMC has been ahead of SMIC in its embrace of a wide array of cutting-edge green technologies and practices, such as water recycling and low-energy chip manufacturing, that align with international sustainability policies. SMIC, on the other hand, has made valid contributions to energy efficiency but is primarily focused on complying with Chinese industrial policy rather than independently pursuing green innovations.

The far-reaching and significant role of the semiconductor industry in a geopolitical context means that the sustainability practices of TSMC and SMIC go beyond simple corporate social responsibility—they directly affect international relations and global supply chains. Leandro (2025) discusses how the semiconductor industry serves as a major conduit for both economic and political power, with both TSMC and SMIC at the centre of global technological networks (Leandro, 2025). This geopolitical dimension underscores the importance of avoiding bad press in sustainability, as a lack of transparency could destabilise global market confidence and supply chains.

Institutional Theory, as a theoretical background, explains how organisational behaviour is a product of external environmental conditions, shaped by a regulatory system largely influenced by cultural expectations and industry norms. DiMaggio and Powell (1983) explored how organisations respond to the pressures of coercive means (legal and regulatory bodies), normative means (professional standards) and mimetic means (imitating successful others); thus, all organisations within similar institutional environments may develop similar practices/structures, which could be referred to as "institutional isomorphism." This theory helps explain how companies may have the same ESG practices and initiatives, even if they are not as deep or as motivated as those in different institutional environments. In this study, TSMC's commitment to environmental innovation and transparent ESG reporting reflects its position in a liberal-market economy where global investor scrutiny and international regulatory standards are strong. Conversely, SMIC, operating within China's state-led model, demonstrates ESG behaviours more aligned with national policy mandates and strategic industrial goals (Zhang, 2024). Institutional Theory thus elucidates how each firm's sustainability strategies are contextually driven by different governance and policy ecosystems.

The Stakeholder Theory expands the domain of corporate responsibility beyond shareholder value maximisation. As Freeman (1984) suggested, for an organisation to be successful in the long term, it must not only understand the importance of shareholders but also balance the power and interests of other stakeholders, such as employees and customers, and the effects on local communities and the environment. Therefore, strategic decisions—especially those related to ESG —are viewed by the organisation through a holistic approach, with the aim of creating shared value and reducing negative externalities.

For example, TSMC's significant carbon-reduction goals and related investments in water reclamation address environmental stakeholders and local communities in Taiwan, while also enhancing its brand equity with global customers and investors (Li et al., 2024). SMIC appears to be making strides through an obligation to compliance and, more recently, engagement with stakeholder pressure (e.g., ethics in the supply chain and obligations to

communities), and is responding to growing demands for corporate citizenship (Zhang, 2024). Stakeholder Theory provides both normative and strategic rationales for these processes.
Institutional and Stakeholder Theory together provide a strong framework for analysing corporate ESG strategies. Institutional Theory situates the external pressures influencing corporate actions, and Stakeholder Theory focuses on the specific ways firms internalise those pressures through the decision-making process.
In summary, a comparative analysis of organisations is foundational to academic research and Stockholder and Institutional Theory form the basis of this analysis.

Research methodology

The study adopted a qualitative case study research design. Secondary data was triangulated from corporate ESG reports, industry publications, and academic literature. The evaluation framework consists of four pillars: (1) environmental and ethical risks, (2) ESG strategy and transparency, (3) SDG project connections, and (4) Innovation and the future of policies. This framework allows for solid comparisons across cases and a thematic synthesis (Zhang, 2024).
The research method used in this study is a comparative case study, which examines Taiwan Semiconductor Manufacturing Company (TSMC) and Semiconductor Manufacturing International Corporation (SMIC) as the chosen firms for analysis. Furthermore, a case study approach is particularly useful for capturing the nuances of sustainability strategies and ESG (Environmental, Social, and Governance) across two significant semiconductor producers and strategic companies operating in differing geopolitical and regulatory regimes. By selecting TSMC and SMIC, this study offers valuable insights into sustainability in the semiconductor industry and allows a direct comparison of Taiwanese market-driven sustainability and China's policy-driven sustainability.

Research design

This study will employ a comparative case study design to compare TSMC and SMIC's sustainability and ethical responsibility strategies. According to Yin (2018), the case study cannot be applied or described consistently, and case study approaches are useful when using a method appropriate for asking about the contemporary phenomenon in real life and in context, especially since the boundaries between the phenomenon and its context are often unspecified. In order to utilise this case study, I will analyse qualitative and quantitative secondary data sources to determine the sustainability strategies across environmental, social and governance issues for both case companies.

Data collection

The methodology for the second study phase will include a review of secondary data sources, including:

Corporate Sustainability Reports - TSMC and SMIC's sustainability reports and ESG disclosures from the past five years of sustainability or ESG reporting are the first of many studies to include a wide range of outcomes, including environmental policy, reductions in emissions, water savings, energy efficiency measures, and participation in the community.
Government and Regulatory Reports – are any sustainability policy documents or guidelines have been made available by the Taiwanese and Chinese regulatory bodies, so to speak, to the regulatory frameworks and policies to which their corporate strategies adhere.

Academic Literature and Industry Reports - Peer-reviewed articles, industry white papers, and global sustainability reports can serve as benchmarks or comparative references for evaluating semiconductor companies' sustainability strategies against established standards or performance metrics. (Li et al., 2024; Zhang, 2024).

Third-party ESG Assessments - Third-party assessments from entities such as the Dow Jones Sustainability Index (DJSI) and the Carbon Disclosure Project (CDP) will assist in verifying reports, notes, and other statements.

News Articles and Press Releases - Local and global news outlets generally inform the world about sustainability goals, communication, and any potential policy and market impacts. While the review of multiple secondary data sources to inform triangulation, the efficacy of data sources will allow for greater understanding of the sustainability practices subject to inquiry, while allowing for less bias associated with having too few sources of data; stated directly, it is better to have sources from various secondary data sources than relying upon a single source (Yin, 2018).

Analytical framework

In reviewing the generated data in order to discover and understand both companies' sustainability strategies and achievements, I will consider four pillars framed and emphasised relative to research questions:

Environmental and Ethical Risk Management - This first pillar relates closely to how TSMC and SMIC identify, categorise, and manage environmental risks, such as carbon emissions, water use, and waste management. The first pillar considers where ethical factors relating to labour practices and human rights dialogues extended the description of risk (Stückelberger et al., 2022).

Corporate Strategy and ESG Reporting - This second pillar explores their strategic ESG plans and discloses their sustainability reports in order to demonstrate and enhance the authors' understanding of their governance structures, disclosures and corporate transparency regarding sustainability. The author will consider TSMC's response to international sustainability disclosures and how this was juxtaposed with experts' reporting on SMIC's response to a statutory-driven approach to sustainability disclosures (Galimberti, 2024).

SDG Project Mapping - Will analyse how well the corporations prioritised and aligned their corporate sustainability projects to the United Nations' Sustainable Development Goals (SDGs). Chapter 2 will describe SDG 9 (Industry, Innovation, and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action) (Leandro, 2025).

Policy and Innovation Recommendations - This study will provide recommendations for sustainability advancements in regulation and innovation, summarised from data organised during the analysis. The recommendations will be summarised and presented thematically, addressing sustainability improvements, policy improvements in regulatory statutes, international collaboration, and cooperative efforts, which may also include applied technological innovations that support sustainability improvements (Numa, 2024).

Data analysis practices

After data collection, the data will be subjected to comparative content analysis to identify patterns, differences, and best practices. Key sustainability indicators, such as carbon footprint, water footprint, renewable energy, and waste initiatives, will be evaluated against global ESG standards. The plan will also involve a Thematic analysis to categorise corporate strategies by the corresponding SDGs, enabling an effective comparison of TSMC and SMIC.

Validation and reliability

To ensure reliability and validity, the study will triangulate data from third-party sustainability assessments, academic literature, and corporate reports. Cross-validation of the data with global

benchmarks such as the Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) will enhance the validity of the results.

Results

The analysis suggests a meaningful distinction between the ESG journeys of TSMC and SMIC, reflecting different political systems, regulatory requirements, and innovation ecosystems.
TSMC is clearly making an effort to mitigate its carbon footprint, in part by investing in renewable energy and achieving mandatory ESG milestones toward its 2050 net-zero target. TSMC has also developed three water reclamation plants to address water scarcity in Taiwan while advancing its contribution toward SDG 6 (Clean Water and Sanitation) and SDG 13 (Climate Action) (Wang et al., 2023) In addition, TSMC purports to adopt state-of-the-art energy-efficient technologies in its fabrication plants, and it has achieved ISO 14001 standardization with respect to environmental management, showing a desire for continuous improvement, transparency, and discipline.

In contrast, SMIC is pursuing its sustainability strategy in a more conservative, albeit policy-compliant dimension. As a state-owned enterprise, SMIC integrates ESG in accordance with Chinese state-led industrial governance (Li et al., 2024). Since late 2020, SMIC's ESG framework has been aligned with China's guidance from the China Securities Regulatory Commission and the Hong Kong Exchange (HKEx). In its ESG reports, SMIC documents the continued correlation between climate risk disclosures and social impact metrics, primarily focused on workforce diversity and emissions control (Zhang, 2024), but lacks the granularity and stakeholder context provided in TSMC's disclosures.

There is also a meaningful distinction in terms of supply chain governance and innovation. TSMC has begun to create value through blockchain and digital traceability in raw material sourcing, aligning with its commitment to sustainability practices and circular economy principles (Li et al., 2024). SMIC has made strides in supplying, but with weaker, unverified 3rd party supervision in the context of China's national policies. Both TSMC and SMIC are committed to SDG 9 (Industry, Innovation, and Infrastructure) and SDG 12 (Responsible Consumption and Production), connected by their process innovation and eco-efficiency measures.

Regarding stakeholder communication, TSMC's ESG report is audited by an external party annually and is available in English and Mandarin to promote global accountability. SMIC's reports appear to be improving but still show the last vestiges of a compliance structure that limits their international comparability. Both companies are growing their sustainability teams and incorporating ESG key performance indicators (KPIs) into the compensation and evaluation of executive performance, revealing an organisational cultural shift toward sustainability performance.

This comparison was structured around the 4 analytical pillars identified in the methodology:

1. Environmental and Ethical Risk Management
2. Corporate Strategy; ESG Reporting
3. SDG Project mapping and
4. Policy and Innovation recommendations

The aim of this comparative analysis is to demonstrate meaningful distinctions and sustainability best practices between the two global semiconductor companies.

Environmental and ethical risk management

For one, TSMC is a clear leader in environmental stewardship, with its commitments to carbon neutrality and the use of water recycling initiatives. Li et al. (2024), who examined TSMC's

sustainability strategies, noted that these strategies currently include advanced water-conservation techniques. In addition, TSMC has achieved water recycling rates of nearly 90 per cent at its facilities, reflecting SDG 12 (Responsible consumption and production) (Li et al., 2024). TSMC's facilities use energy-efficient technology across its production lines, which has also been notable in its efforts to mitigate carbon emissions. TSMC is aiming for net-zero emissions by 2050 (Li et a., 2024).

A contrasting approach to environmental risk is evident at SMIC. According to Zhang (2024), SMIC's strategy for environmental risks was governed by specific Chinese national policy guidance. Unlike TSMC's market-based mechanism, SMIC's environmental focus was on regulations driven by politicians, prioritising regulatory compliance over voluntary pathways to sustainability. In addition, while SMIC was recognised for aspects of energy efficiency as well as pollution reductions, engagement figures relied on exploitative national policy mandates and therefore do not reflect SMIC's sustainability strategies (Zhang, 2024).

There are also distinctions concerning ethical risk management. TSMC aligns with global labour standards and provides disclosures on its supply chain practices in accordance with international human rights regimes. SMIC's ethical disclosures are less observable and typically report only the state-determined labour policy obligation, without indicating independent audits or third-party verifications (Galimberti, 2024).

Corporate strategy and ESG reporting

TSMC has been a leader in transparent ESG reporting, disclosing its sustainability reports using the Global Reporting Initiative (GRI) and Carbon Disclosure Project (CDP) measures. Its annual sustainability reports provide detailed analysis of energy usage, greenhouse gas emissions, and supply chain impacts (Stückelberger et al. 2022). TSMC's sustainability reports showcase routes to success and are transparent about shortcomings in areas such as electronic waste and resource-heavy production.

In contrast, SMIC provides more generalised ESG reports that are most closely related to Chinese regulatory expectations. While SMIC does publish sustainability reports, they lack the level of granularity and provide less transparent disclosures compared to TSMC's global reports (Zhang, 2024). SMIC has done less to voluntarily report on the impacts of social and environmental change because its emphasis has been on compliance with government regulations. SMIC's ultimate goals are driven by the state, as initiatives like the "Made in China 2025" strategy focus on technological self-reliance rather than taking the necessary steps to be transparent about environmental change (Galimberti, 2024).

SDG project mapping

Both TSMC and SMIC have aligned their corporate strategies with the UN Sustainable Development Goals (SDGs), but they differ markedly in approach. TSMC's sustainability efforts predominantly fall under SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action). TSMC's sustainability efforts include investments in renewable energy, the development of industrial water recycling systems, and circular economy activities in chip manufacturing (Li et al., 2024). SMIC's SDG project efforts have also aligned with government policy goals, including China's Belt and Road Initiative and industrial modernisation policy. Furthermore, Zhang (2024) discusses how SDGs' interoperability with SMIC's project goals is primarily due to a need to align with Chinese government policies, rather than with corporate sustainability values, rather than with corporate sustainability values (Zhang, 2024). SMIC's efforts have focused on reducing its carbon footprint and improving energy efficiency. However, its certification efforts

for corporate sustainability are much less diverse and creative, whereas TSMC has shown itself to be more open to market-driven innovation.

Policy and innovation recommendations

The results show that TSMC's proactive response to sustainability is primarily governed by global market forces and possibly competitive benefits in green technology. TSMC's commitment to renewable energy and sustainable chip manufacturing practices serves as a roadmap for global ESG practices in the semiconductor sector. TSMC is encouraged to even further develop its circular economy strategies to include end-of-life product and e-waste management.

For SMIC, recommendations encouraged greater transparency and expanding its sustainability efforts beyond compliance. As China continues to bolster its environmental mandates, SMIC is well placed to embrace international ESG standards to attract global investment and deliver greater returns on its competitive advantages. Greater exuberance toward international sustainability indices such as the Dow Jones Sustainability Index (DJSI) could lend global credibility to SMIC.

Also, partnerships between TSMC and SMIC could help nations establish cross-border mutual sustainability standards for semiconductor manufacturing. Collaborations on green innovation, shared sustainable practices in water conservation, and co-investment in low-carbon technologies would strengthen firm-level sustainability performance while also contributing to collective carbon mitigation efforts aligned with global sustainability targets (Numa, 2024).

The comparative analysis of TSMC and SMIC demonstrated two divergent values regarding sustainability and ESG adoption. Where TSMC's proactive, market-oriented strategy prioritised transparency and technology innovation, SMIC's sustainability agenda is more closely aligned with regulatory compliance and the state's agenda. Ultimately, their diverging points of reference underscore international geopolitical and market-driven dynamics that shape sustainability practices across the semiconductor supply chain.

Summary and further research directions

This study compares Taiwan Semiconductor Manufacturing Company (TSMC) and Semiconductor Manufacturing International Corporation (SMIC) in terms of sustainability performance and ethical responsibility within the semiconductor industry. Employing a case study design structured around four analytical pillars—Environmental and Ethical Risk Management, Corporate Strategy and Governance, ESG Reporting, SDG Project Mapping, and Policy and Innovation Recommendations—the analysis identifies substantial differences and strategic divergence in the sustainability approaches of the two firms.

TSMC established itself as an environmental sustainability leader by adopting green technologies, innovative water-recycling programs, and aggressive carbon-neutrality goals. It has a clear alignment to the United Nations Sustainable Development Goals (SDGs), particularly SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). TSMC demonstrates its awareness of wider global sustainability standards. Firm ESG disclosures and alignment with global standards such as the Global Reporting Initiative (GRI) and the Carbon Disclosure Project (CDP) further validate its position and build stakeholder trust (Li et al., 2024).

SMIC's sustainability mandates are largely based on regulations, rather than voluntary corporate governance. While emissions-reduction and water-conservation efforts are underway, sustainability planning lacks a framework and state backing. SMIC discloses ESG reports that are sparse and enable it to meet governmental standards rather than align with global best

practice (Zhang, 2024). Despite this, SMIC remains aligned with national goals, such as "Made in China 2025", that drive state policy. Thus, it is juxtaposed as a major piece of China's sustainable industrial plans, albeit not as clearly communicative or innovative in a global context as TSMC.

The analysis indicates that TSMC is more market-driven, and larger sustainability disclosures indicate transparent corporate governance. SMIC is also important in the market because it is compliance-focused. This indicates both distinct corporate strategies and significant differences in regional geopolitical and economic contexts, and it drives sustainability priorities in the semiconductor space.

This comparative study reflects the shifting fabric of ESG strategy in the semiconductor industry, using TSMC and SMIC as examples of contrasting sustainability paths that are converging. TSMC is representative of the environment of a liberal-market economy in Taiwan, with innovation-led sustainability as a goal, characterised by a commitment to transparency, water reuse, and global benchmarking. SMIC is representative of state-guided capitalism and government authority directed towards sustainability, where the organisation's goals align with national directives, internal sustainability compliance, and social responsibility.

Both firms are addressing sustainable transformation in one of the most resource-intensive and economically challenged industries in the world, while facing significant challenges due to largely transparent reporting. This study highlights the importance of tailoring ESG practices to national policy contexts, while retaining global coherence in sustainability reporting.

Possible future extensions of the research:

- Include other major players in the semiconductor industry – Intel, Samsung, UMC, for broader comparative analysis
- How have cross-border policy developments (e.g. EU Green Deal; U.S. CHIPS comments) advanced the development of ESG practices in Asia
- What long-term implications arise from the ESG performance of a firm with respect to brand equity, investor confidence, and the encompassing and clarity of innovation cycles?

With the need to further rationalise and harmonise sustainability metrics at the global level, comparative studies such as this must evolve into meaningful, standardised benchmarks that establish a causal connection between these comparisons and achievable transformation in the sustainability capital of the global semiconductor supply chain.

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The openness to meat substitutes among hobby runners in Hungary and their consumption habits

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Abstract

The rise in global meat consumption poses significant sustainability challenges, driving the exploration of alternative protein sources. This study investigates consumer attitudes towards meat alternatives, including plant-based options, lab-grown meat, and insect-based foods, among physically active individuals. Using an online survey disseminated through running communities, data from 876 hobby runners were analysed through SPSS (Statistical Package for the Social Sciences) with descriptive and comparative statistics. Results indicate that while meat consumption remains prevalent, there is a growing awareness of plant-based options; however, lab-grown meat and insect-based foods face greater scepticism. The findings contribute to understanding the role of sustainable food choices and offer recommendations for promoting meat alternatives in the evolving food industry.

Keywords: sustainability, meat alternatives, consumer attitudes, plant-based foods, food trends, healthy lifestyle

JEL Classification: D12, M31, Q01, Q56, O33

Introduction

The global population is steadily increasing, and according to United Nations estimates, it may reach 10.3 billion by 2084 (United Nations, 2024). Feeding this growing population and meeting the rising demand for meat represent major challenges for the food industry. Although a modest decline in meat consumption, particularly red meat, can be observed in the Western world, this trend is insufficient to offset the overall increase in global demand and rising levels of prosperity worldwide. For instance, in Germany, official statistics show that per capita meat consumption fell by approximately 3% (2.5 kg per person per year) between 2020 and 2021 (BLE, 2022). Similarly, the United Kingdom recorded an 11.2% decline in meat consumption between 2019 and 2022 (DEFRA, 2022). In developed countries, the decline in red meat consumption is primarily driven by health, ethical, and environmental concerns (OECD–FAO, 2020). Nevertheless, with rising global affluence, meat is no longer considered a luxury item for many social groups, especially in developing regions (Chemnitz & Becheva, 2022).

In light of global population growth, food security challenges, and sustainability considerations, the exploration of alternative protein sources to replace animal-based proteins has become one of the most pressing issues in contemporary food science and policy. Conventional meat production imposes significant environmental burdens on ecosystems, including greenhouse gas emissions, increased water and land use, and the spread of antimicrobial resistance (Alexandratos & Bruinsma, 2012; Gerber et al., 2013; IPCC, 2022; OECD–FAO, 2020; Poore & Nemecek, 2018; Ritchie et al., 2021; Van Boeckel et al., 2015). Livestock farming plays a substantial role in global greenhouse gas emissions and resource use, thereby contributing to climate change and environmental degradation. According to the Food and Agriculture Organisation (FAO), the livestock supply chain accounts for approximately 14.5% of total anthropogenic greenhouse gas emissions (Gerber et al., 2013). Furthermore, the

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latest IPCC (Intergovernmental Panel on Climate Change) report indicates that the AFOLU sector (Agriculture, Forestry, and Other Land Use) accounts for approximately 22% of global emissions (IPCC, 2022). In this context, there is an urgent need to develop more sustainable food systems, with a particular emphasis on the partial replacement of animal proteins. Recent research and industrial innovation have identified three promising categories of alternative protein sources: plant-based meat substitutes, lab-grown (cultured) meat, and edible insects.

Theoretical background

Onwezen and colleagues (2021) identified five main types of alternative proteins that consumers might choose as substitutes for conventional meat: legumes (e.g., beans and lentils), algae, insects, plant-based meat alternatives, and cultured meat. Among these, insects had the lowest level of consumer acceptance, followed by cultured meat. Legumes and plant-based proteins were the most widely accepted.

Plant-based meat alternatives are foods made from plant ingredients (e.g., grains, legumes) that aim to replicate the texture, flavour, and nutritional content of conventional meat as realistically and comprehensively as possible (Andreani et al., 2023; He et al., 2020; Sadig & Wu, 2024; Thavamani et al., 2020). Cultured meat, also referred to as in vitro or lab-grown meat, is produced from animal cells under controlled conditions and offers a meat-like product without the need for animal slaughter (Chemnitz & Becheva, 2022; Post, 2012; Rosenfeld & Tomiyama, 2023; Sghaier & Hocquette, 2020). Edible insects such as crickets and mealworms provide high-quality protein and can be produced in environmentally friendly ways (van Huis et al., 2013; Nowakowski et al., 2021). These alternatives have a significantly lower ecological footprint: plant- and insect-based products generate lower greenhouse gas emissions and require less water and land than conventional meat production (Clune et al., 2017; Poore & Nemecek, 2018).

In a 2020 nationwide survey of 1,800 American consumers, participants were asked to choose between four types of hamburger patties: conventional beef, cultured meat, plant-based pea protein, and a hybrid patty containing both plant and animal ingredients. When offered these options without brand names and at equal prices, 72% of respondents chose the conventional beef patty, 16% chose the plant-based pea patty, 7% chose the hybrid, and only 5% chose the cultured meat option. Adding brand names (e.g., Certified Angus Beef, Beyond Meat, Impossible Foods, Memphis Meats) increased the share of those selecting conventional beef to 80%. Even when the price of the meat alternatives was reduced by 50%, conventional beef maintained its leading position. The study found that vegetarians, men, younger individuals, and those with higher education levels were more open to meat alternatives. Moreover, more participants opposed than supported the use of the term “beef” for plant-based or cultured meat products (Van Loo et al., 2020).

Global and Hungarian acceptance of plant-based meat alternatives

The development of plant-based meat alternatives has made it easier for flexitarians, vegetarians, and vegans to adopt a meat-free diet. Flexitarians are the primary target group for these products, as they enable reduced meat consumption without requiring full abstention. Several studies have shown that heavy meat-eaters are less willing to substitute plant-based alternatives compared to flexitarians and may be discouraged by labels such as “plant-based” or “vegan.” However, other studies suggest that as more consumers become familiar with plant-based products, fewer seek alternatives that mimic the sensory characteristics of meat, since vegetarians and vegans typically do not prioritise such properties in their food (Andreani et al., 2023).

A nationally representative survey conducted by Szakály and Szilágyi (2022) with 500 participants revealed that one-third of Hungarian consumers had already tried plant-based meat alternatives. Openness was higher among women, younger respondents, and those with higher education levels. Nearly 70% of respondents indicated that they did not plan to try plant-based products in the future, suggesting that the market for these products in Hungary remains a niche.

Global and Hungarian acceptance of cultured meat

In the case of cultured meat, initial consumer reactions often include disgust and perceptions of unnaturalness. Although cultured meat most closely resembles traditional meat in appearance and preparation, acceptance must be studied from a psychological perspective. For instance, one study showed that participants were more willing to try cultured meat when it was labelled as "clean meat" rather than "lab-grown meat" (Sghaier & Hocquette, 2020; Rosenfeld & Tomiyama, 2023). It also remains unclear whether individuals following a flexitarian or vegetarian diet would accept this category as a meat substitute.

Researchers at the University of Debrecen conducted a nationally representative survey of 500 Hungarian participants to investigate consumer preferences regarding cultured meat. The results indicated that acceptance of cultured meat is very low: only 4.2% were certain they would try it, and just 5.2% would consume it regularly. However, willingness to try was higher among those who had already consumed plant-based alternatives, as well as among younger, health-conscious, and environmentally aware individuals (Szakály et al., 2024).

In a separate study, Pakurár and Kiss (2023) used an online questionnaire with 132 respondents to examine how AI-generated (artificial intelligence) images influenced consumer attitudes toward unfamiliar foods and specifically cultured meat. Their findings indicated that such images significantly increased both willingness to try and to purchase the product, although they did not enhance willingness to pay a premium.

Global and Hungarian acceptance of edible insects

Consumer acceptance of insect-based foods in Western countries remains low, and few people are willing to consume insects as a meat substitute. Such foods are often met with fear and aversion. However, prior positive experiences, such as trying insect-based dishes while travelling in Asia, can increase willingness to consume edible insects (Nowakowski et al., 2021; Thavamani et al., 2020). According to a representative survey conducted by Hungary's National Food Chain Safety Office (NÉBIH), since 2016, the proportion of consumers rejecting insect consumption has increased by 2.4%. Fewer than 5% of Hungarian consumers are willing to eat insect-based foods, while over 70% firmly reject the idea (NAK, 2023). Szendrő et al. (2021) also examined Hungarian consumers' openness to insect-based foods in a non-representative survey involving 414 participants. They found that while general knowledge of insect consumption was average, willingness to try such foods remained low. Men were more open than women, as were individuals with higher education, and those aged 30–39 showed the greatest openness. No significant preferences were found based on residence or income. The researchers concluded that Hungarian consumers exhibit a strong aversion to insect-based foods, and without commercial availability, a substantial increase in consumption is unlikely.

An environment-conscious consumer segment: LOHAS (Lifestyles of Health and Sustainability)

In light of the low acceptance of meat alternatives, particularly lab-grown and insect-based proteins, it becomes crucial to explore consumer segments that may be more open to such innovations. One such group comprises individuals whose lifestyle choices are driven by sustainability, health, and ethical considerations. The LOHAS segment includes consumers

who place high importance on environmental responsibility, social equity, personal health, and sustainable consumption (Szakály 2017; Törőcsik, 2007). These individuals are more likely to adopt environmentally friendly behaviours, including reducing meat consumption, and demonstrate greater acceptance of innovative food technologies aimed at mitigating climate and animal welfare issues (Choi and Feinberg, 2018). Within this context, hobby runners present a relevant research target group. Regular participation in sports, such as recreational running, has been associated with greater health consciousness and a proactive approach to diet and lifestyle management (Wirnitzer et al., 2023).

Findings

In my research, the initial hypothesis was that, within the specific, health-conscious target group of recreational runners, a higher proportion would adhere to plant-based diets than in the general population. This assumption appeared to be confirmed over the course of the study: in the sample of 876 participants who were running at least once a week, the proportion of individuals following a vegetarian diet reached 6.4%, whereas in the Hungarian adult population, this figure ranges only between 1.1% and 2.8%, according to existing research. A similar discrepancy was observed regarding the trial of meat substitute products: 46% of recreational runners reported consuming at least two types of plant-based meat alternatives occasionally or more frequently, while nationally representative studies indicate that such trial rates do not exceed one-third of the general population (Kovács, 2021; KSH, 2019; Pintér, 2024; Szakály & Szilágyi, 2022).

Methodology

The methodology of the study was based on a self-developed online questionnaire, which was distributed using a convenience sampling approach combined with snowball sampling. The dissemination took place through running-related social media groups, running clubs, and posters containing QR codes (Quick Response codes). Data were analysed using SPSS (Statistical Package for the Social Sciences) software, employing descriptive and cross-tabulation statistics, along with significance tests. The three categories of meat alternatives: plant-based substitutes, lab-grown meat, and insect-based foods were examined separately, as they are characterised by distinct consumer perceptions and technological backgrounds. While this classification is not entirely novel in the academic literature, the originality of the present study lies in its focus on a specific, previously unexplored target group: hobby runners. Moreover, the research offers a comprehensive comparison of consumer awareness, acceptance, and willingness to try these alternatives, and examines their relationships with dietary habits and underlying motivations.

The primary aim of this research was to gain insight into individuals who run at least once per week, focusing on their demographic characteristics, running-related motivations, and dietary preferences, particularly regarding special diets and meat-substitute alternatives. The online questionnaire was available on the Google Forms platform between 19 and 29 October 2024. During this period, 895 responses were received. However, 19 respondents were screened out at the filtering questions, as they either did not run at all or reported running less frequently than once a week. Consequently, their input was deemed irrelevant to the study objectives, and the final sample comprised 876 participants.

Sample composition

Based on the demographic data of the respondents who reported running at least once per week (N = 876), 69.3% identified as female and 30.7% as male. Within this group, 0.5% were under the age of 18, and 5.5% were between 18 and 27 years old, meaning that 6% belonged to Generation Z. Respondents aged 28–43 (Generation Y) made up 32.7% of the sample, while

the largest generational cohort was Generation X (aged 44–59), accounting for 58.6%. The Boomer generation (aged 60–78) represented 2.6%, and one respondent belonged to the Silent Generation (0.1%). In terms of place of residence, approximately one-third of respondents (34%) lived in the capital city, 49% resided in county capitals or other urban areas, and 17% lived in smaller settlements, such as villages or rural homesteads. Regarding educational attainment, 0.9% had completed only primary education. Half of these respondents were under 18 and likely still attending secondary school. Additionally, 5.1% had vocational qualifications, 26.2% held a secondary school maturity exam, and a remarkably high proportion (67.8%) possessed a higher education degree, indicating that two-thirds had at least a bachelor's degree. Regarding financial status, 4.2% reported living under financial constraints, 33.6% stated they lived comfortably but were unable to save, while 50.6% said they lived well and could save money. Due to the sensitive nature of this question, an option for "do not know / prefer not to answer" was provided, which was selected by 11.6% of respondents.

Results

In the context of this study, only one of the five hypotheses formulated could be confirmed based on the empirical results, while four had to be rejected.

H1. The most common dietary pattern among regular runners is omnivorous, while vegetarianism is the most popular among special diets.

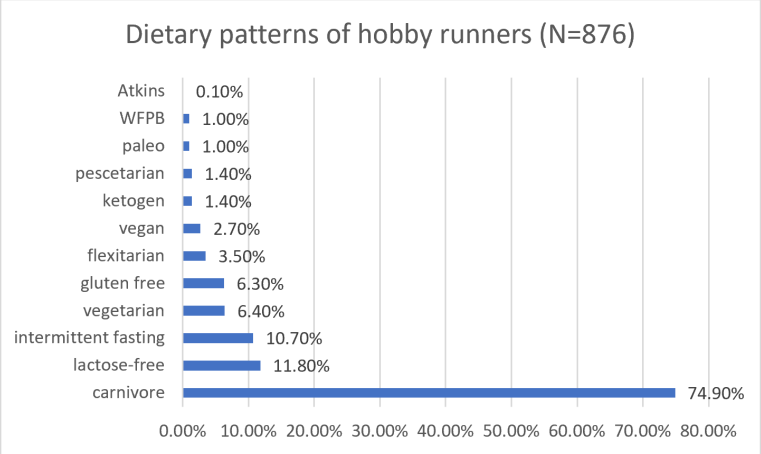

Figure 6: *Dietary patterns of hobby runners*
Source: *compiled and edited by the author based on primary data*

The analysis of questionnaire responses confirmed that omnivorous eating is indeed the most prevalent diet among regular runners, with 74.8% of participants following it. Vegetarianism is practised by 6.4% of respondents. However, this was preceded in popularity by lactose-free diets (11.8%) and intermittent fasting (10.9%). Consequently, this hypothesis must be rejected (Figure 1 shows the breakdown of diets within the sample; axis Y shows the diets followed by respondents, while axis X shows the percentage of respondents following that diet).

When aggregating respondents who identified as vegan, vegetarian, or followers of a whole food plant-based diet, the proportion of individuals adhering to a meat-free dietary pattern amounted to 9.2% of the sample.

H2. At least half of regular runners consume at least two types of plant-based meat alternatives occasionally or regularly.

The results revealed that 46% of participants reported consuming at least two types of plant-based meat substitutes occasionally or more often, while 54% either did not consume any or only one type (This is illustrated in Figure 2, where axis Y shows the number of plant-based

meat alternatives tried while axis X shows the percentage of respondents). Therefore, this hypothesis is also rejected.

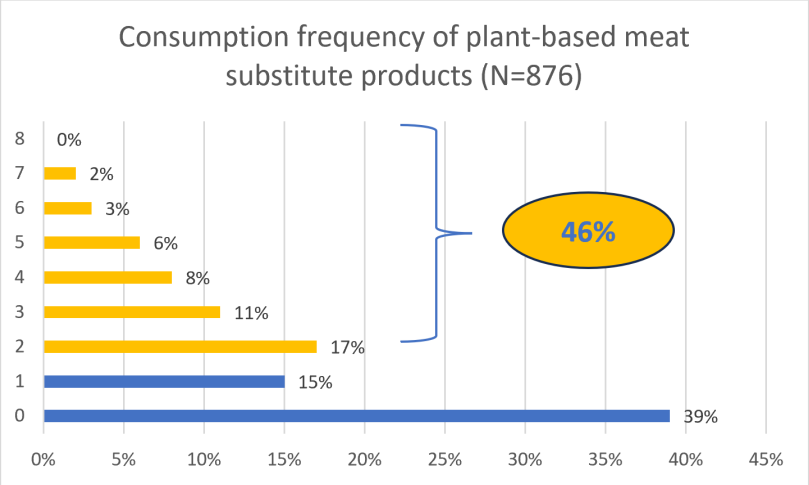

Figure 7: *Consumption frequency of plant-based meat substitute products*
Source: *compiled and edited by the author based on primary data*

Based on secondary research and personal expectations (especially regarding the assumed higher prevalence of vegetarianism among hobby runners), it was anticipated that consumption of plant-based meat alternatives would be higher. The 46% figure is close to the hypothesised threshold of 50%, suggesting that with expanded product availability, future research may find a proportion exceeding this benchmark.

It can be concluded that tofu, vegetable patties, and falafel were the most well-known plant-based meat alternatives, with only a few dozen respondents indicating unfamiliarity with these products. Similar levels of awareness were observed for plant-based cold cuts, sausages, frankfurters, and ready-made meals (such as plant-based fish fingers or burger patties), as well as soy granules. More than half of the respondents had never heard of seitan, while approximately three-quarters were unfamiliar with tempeh. At least occasionally, 50.9% of respondents consume vegetable patties and falafel, 39% consume tofu, 22.9% consume plant-based ready meals (e.g., fish fingers, burger patties), and 19.4% consume plant-based versions of processed meat products such as cold cuts, sausages, or frankfurters. Figure 3 demonstrates the familiarity and consumption frequency of each examined meat substitute.

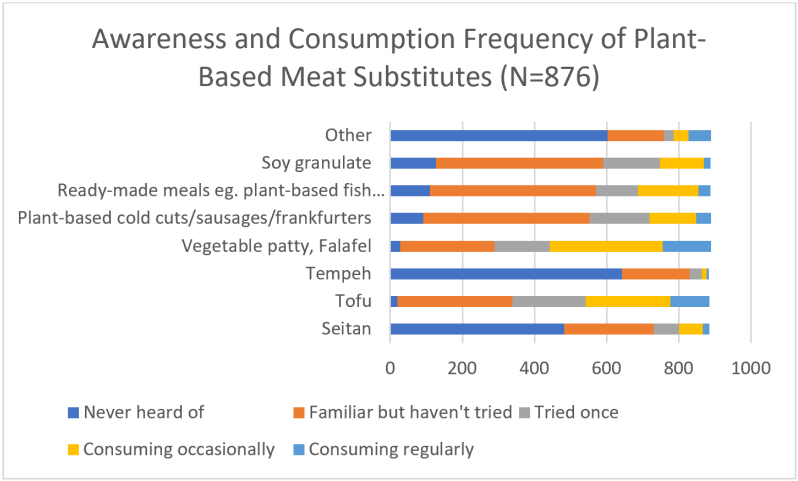

Figure 8: *Awareness and consumption frequency of plant-based meat substitutes*
Source*: compiled and edited by the author based on primary data*

H3. Among those who consume plant-based meat alternatives occasionally or regularly, at least two-thirds believe that doing so benefits their health.

Among those who reported consuming at least one type of plant-based meat alternative at least occasionally (N = 537), only 40% agreed that this choice was beneficial to their health. As a result, this hypothesis must also be rejected. This finding was somewhat unexpected, as it had been presumed that health considerations would be the primary motivation for consuming plant-based alternatives. While this assumption was confirmed in general, the actual magnitude was lower than anticipated.

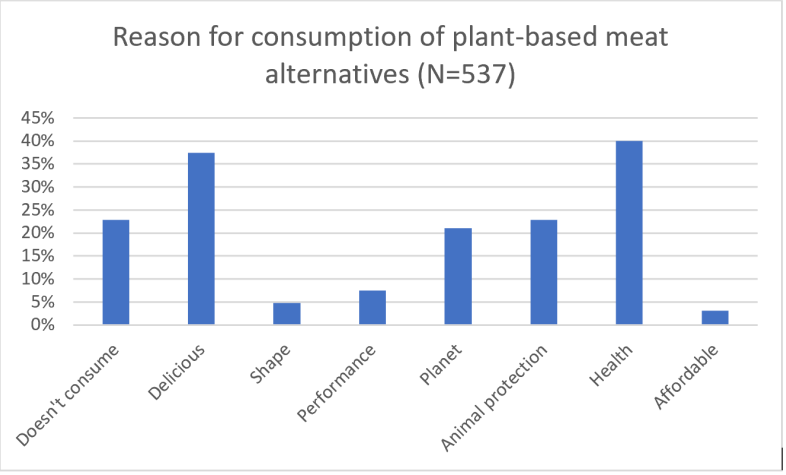

Figure 9: *Reason for consumption of plant-based meat alternatives.*
Source: *compiled and edited by the author based on primary data*

Notably, 37.4% cited taste ("delicious"), 22.9% mentioned animal protection, and 21% identified planetary sustainability as key drivers. These findings suggest that the appeal of meat substitutes among hobby runners extends beyond health concerns, encompassing ethical and environmental values as well as sensory satisfaction. Figure 4 details the possible motivational factors for consuming plant-based meat alternatives and the percentage of respondents who report them.

H4. Individuals following meat-inclusive diets are more open to trying cultured meat and insect-based foods than those following meat-free diets.

Among participants following diets that included meat (omnivorous, flexitarian, pescatarian, paleo, ketogenic, Atkins, or other special diets, N = 795), 28.05% were open to trying cultured meat, and 34.97% were open to trying insect-based foods. In comparison, among those adhering to meat-free diets (vegan, vegetarian, whole-food plant-based, N = 81), 13.58% were open to trying cultured meat and 20% to insect-based products.

To test the relationship between diet type and willingness to try alternative protein sources, Pearson's chi-square test was applied. The results were statistically significant at the 5% level for both cultured meat ($\chi^2 = 7.862$, $p = 0.005$) and insect-based products ($\chi^2 = 7.300$, $p = 0.007$).

The strength of association, measured by Cramér's V, was 0.095 for cultured meat and 0.091 for insect-based products, indicating a very weak associative relationship. These results suggest that, while diet type is statistically associated with willingness to try alternative proteins, the magnitude of its influence is modest. This hypothesis is accepted.

To explore participants' spontaneous associations with cultured meat, an open-ended question was included in the survey. A total of 719 respondents attempted to answer this question; however, 7 responses consisted solely of punctuation marks and were excluded from analysis, leaving 712 valid entries. The most frequently mentioned associations were "artificial" (193 mentions) and "fake" (162 mentions). These associations are visualised in Figure 5.

Figure 10: *Associations for cultured meat*
Source: *compiled and edited by the author based on primary data.*

At the end of the questionnaire, respondents were also invited to share their free-text opinions on edible insect-based foods (N=698). Prominent terms included "no" (121 mentions), typically in contexts such as "I would not try it," followed by "disgusting" (104 mentions) and "protein" (70 mentions). These associations are visualised in Figure 6.

Figure 11: *Associations for edible insects*
Source: *compiled and edited by the author based on primary data.*

Although negative associations dominated for both alternatives, it is noteworthy that, for insect-based meat, the term was also mentioned in a positive context as a source of protein.

H5. Cultured meat and insect-based foods are more likely to be tried by men, individuals under the age of 28, residents of the capital, those with higher education, and those with higher material well-being.

To examine the demographic determinants of willingness to try cultured and insect-based foods, Pearson's chi-square test, Cramér's V, and adjusted standardised residuals were used, with a significance threshold set at 5%.

- Gender: Statistically significant relationships were found (cultured meat: $\chi^2 = 32.517$, $p < 0.001$, $V = 0.193$; insect-based: $\chi^2 = 24.613$, $p < 0.001$, $V = 0.168$). Residual values for men exceeded +5 in the "would try" category, while those for women were around +5 in the "would not try" category, indicating strong and directed gender differences.
- Age: No statistically significant association was found (cultured meat: $\chi^2 = 3.779$, $p = 0.437$; insect-based: $\chi^2 = 1.542$, $p = 0.819$). No residual exceeded ±2, and the age group under 18 could not be evaluated due to a low sample size (N = 4).
- Place of residence: Significant relationships were observed (cultured meat: $\chi^2 = 16.031$, $p < 0.001$, $V = 0.135$; insect-based: $\chi^2 = 10.844$, $p = 0.004$, $V = 0.111$). Residents of the capital were significantly more open (residuals: cultured meat +3.7; insect-based +2.9), while rural respondents were significantly more dismissive (cultured meat -2.6; insect-based -2.5).
- Education: Statistically significant differences were also identified (cultured meat: $\chi^2 = 10.379$, $p = 0.016$, $V = 0.109$; insect-based: $\chi^2 = 15.804$, $p = 0.001$, $V = 0.134$).

Those with a university degree had residuals around +3 in the "would try" category, while secondary school graduates showed significant rejection in the "would not try" category (residuals around -2.5).

- Financial status: No significant relationship was found (cultured meat: $\chi^2 = 4.996$, $p = 0.172$, $V = 0.076$; insect-based: $\chi^2 = 2.785$, $p = 0.426$, $V = 0.056$). Although slightly higher willingness was observed among those who reported living well and being able to save, the residuals (+1.4 to +1.9) did not reach statistical significance.

Hypothesis	Cultured meat	Edible insects
Rather men	✓	✓
Rather under 28 years of age	☒	☒
Rather living in the capital	✓	✓
Rather with a higher degree	✓	✓
Rather financially stable	☒	☒

Table 1: *Hypothesis acceptance by demographics*
Source: *compiled and edited by the author based on primary data.*

In summary, as shown in Table 1, male respondents, urban residents, and individuals with higher educational attainment showed significantly greater openness to cultured and insect-based foods. Conversely, women, rural residents, and those with secondary education exhibited higher rejection rates. Thus, the hypothesis is only partially supported, with three variables confirmed (gender, residence, education) and two (age, financial status) not confirmed.

Conclusions

The findings of this exploratory study indicate that recreational runners exhibit a higher level of openness to meat-free diets and alternative protein sources than the general population in Hungary. In the non-representative sample of 876 respondents, 6.4% reported following a vegetarian diet, which significantly exceeds the Hungarian national average of 1.1–2.8% (Kovács, 2021; KSH, 2019; Szakály & Szilágyi, 2022). Furthermore, 46% of respondents reported consuming at least two types of plant-based meat substitutes at least occasionally, surpassing the approximately one-third adoption rate observed in national representative surveys (Szakály & Szilágyi, 2022).

Health considerations were identified as the primary driver of meat substitute consumption, followed by ethical and environmental concerns. These patterns reflect global trends observed among LOHAS-type consumers who prioritise personal health, ecological sustainability, and animal welfare.

In contrast, acceptance of lab-grown meat and insect-based protein sources remains low, mirroring findings from Hungary and internationally, in which disgust, unnaturalness, and food neophobia were dominant reactions. However, there are nuanced signs of openness in this specific segment, such as the positive framing of insect-based foods as protein-rich alternatives. These insights suggest that hobby runners could be a valuable early-adopting target group for sustainable food innovations. Although the research is not representative, the results suggest that recreational runners are proportionally more open to meat-free diets and alternative protein sources than the general population.

Demographic factors such as gender, education, and place of residence significantly influenced willingness to try lab-grown and insect-based foods, with men, urban residents, and higher-educated respondents showing greater openness. These results align with the observations of Szakály and Szilágyi (2022), who found that women, older individuals, and those with lower educational attainment were generally more resistant to novel food technologies, particularly meat substitutes. Similarly, Szakály et al. (2024) reported that younger, health-conscious, and environmentally aware consumers had a higher propensity to try lab-grown meat, a trend also observed among hobby runners in the present study. Furthermore, Szendrő et al. (2021) highlighted generational and educational differences in the acceptance of insect-based foods, noting that men and individuals with university degrees were generally more open to entomophagy. These earlier findings reinforce the conclusion that demographic segmentation plays a crucial role in shaping consumer responses to alternative proteins and support targeting educated, urban, and health-conscious subgroups as potential early adopters of sustainable food innovations.

Limitations

The study employed a convenience sampling method using snowball distribution via online running communities and social media, which may limit the generalizability of the findings. The sample is overrepresented by individuals with higher education and urban residency, which may bias the results toward more health-conscious and sustainability-oriented perspectives. Additionally, the self-reported nature of dietary habits and attitudes may be subject to social desirability bias.

Future research directions

Future studies should aim to employ representative sampling methods to confirm these preliminary findings on a broader scale. It would also be valuable to investigate the psychological drivers (e.g., food neophobia, identity-based motivations) behind the acceptance or rejection of novel protein sources such as lab-grown meat and edible insects. Longitudinal research could further explore how lifestyle choices such as regular physical activity interact with dietary transitions and the adoption of sustainable consumption practices. Finally, segmentation analysis based on values, attitudes, and behavioural intentions could guide more targeted food marketing strategies aimed at health- and sustainability-oriented consumers.

Recommendations

To effectively promote meat alternatives in the evolving food industry, tailored strategies should be adopted for each category. For plant-based meat substitutes, health-centric messaging remains a key driver, particularly among consumers who are already health-conscious or physically active, such as hobby runners. Emphasising nutritional benefits, such as reduced saturated fat and increased fibre content, can enhance appeal. Furthermore, offering products in familiar formats such as burgers or sausages with optimised taste and texture can help overcome sensory hesitations. Clear, transparent labelling that avoids overly technical or exclusionary language (e.g., solely vegan-focused branding) may also broaden consumer acceptance, particularly among flexitarians.

For lab-grown meat, reframing its identity using more appealing terminology, such as "cultivated" or "clean meat," can reduce perceptions of artificiality and increase openness. Marketing efforts should target early adopters, especially those aligned with LOHAS values, who tend to be more receptive to innovations supporting sustainability and animal welfare. Educational campaigns highlighting the reduced environmental footprint and ethical

advantages compared to traditional meat production may further enhance acceptance, particularly among environmentally and ethically motivated consumers.
In the case of insect-based protein products, indirect integration into familiar foods, such as protein-enriched snacks or pasta, can significantly increase psychological acceptability. Positioning insect protein as a high-performance, nutrient-rich food source is especially promising for athletic and health-oriented demographics. Additionally, storytelling about the traditional and global culinary uses of edible insects can help normalise consumption by presenting these products not as novelties but as rediscovered, sustainable dietary solutions with deep cultural roots. Together, these approaches can support more effective positioning and wider adoption of alternative proteins in the food landscape.

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Exploring the role of content marketing as a sustainability communication strategy in online audience engagement: Scoping review

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Abstract:

This paper explores the role of content marketing as a sustainability communication strategy and its impact on online audience engagement. Through a comprehensive scoping review of 62 peer-reviewed studies published between 2012 and 2025, the research maps existing literature to identify how sustainability-focused content marketing strategies influence engagement, consumer behaviour, trust, and brand perception in digital spaces. Drawing on theoretical frameworks such as the Elaboration Likelihood Model, Social Exchange Theory, and the Theory of Planned Behaviour, the study finds that content marketing enhances engagement when messages are emotionally resonant, visually compelling, and aligned with consumers' values and social norms. The results highlight several key drivers of engagement, including storytelling, authenticity, interactivity, and influencer credibility. Enhanced engagement was observed in 24 studies, with content that promoted transparency, relevance, and community involvement resulting in increased likes, shares, comments, and brand advocacy. Additionally, sustainability content fostered stronger brand perception and trust in 15 studies, while 10 studies linked such content to positive behavioural changes toward eco-friendly consumption. Conversely, content perceived as inauthentic or misleading, particularly in cases of greenwashing, often triggers scepticism and reduces engagement. The review also identifies gaps in the literature, such as the limited exploration of business-to-business and customer-to-customer contexts and the predominance of cross-sectional designs, which restrict causal inference. The paper concludes by recommending the strategic integration of credible, dialogical, and value-driven content into sustainability marketing efforts to foster deeper digital engagement and promote sustainable consumer behaviours.

Keywords: Content Marketing, Sustainability Communication, Online Audience Engagement

JEL Classification: M31, Q56

Introduction:

In recent years, sustainability has transitioned from a peripheral concern to a core principle in corporate strategy, driven by increased consumer awareness and the demand for environmental accountability (Braga et al., 2024). This shift has compelled organisations to adopt innovative communication strategies to convey their sustainability initiatives effectively. Among these, content marketing has emerged as a pivotal tool, leveraging storytelling and value-driven narratives to engage online audiences and foster sustainable consumer behaviours (Ebrahimi et al., 2023).

Social media platforms have become instrumental in this paradigm, offering interactive channels that facilitate two-way communication between brands and consumers. The dialogical nature of social media enables companies not only to disseminate information but also to engage in meaningful conversations about sustainability, thereby enhancing consumer trust and loyalty (Chen et al., 2023). Studies have shown that sustainability messages incorporating dialogical features, such as responsiveness, openness, and mutuality, significantly boost social media engagement, brand affinity, and purchase intentions (Chen et al., 2023).

Moreover, the effectiveness of content marketing in promoting sustainability is amplified when messages are perceived as informative, entertaining, and relevant (Ebrahimi et al., 2023). Eco-friendly content that resonates with consumers' values not only increases their knowledge about sustainable products and practices but also enhances their willingness to share information and make environmentally conscious purchasing decisions (Zafar et al., 2022). Visual elements, emotional appeals, and personalised narratives further augment the persuasive power of sustainability communication, making content more engaging and memorable (Li & Xie, 2020).

The Uses and Gratification Theory (UGT) (Katz et al., 1973) posits that individuals actively seek out media content to satisfy specific needs, such as information, entertainment, and social interaction. In the context of sustainability communication, content marketing that provides informative, engaging material can fulfil these needs, thereby enhancing audience engagement. For instance, Febrian and Husna (2023) found that informative content significantly increases social media engagement, suggesting that audiences are drawn to content that gratifies their desire for knowledge and practical information.

Social Exchange Theory (SET) (Blau, 1964; Homans, 1958), on the other hand, suggests that social behaviour results from an exchange process aimed at maximising benefits and minimising costs. In online sustainability communication, when audiences perceive that engaging with branded content provides them with valuable information or social capital, they are more likely to interact and share that content. Zafar et al. (2022) highlighted that consumers are more inclined to engage with brands that offer valuable and trustworthy sustainability content, reinforcing the reciprocal nature of the brand-consumer relationship.

Furthermore, Relationship Marketing Theory (RMT) (Berry, 1983; Grönroos, 1994) focuses on building long-term relationships between businesses and consumers. In the field of sustainability, content marketing serves as a tool to foster trust and loyalty by consistently communicating a brand's commitment to sustainable practices. Zafar et al. (2022) emphasised that relationship marketing strategies are pivotal in engaging consumers in sustainable consumption, as they encourage ongoing interaction and emotional connection with the brand. As content marketing continues to expand, particularly through social media, understanding how consumers process messages is crucial. The Elaboration Likelihood Model (ELM) (Petty & Cacioppo, 1986) explains how people process persuasive messages through two routes: central and peripheral. In sustainability content marketing, messages that present strong, logical arguments (central route) can lead to lasting attitude change. At the same time, those that use appealing visuals or endorsements (peripheral route) can also influence attitudes, albeit more temporarily. Mardhatilah et al. (2023) demonstrated that both routes are effective in increasing audience engagement on social media platforms, suggesting that a combination of informative content and aesthetic appeal can enhance the persuasiveness of sustainability messages.

Additionally, the Theory of Planned Behaviour (TPB) (Ajzen, 1991) provides a strong framework for understanding how attitudes, subjective norms, and perceived behavioural control influence individuals' intentions and behaviours. In the context of sustainability communication, this framework helps explain how content marketing can shape pro-environmental intentions and actions among online audiences. Sustainability content that highlights the positive outcomes of sustainable behaviour, such as reducing waste and supporting ethical brands, can strengthen attitudes toward those behaviours. When such content reflects the expectations and behaviours of peers, influencers, or social groups, it reinforces subjective norms, making individuals more likely to conform to perceived social expectations (Vermei & Verbeke, 2008). Furthermore, content that showcases practical steps, tools, or easy-to-adopt behaviours enhances the audience's perceived behavioural control, empowering them to act (Kim et al., 2020).

With the dominance of digital platforms, motivation-driven engagement plays a significant role in the success of content marketing. The Self-Determination Theory (SDT) centres on the motivation behind choices people make without external influence, highlighting the importance of autonomy, competence, and relatedness. In sustainability communication, content that empowers audiences to make informed decisions and connects them to a community of like-minded individuals can enhance intrinsic motivation (Huang et al., 2022). For example, content that showcases actionable steps toward sustainability can satisfy the need for competence, while community-driven initiatives fulfil the need for relatedness (Ryan et al., 2019). This approach aligns with the principles of SDT, fostering deeper engagement.

Despite the growing body of research on sustainability communication, there remains a need to explore the strategic integration of content marketing within this context. Understanding how content marketing can effectively convey sustainability messages and drive online audience engagement is crucial for organisations and businesses to align their marketing efforts with environmental objectives (Rocca et al., 2024). This paper examines the role of content marketing as a sustainability communication strategy, analysing its impact on online audience engagement and identifying best practices to foster sustainable consumer behaviours. Firstly, the paper begins with a brief chapter highlighting the importance of content marketing on social media in sustainability communication strategies. Secondly, the method used to examine the correlation between content marketing as a sustainability communication strategy and online audience engagement is presented in detail. Thirdly, the findings from the data collection are analysed, compiled, summarised, and reported in three tables. Finally, the results are discussed, and the research and practical implications, along with the limitations and potential research avenues, are addressed in the final chapter.

Research question: How does content marketing, when used as a sustainability communication strategy, impact online audience engagement?

The importance of content marketing on social media in sustainability communication strategies:

Sustainability communication (SC) has emerged as a vital component of marketing strategies, particularly in fostering trust and legitimacy with stakeholders. Braga et al. (2024) conducted a comprehensive literature review that identified four core themes in SC: reporting sustainability, sustainability advertising, consumer relations, and promoting pro-sustainable behaviour. The study emphasises the necessity for transparent and trustworthy information dissemination to build stakeholder confidence. Notably, social media platforms play an increasingly important role in facilitating these communications, allowing organisations to engage directly and authentically with consumers.

The integration of social media into sustainability communication has been widely explored across recent studies. For instance, Du Plessis (2022) highlights that digital brand content shared on social media platforms significantly influences consumer engagement, brand trust, and purchase intentions. She stresses the importance of delivering informative, entertaining, and relevant content that aligns with consumer needs in order to nurture long-term relationships and encourage sustainable consumption. Similarly, Zahrah et al. (2024) suggested in their study that eco-friendly posts on social media enhance perceived informative and entertaining value, which in turn drives positive word-of-mouth (WOM) and stronger purchase intentions.

Building on this, Crapa et al. (2024) investigated green communication strategies in Italy's large-scale retail sector, demonstrating that green marketing content on social media effectively engages consumers and fosters sustainable behaviour. Their research also emphasises the importance of dialogical communication and interactive features that invite two-way engagement, fostering trust and a sense of community between brands and consumers.

The effectiveness of social media marketing in promoting sustainable consumption has also been examined through the lens of specific communication tools and content strategies. A systematic review by Suki et al. (2022) highlights that influencer marketing and creative, platform-tailored content play crucial roles in shaping consumer behaviour toward sustainability. Tarhan and Dursun (2024) further support this view, identifying key social media marketing strategies that help companies differentiate their offerings while promoting sustainability through valuable, relevant content.

The role of influencers in sustainability communication has attracted increasing scholarly attention. Munaro et al. (2024) conducted a systematic review demonstrating that influencers with authentic, green-oriented personas significantly shape followers' pro-environmental attitudes and intentions. Their work provides a conceptual framework illustrating the connection between influencers and pro-sustainable outcomes. Similarly, Kapoor et al. (2021) conducted a study in the hospitality industry and found that the persuasive impact of sustainability messages depends on matching message appeals (e.g., guilt or sensuality) with credible sources (e.g., eco-friendly hotels or influencers) to effectively influence travellers' intentions toward sustainable accommodations.

Complementing these findings, Pera and Aiello (2023) analysed climate change communication on YouTube and TikTok. They discovered that content creators on TikTok use more emotionally resonant and action-oriented language, enhancing audience engagement and aligning discourse with sustainability goals. This suggests that platform-specific content strategies are crucial for maximising the impact of green messaging.

Several studies have explored broader frameworks for content marketing and sustainability. Gomez (2020) reviewed how social media is used in corporate social responsibility (CSR) communication, emphasising its ability to engage stakeholders and effectively disseminate sustainability initiatives. Taiminen and Ranaweera (2019) add that value-rich digital content fosters trusted B2B relationships, highlighting its potential in green marketing and sustainable branding. Nosratabadi et al. (2019) reinforce this view through a review of sustainable business models, underlining the importance of content marketing and digital platforms in achieving triple bottom-line goals, namely economic, environmental, and social.

Lastly, recent research has delved into how consumers process and respond to sustainability communication. Cortis and Davis (2020) conducted a systematic review of social opinion mining, shedding light on how user-generated content (UGC) reveals public sentiment and behaviour in relation to sustainability. Furthermore, Cammarota et al. (2023) explored brand activism, offering insights into how companies publicly take stands on environmental and social issues. Their study underscores the importance of authenticity in brand messaging and its influence on consumer trust and engagement.

Methodology

A scoping review was used as a method in this research to comprehensively map the existing literature on content marketing and its impact on online audience engagement in the context of sustainability communication. Researchers often use a scoping review to identify knowledge gaps, clarify concepts, review a body of literature, or examine complex or heterogeneous literature (Arksey & O'Malley, 2005; Levac et al., 2010; Munn et al., 2018). Also, it was crucial to explore the range of evidence on the correlation between content marketing and online audience engagement in sustainability communication, which is often challenging to find amid the large, complex subject area (Peters et al., 2021). The scoping review was guided by the principles of the Joanna Briggs Institute (JBI) Methodological Guidelines (Aromataris & Riitano, 2014; Peters et al., 2021), which also aligns with the PRISMA-ScR framework (Tricco

et al., 2018). The review is presented in accordance with the five-phase framework proposed by Arksey and O'Malley (2005).

Phase 1: Formulating the research question

This scoping review attempts to answer the following main research question: How does content marketing, when used as a sustainability communication strategy, impact online audience engagement?

This question led to three sub-questions:

- **Sub-question 1:** How can we characterise the studies available on this topic?
- **Sub-question 2:** What is the evidence of the correlation between content marketing as a sustainability communication strategy and online audience engagement?
- **Sub-question 3:** Which range of methodologies was used in these studies?

Phase 2: Identifying the relevant studies

The studies in this review were identified using key concepts relevant to sustainability communication, content marketing, and online audience engagement with environmentally focused messages. A comprehensive search was conducted across reputable academic databases, including Scopus, ScienceDirect, Web of Science, EBSCO/Business Source Ultimate, JSTOR, and Google Scholar. These databases were selected due to their broad coverage of business, management, and communication disciplines, as well as their inclusion of peer-reviewed journals that publish research on sustainability communication strategies. Multiple databases were utilised to ensure broad coverage of the literature, following best practices for systematic searches as recommended by MacFarlane et al. (2022).

The following Boolean search commands were used to query these databases:

- ("Sustainability communication" OR "green marketing" OR "eco-friendly content") AND ("online audience engagement" OR "online consumer engagement" OR "digital audience engagement")
- ("Sustainability communication" OR "green content marketing" OR "eco-friendly branding") AND ("attracting environmentally conscious consumers" OR "green audience" OR "green customers")
- ("Sustainability messaging" OR "eco-friendly marketing" OR "sustainable brand content") AND ("engaging online audience" OR "digital audience engagement")
- ("Sustainability communication" OR "green content") AND ("affects online consumer behavior" OR "green purchase decision")
- ("Sustainable marketing" OR "eco-brand content") AND ("influences consumer attitudes" OR "online audience perception")
- ("Green content marketing" OR "sustainability messaging") AND "online engagement"
- (Impact OR effect) AND ("sustainability communication" OR "eco-friendly marketing") AND ("digital audience" OR "online consumer engagement")
- ("Sustainable content" OR "green content marketing") AND ("online audience engagement" OR "brand trust" OR "eco-brand loyalty" OR "social media interaction")
- ("Sustainability messaging" OR "eco-friendly marketing") AND ("consumer engagement" OR "brand perception" OR "green brand attachment")
- ("Green content marketing" OR "eco-brand content") AND ("consumer engagement" OR "customer relationships" OR "environmental brand loyalty")
- ("Eco-marketing" OR "sustainable content marketing") AND ("customer engagement" OR participation OR involvement OR "green word of mouth" OR "eco-purchase intention")
- ("Sustainability communication" OR "sustainable content marketing") AND ("social media" OR "digital platforms") AND ('consumer behavior" OR "environmental interaction")

- (“Green content marketing” OR “eco-friendly content”) AND (“audience engagement” OR “brand interaction”) AND (“case study” OR “empirical research” OR “systematic review”)
- (“Sustainable content marketing” OR “eco-friendly content OR “sustainability communication”) AND (“return on investment” OR “Key performance indicators” OR “conversion rates”) AND (“online audience engagement” OR “brand awareness”)

To simplify and enhance the search for unique documents in our dataset, we used Boolean operators. Specifically, the “AND” operator was applied to ensure that all terms appeared in the search results, thereby narrowing the search and reducing irrelevant results. In contrast, the “OR” operator retrieved results that contained at least one of the specified terms, thus expanding the search by including synonyms or related terms. Furthermore, parentheses were employed to group search terms and maintain the correct order of operations, thereby preventing the search engine from misinterpreting the logic. Additionally, quotation marks were used to force the search engine to look for an exact phrase or a concept consisting of two or three words rather than separate words, ensuring more precise results.

The development of these Boolean search strings was guided by the main conceptual dimensions of this research, namely sustainability communication, content marketing, and online audience engagement. Preliminary keywords were derived inductively from prior systematic review (e.g., Braga et al., 2024; Du Plessis, 2022) and from recurring terminology within the abstracts of foundational papers identified during an initial scan. For instance, “green marketing,” “eco-friendly content,” and “sustainability messaging” frequently co-occurred in studies focusing on corporate environmental communication, whereas “online audience engagement” and “digital interaction” were dominant in the engagement literature. As the search process evolved, related terms such as “green audience”, “eco-brand loyalty”, and “social media interaction” emerged through iterative database queries and backward citation tracking. These refinements helped ensure conceptual alignment between sustainability-focused marketing strategies and audience engagement, while maintaining sufficient breadth to capture interdisciplinary perspectives. Thus, each Boolean combination reflects a link between sustainability communication constructs and engagement outcomes observed across marketing and communication research.

In addition to the comprehensive Boolean search strategy outlined above, further measures were taken to reduce the risk of excluding relevant studies.

Despite efforts to expand and diversify the search strategy, we acknowledge the inherent risk of missing relevant studies due to variations in terminology and indexing across different databases. To mitigate this risk, we adopted a multi-pronged approach. First, we deliberately selected a broad set of databases spanning sustainability communication, marketing management, and business research. Second, we formulated an inclusive set of Boolean search queries incorporating synonyms and related constructs, including “green content marketing”, “eco-friendly content”, “sustainability communication”, “green marketing”, and various forms of “audience engagement”. Third, we complemented this systematic approach with manual techniques, including backward citation tracking (examining references in selected papers) and forward citation analysis using tools such as Google Scholar to identify newer studies that cited key articles. These steps were particularly helpful in identifying studies that may not have used standard terminology in titles or abstracts. Lastly, we reviewed the reference lists in existing systematic reviews and conceptual papers on content marketing in the context of sustainability communication to ensure that no significant study was unintentionally excluded. While it is impossible to guarantee full coverage in any review, these steps were designed to maximise the inclusiveness and comprehensiveness of our literature base.

Phase 3: Inclusion and exclusion criteria

The inclusion and exclusion criteria for the study were determined using a methodological protocol. To be selected, the publications had to meet the following inclusion criteria:

- An empirical or conceptual study
- Peer-reviewed journal articles
- Conference proceedings
- Scientific research with any research design
- Published in English
- Published from 2012 to 2025
- Addressed the impact on online audience engagement with sustainability-related content
- Referred to content marketing and sustainability communication in the title and/or abstract and/or body of the paper

The search process varied slightly across the aforementioned databases, depending on the features and filters available. Firstly, in Scopus, advanced search options were employed to ensure a precise search. The terms were entered in the title, abstract, and keyword fields to capture the most relevant studies. Boolean operators such as "AND" and "OR" were used to combine terms such as "green marketing", "sustainability communication", "eco-friendly content", "online audience engagement", and "eco-brand loyalty". Additionally, filters were applied to limit the search to articles published between 2012 and 2025 and within peer-reviewed journals. Moreover, document types were filtered to include only articles, reviews, and conference papers. Similar advanced search functions were employed in Science Direct and Web of Science, focusing on sustainability, business and marketing journals, with date and document type filters applied. Likewise, in EBSCO/Business Source Ultimate, searches were conducted using both basic and advanced search functions, applying filters for full-text, peer-reviewed articles in sustainability communication, business and green marketing. On the other hand, the search in JSTOR was performed using its advanced search capabilities, with Boolean operators applied to combine key terms and filter for academic journals in sustainability, business, and the social sciences from 2012 to 2025. Lastly, for Google Scholar, the search was broader, as the platform does not allow for as many specific filtering options. Search terms entered with quotation marks to capture exact phrases (e.g., "sustainability content marketing"), customising the data range to (from 2012 to 2025). Boolean operators were used to combine terms and related synonyms. Although Google Scholar does not offer extensive filtering, results were manually refined based on relevance and citation count, and only articles published within the last 13 years were considered. Finally, the results were manually screened to ensure relevance, focusing on peer-reviewed articles and academic publications.

The past 13 years have seen significant evolution in sustainability communication and green content marketing, driven by the rapid growth of social media platforms, influencer marketing, and data-driven strategies to promote environmentally conscious behaviours. Choosing 2012 as the starting point enables a comprehensive analysis of how digital transformation has reshaped the way organisations communicate sustainability messages and engage eco-aware audiences. Since 2012, businesses and brands have increasingly relied on engagement metrics, such as likes, shares, comments, and online interactions, to assess the effectiveness of green messaging and digital campaigns. This timeframe captures the rise of key technological developments, including programmatic advertising, AI-driven content personalisation, and interactive media, all of which have enhanced the delivery and impact of sustainability-focused content. Analysing studies from this period offers insights into how content marketing strategies evolved in response to technological innovation and shifting consumer expectations. Additionally, this timespan aligns with a growing scholarly focus on digital consumer engagement and sustainable branding, ensuring that the review includes

contemporary and relevant research. Studies published prior to 2012 largely emphasised traditional marketing approaches, while the post-2012 era marks a clear transition to digital-first and purpose-driven communication strategies. Extending the review through 2025 allows for the inclusion of the latest tools, trends, and best practices in sustainability communication, while also identifying current research gaps and future directions in green content marketing.

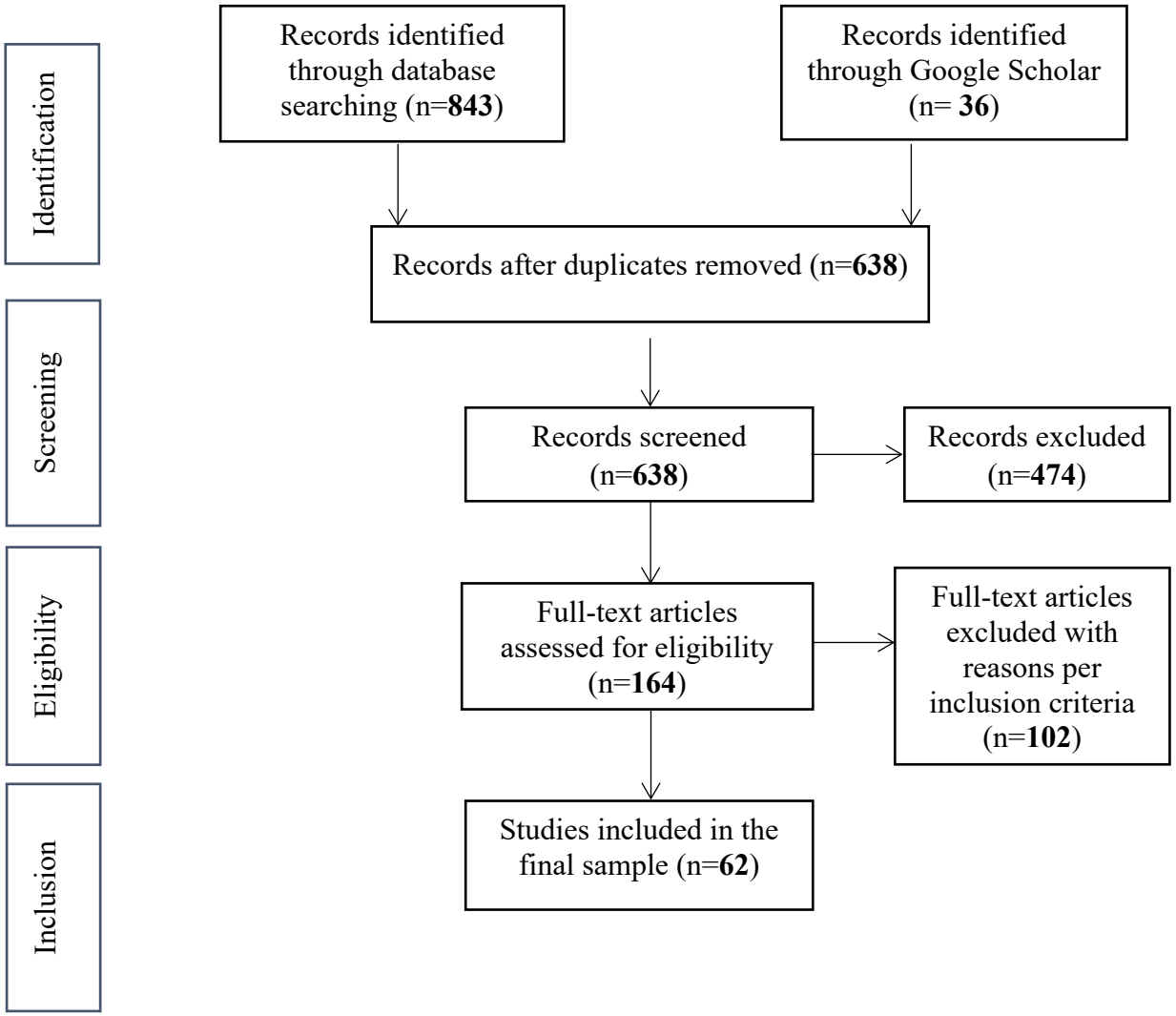

Figure 1: *Article selection process*
Source: *Own research and edition, 2025*

As illustrated in Figure 1, the article selection process followed a structured, systematic, and transparent approach. Initially, 843 records were retrieved from academic databases, with an additional 36 records identified through Google Scholar. All references were imported into Mendeley reference management software (version 2.108.0), where duplicates were automatically and manually removed, resulting in 638 unique records. These records were screened at the title and abstract level based on broad inclusion criteria focused on content marketing, sustainability communication, and online audience engagement. At this stage, 474 records were excluded for failing to meet topical relevance or publication-type standards.
The remaining 164 full-text articles were imported into ATLAS.ti software (version 24) for structured coding and evaluation. A deductive coding framework was applied to assess alignment with the inclusion criteria, including clarity of research objectives, relevance to digital content strategies, sustainability communication, green marketing, the presence of empirical or conceptual analysis, and the extent to which online audience engagement was

examined. Each article was coded across several dimensions, including research methodology (quantitative, qualitative, and conceptual), industry, context, geographic focus, and engagement outcomes. A codebook was developed and refined during a pilot coding phase to ensure consistent application across studies.

To enhance methodological rigour, an audit trail was maintained throughout the coding process, including memos for borderline cases, detailed justifications for inclusion or exclusion, and logs of decision-making. When ambiguity arose, a secondary reviewer was consulted to reach a consensus. Based on this process, 102 articles were excluded, most commonly due to insufficient methodological quality or weak alignment with the review's focus. The final sample comprised 62 studies, including journal articles and conference proceedings.

Phase 4: Extracting and analysing the relevant data.

Two summary tables (1 and 3), covering the authors, year of publication, journal, objectives, research methodology and approach, context and industry, study's location, impact of content marketing as a sustainability communication strategy on online audience engagement, and the reason for impact, were used to systematically extract the content of the articles in the final sample. Subsequently, the data were categorised based on the research's three sub-questions.

Phase 5: Compiling, summarising, and reporting

During this stage, a quantitative process was used first to quantify and classify the raw data. The data were then qualitatively interpreted using a deductive approach to provide meaning that aligns with the sub-questions of the study. Therefore, mapping our current knowledge of the relationship between content marketing and online audience engagement in the context of sustainability communication was essential, as was summarising the results for future research.

Results

In this scoping review, 62 primary studies explored content marketing and online audience engagement through various epistemological perspectives and methodological approaches. Recent scholarly focus has evolved from defining the core components of content marketing to examining its effectiveness as a strategic tool, particularly in sustainability communication. Increasingly, research investigates how content marketing facilitates meaningful online engagement on sustainability issues, aiming to establish a clearer connection between content-driven strategies and audience participation in environmental and social discourse.

The results section is structured to provide a clear response to the study's primary research question by systematically addressing its sub-questions. The first segment, which outlines the characteristics of the included studies, provides a comprehensive overview of the selected research, highlighting key attributes such as objectives, methodologies, industry, and contexts. This foundational understanding then leads to evidence of the correlation, in which the relationship between content marketing as a sustainability communication tool and online audience engagement is examined, yielding empirical findings that support or challenge this connection. Finally, the research methodologies used detail the analytical approaches employed across studies, providing insight into the reliability and validity of the results, which can be interpreted as follows:

Table 1 demonstrates a general description of the key characteristics and findings of the 62 studies included in this scoping review. The data was collected from 26 countries and geographic contexts, namely the United States (n=7), Italy (n=4), Germany (n=3), France (n=3), United Kingdom (n=3), Australia (n=3), South Korea (n=3) China (n=2), Spain (n=2), Belgium (n=2), Finland (n=2), and one study per country for Jordan, Romania, Switzerland, Netherlands, Turkey, Singapore, Europe as one geographic context, Sweden, and India. On the other hand, 6 studies did not specify the study's location, focusing on a global scope. Moreover, the studies

were published in 42 academic journals (Table 2). Of these studies, 6 were published in the Journal of Business Ethics, 4 in the Journal of Sustainability, 4 in the Journal of Business Research, and 3 in the Journal of Marketing

A regional analysis highlights varying research emphases on sustainability communication. Studies from Western economies (e.g., the US, UK, and Australia) often examined how sustainability communication via content marketing influences brand engagement and word-of-mouth (WOM). These studies typically analysed the effectiveness of corporate messaging and consumer engagement through sustainability-themed content. In contrast, Asian studies (e.g., Singapore, South Korea, and China) focused on integrating sustainability communication within digital transformation frameworks, emphasising the role of social media and online platforms in fostering consumer awareness and engagement with sustainable practices. Notably, studies from South Korea examined the hospitality sector's use of eco-friendly content to build consumer loyalty. European studies, particularly from Germany, France, and Italy, predominantly explored corporate social responsibility (CSR) communication, the strategic use of green branding, and storytelling to enhance brand perception and consumer interaction. These studies highlighted the need for transparency and consistency in sustainability messaging, particularly in sectors such as energy, fashion, and FMCG. Emerging markets, such as India and Jordan, explored how sustainability communication impacts trust-building and customer decision-making in digital content contexts. Global studies aimed to develop a holistic understanding of how sustainability communication varies across cultural and industrial contexts, addressing both challenges and best practices.

This geographical distribution suggests that sustainability communication strategies via content marketing are tailored to regional market dynamics. Western research prioritises measurable marketing outcomes and engagement metrics, whereas Asian and emerging market studies place emphasis on technological innovations and customer relationships.

The regional variation suggests that cultural and national norms significantly shape how sustainability communication is practised and studied. For instance, Western economies often emphasise transparency, corporate ethics, and measurable engagement outcomes, reflecting individualistic and accountability-oriented cultural values. Conversely, studies from Asian contexts highlight collectivist tendencies, focusing on community participation, relational trust, and technological innovation in sustainability messaging. Emerging economies, such as India and Jordan, frequently frame sustainability communication around developmental narratives and trust-building. These cultural and institutional differences underline how sustainability discourse adapts to local expectations and social norms.

The selected studies conducted from 2012 onwards illustrate an attempt to clarify the impact of content marketing as a sustainability communication tool on online audience engagement, with more conclusive evidence. This was done by concentrating on the role of sustainability-themed content in online audience engagement in different industries, namely 14 studies in the context of social media and digital marketing as a whole, 19 in which the industry was not specified, and 38 studies in other industries, including consumer goods and retail, fashion and luxury goods, tourism, energy, hospitality and tourism, higher education, manufacturing, technology and telecommunications, professional services, and agriculture and food.

The findings demonstrate that, while the literature on this topic up to 2018 remains insufficient, the growth of studies since then has been evident. Interestingly, only 4 studies addressed online audience engagement in the business-to-business (B2B) context, 49 in the business-to-consumer (B2C) context, and 9 in both contexts (Table 1). This illustrates that over the last 13 years (2012 to 2025), more research on content marketing in the B2C context was conducted due to increased focus on its impact on audiences.

B2B studies predominantly employed qualitative methodologies, such as case studies, literature reviews, and in-depth interviews, reflecting the complexity of business relationships and content marketing strategies within professional and manufacturing sectors. However, few B2B studies adopted quantitative methodologies, thereby limiting generalizability across industries. In contrast, B2C studies extensively used quantitative approaches, leveraging surveys, statistical modelling, content analyses, and experimental designs, emphasising consumer engagement metrics, attitude shifts, and behaviour patterns. Qualitative approaches, such as literature reviews and thematic analysis, were also present, primarily in studies on CSR communication and storytelling. Furthermore, studies combining both contexts often employed mixed methods, integrating quantitative data (surveys) with qualitative insights (case studies) to provide a comprehensive understanding of content marketing dynamics in both consumer and professional environments. Therefore, B2C studies tend to prioritise empirical, data-driven research methods to capture consumer reactions, while B2B studies favour in-depth qualitative analysis to explore strategic applications and relationship dynamics.

The characteristics of the studies included in the final sample:

Table 1: *The characteristics of the studies included in the final sample*
Source: *Own research and edition, 2025*

Study	Author(s)	Journal/ conference proceeding	Objective(s)	Methodology	Context / Industry	Study's location
1	Braga et al. (2024)	RAUSP Management Journal	Systematically review the literature on sustainability communication in marketing and propose a future research agenda.	Systematic literature review, qualitative	B2C and B2B, not specified industry	-
2	Du Plessis (2022)	SAGE Open	Provide a broad synopsis of studies on the effect of content marketing on online consumer behaviour over 12 years.	Scoping review, qualitative	B2C and B2B, fashion, tourism, luxury goods, and professional services	-
3	Feng & Ye (2023)	Sustainability	Examine how eco-friendly content on social media influences brand attitude and consumer engagement.	Survey, quantitative	B2C, not specified industry	Global scope
4	Munaro et al. (2024)	Sustainable Production and Consumption	Assess the impact of influencers on promoting sustainable consumption	Systematic literature review, qualitative	B2C, social media	-

5	Kapoor et al. (2021)	. International Journal of Contemporary Hospitality Management	Examine the effectiveness of sustainability communication on social media, focusing on message appeal and source	Survey, quantitative	B2C, hospitality industry	Global scope
6	Suki et al. (2022)	International Journal of Environmental Research and Public Health	Systematically review the impact of social media marketing on consumer engagement in sustainable consumption	Systematic literature review, qualitative	B2C, social media	-
7	Crapa et al. (2024)	Journal of Research in Interactive Marketing	Analyse green communication performance across social media in large-scale retail in Italy.	Survey, quantitative	B2C, social media, retail	Italy
8	Tarhan & Dursun (2024)	Turkish Journal of Marketing	Review social media marketing activities	Literature review, qualitative	B2C and B2B, social media	-
9	Gomez (2020)	The International Encyclopedia of Media Psychology	Explore corporate social responsibility (CSR) communication	Encyclopedia entry, literature review, qualitative	B2C, CSR communication	-
10	Taiminen & Ranaweera (2019)	Digital Content Marketing	Examine how digital content marketing fosters brand engagement and trusted B2B relationships.	Survey, quantitative	B2B, industry not specified	Global scope
11	Nosratabadi et al. (2019)	Sustainability	Review sustainable business models	Literature review qualitative	B2B and B2C, industry not specified	-
12	Cammarota et al. (2023)	Journal of Business Research	Conduct a systematic literature review on brand activism and propose a future research agenda.	Systematic literature review, qualitative	B2B and B2C, industry not specified	-

Table 1: *(continued)*

Study	Author(s)	Journal/ conference proceeding	Objective(s)	Methodology	Context / Industry	Study's location
13	Lemon & Verhoef (2016)	Journal of Marketing	Conceptualise customer experience (CX) and its management across the entire customer journey	Conceptual, qualitative, literature review	B2C, industry not specified	-
14	Brexendorf & Keller (207)	Journal of Marketing	Explore how corporate brand innovativeness and brand architecture influence brand equity.	Survey, structural equation modelling, quantitative	B2B and B2C, industry not specified	Germany & USA
15	Hartmann & Apaolaza-Ibáñez (2012)	Journal of Business Research	Investigate the psychological benefits influencing consumer attitudes and purchase intentions toward green energy brands.	Survey, regression analysis, quantitative	B2C, energy	Spain
16	White et al. (2019)	Harvard Business Review	Examine why consumers' intentions to purchase sustainable products often do not translate into actual behaviour.	Literature review, qualitative	B2C, consumer goods and retail	-
17	Kapitan & Silvera (2016)	*Marketing Letters*	Explore how consumers' attributions about endorsers influence the effectiveness of endorsements.	Experimental design, quantitative	B2C, social media	Norway
18	Lundqvist et al. (2013)	Journal of Brand Management	Assess how firm-originated storytelling influences consumer brand experience.	Experimental design, quantitative	B2C, retail and services	Finland

19	Font & McCabe (2017)	Journal of Sustainable Tourism	Explore the role of marketing in promoting sustainable tourism and the associated challenges it poses.	Literature review, conceptual	B2C, tourism	-
20	Berger & Milkman (2012)	Journal of Marketing Research	Identify the characteristics of online content that make it more likely to be shared.	Content analysis, quantitative	B2C, industry not specified	USA
21	Kapferer & Michaut-Denizeau (2014)	Journal of Brand Management	Investigate luxury consumers' perceptions of sustainability and its compatibility with luxury brands.	Survey, quantitative	B2C, luxury goods	France
22	De Veirman et al. (2017)	International Journal of Advertising	Examine how the number of followers and product alignment affect the effectiveness of Instagram influencers.	Experimental design, quantitative	B2C, social media	Belgium
23	Järvinen & Taiminen (2016)	Industrial Marketing Management	Explore how B2B companies can utilise marketing automation in content marketing strategies.	Case studies, qualitative	B2B, industry not specified	Finland
24	Du et al. (2015)	Journal of Business Ethics	Examine how CSR communication via social media affects customer-company identification and engagement.	Survey, regression analysis, quantitative	B2C, consumer goods	USA

Table 1: *(continued)*

Study	**Author(s)**	**Journal/ conference proceeding**	**Objective(s)**	**Methodology**	**Context / Industry**	**Study's location**
25	Reilly & Hynan (2014)	Public Relations Review	Explore how brands use content to communicate sustainability initiatives and its	Case study, qualitative	B2C, fashion retail	USA

			impact on engagement.			
26	Kumar & Christodoulopoulou (2014)	Journal of Business Research	Analyse how sustainability marketing content affects customer engagement and loyalty.	Survey, structural equation modelling, quantitative	B2C, consumer goods	Global scope
27	Pomering (2017)	Journal of Strategic Marketing	Investigate the effectiveness of corporate sustainability messaging in building online engagement.	Survey, quantitative	B2C, energy	Australia
28	Janssen et al. (2015)	Journal of Business Ethics	Examine how different sustainability content types affect consumer reactions and engagement.	Experimental design, quantitative	B2C, food & beverage	Belgium
29	Lim et al. (2020)	Sustainability	Analyse the effectiveness of sustainability-themed video content in driving YouTube engagement.	Content analysis, quantitative	B2C, industry not specified	South Korea
30	Peloza et al. (2013)	Journal of Public Policy & Marketing	Evaluate how different sustainability message frames affect consumer engagement levels	Experimental design, quantitative	B2C, industry not specified	USA
31	Biloslavo et al. (2013)	Journal of Communication Management	Explore strategic use of content for CSR storytelling and online stakeholder engagement	Case study, qualitative	B2B, manufacturing	Italy
32	Castelló et al. (2013	Journal of Business Ethics	Analyze social media dialogues around corporate sustainability and stakeholder engagement	Discourse analysis, qualitative	B2C, multinational firms	Global scope
33	Thakur et al. (2025)	International Journal of Innovation Science	Examine how digital marketing communication influences online	Survey, structural equation	B2C, green apparel	India

			customer experience and sustainable purchase intention	modeling, quantitative		
34	Murtarelli et al. (2023)	IGI Global	Explore how companies balance corporate messaging and consumer dialogue in sustainable marketing via social media.	Case studies, qualitative	B2C, fashion	Europe
35	Abuzeinab et al. (2024)	International Journal of Sustainability in Higher Education	Assess how UK higher education institutions communicate sustainability on their websites	Content analysis, quantitative	B2C; Higher education	UK

Table 1: *(continued)*

Study	**Author(s)**	**Journal/ conference proceeding**	**Objective(s)**	**Methodology**	**Context / Industry**	**Study's location**
36	Di Tullio et al. (2021)	Administrative Sciences	Explore the role of social media in universities' sustainability reporting and stakeholder engagement	Case study, qualitative	B2C; Higher education	Italy
37	Müller & Christandl (2019)	Journal of Business Research	Investigate how different types of sustainability-related content influence consumer	Experimental design, quantitative	B2C, industry not specified	Germany
38	Sabate et al. (2014)	European Management Journal	Identify factors that influence the popularity of branded content on Facebook.	Content analysis, quantitative	B2C, industry not specified	Spain
39	Wang & McCarthy (2021)	Journal of Retailing and Consumer Services	Examine how content and message framing on social media influence sustainable consumer behaviour.	Experimental design, quantitative	B2C, retail	Australia

40	Chung & Lee (2019)	Journal of Business Ethics	Examine how sustainability messages in brand content influence consumer trust and engagement on social media.	Survey, statistical analysis, quantitative	B2C, consumer goods	South Korea
41	Beckmann et al. (2017)	Journal of Marketing Communications	Analyse the role of corporate sustainability storytelling in increasing online engagement.	Content analysis, quantitative	B2C, FMCG	Germany
42	Du & Vieira (2012)	International Journal of Advertising	Investigate how corporate social responsibility (CSR) content in digital marketing affects stakeholder engagement.	Experimental design, quantitative	B2C, industry not specified	USA
43	Colleoni (2013	Public Relations Review	Understand the relationship between CSR content on Twitter and user engagement.	Social media analytics, regression analysis, quantitative	B2C, industry not specified	Global scope
44	Pelet & Lecat (2023)	Journal of Digital & Social Media Marketing	Assess the effectiveness of interactive sustainability content in driving consumer engagement in online platforms.	Eye-tracking, survey, experimental design, mixed methods	B2C, e-commerce	France
45	van der Waal & Thijssens (2020)	Business Strategy and the Environment	Explore how proactive sustainability communication strategies influence online stakeholder responses.	Case studies, qualitative	B2B; energy	Netherlands
46	Moraes et al. (2019	Journal of Business Research	Evaluate how ethical brand positioning through content marketing drives engagement and brand trust.	In-depth interviews, thematic analysis, qualitative	B2C; fashion	UK

Table 1: *(continued)*

Study	Author(s)	Journal/ conference proceeding	Objective(s)	Methodology	Context / Industry	Study's location
47	Cervellon & Carey (2014)	Journal of Marketing Management	Investigate green branding via social media content and its impact on consumer interaction.	Content analysis, quantitative	B2C, luxury	France
48	Gatti et al. (2021)	Corporate Social Responsibility and Environmental Management	Analyse content strategies used in sustainability reporting via social media platforms.	Content analysis, quantitative	B2C and B2B, industry not specified	Italy
49	Islam et al. (2020	Technological Forecasting and Social Change	Analyse the role of social media content in shaping perceptions of environmental responsibility among millennials.	Survey, structural equation modelling, quantitative	B2C, tech	USA
50	Torelli et al. (2019)	Journal of International Marketing	Investigate cross-cultural effectiveness of sustainability content marketing in engaging diverse global audiences.	Comparative analysis, quantitative	B2C, industry not specified	Global scope
51	Chen et al. (2021	Sustainability Marketing Journal	Assess how interactive green content (e.g., quizzes, eco-tips) fosters customer loyalty and engagement.	Experimental design, quantitative	B2C, e-commerce	China
52	Bucic et al. (2014))	European Journal of Marketing	Explore how emotional appeal in sustainability messaging influences online sharing and comments.	Survey, content analysis, quantitative	B2C, FMCG	Australia
53	Alalwan (2021)	Journal of Retailing and Consumer Services	Investigate how sustainability-themed influencer content impacts engagement	Regression analysis, quantitative	B2C, social media	Jordan

			behaviours (likes, comments, shares).			
54	Sjöström & Jansson (2017)	Corporate Communications: An International Journal	Evaluate the credibility of sustainability messages in digital content and their effect on audience trust.	Survey, interviews, mixed methods	B2C and B2B, industry not specified	Sweden
55	Yuan & Wu (2022)	Journal of Interactive Marketing	Understand the use of storytelling in green content marketing and its influence on digital engagement metrics.	Case study, digital analytics, mixed methods	B2C; fashion	China
56	Petrescu-Mag et al. (2015)	Journal of Cleaner Production	Assess the use of social media for sustainability education and awareness through branded content.	Survey, interviews, thematic analysis, regression analysis, mixed methods	B2C; agriculture and food	Romania

Table 1: *(continued)*

Study	**Author(s)**	**Journal/ conference proceeding**	**Objective(s)**	**Methodology**	**Context / Industry**	**Study's location**
57	Bradu et al. (2020)	Journal of Marketing Management	Explore how authenticity in sustainability content drives higher engagement among ethically conscious consumers.	Online experiments, statistical analysis, quantitative	B2C, fashion	UK
58	Parguel et al. (2015)	Journal of Business Ethics	Study the influence of green advertising content on consumer attitudes and social media responses.	Survey, experimental design, quantitative	B2C, industry not specified	France
59	Schmuck et al. (2018)	Journal of Advertising	Investigate the psychological mechanisms through which sustainability claims in content	Experimental design, quantitative	B2C, consumer goods	Germany

			marketing drive engagement.			
60	Kim & Hall (2022)	Tourism Management Perspectives	Examine the impact of eco-friendly content marketing on engagement in sustainable hospitality brands.	Survey, quantitative	B2C, hospitality	South Korea
61	Lim et al. (2021)	Corporate Communications	Explore how consistency and transparency in sustainability content affect engagement on corporate websites and social media.	Content analysis, in-depth interviews, mixed methods	B2C, telecommunications	Singapore
62	Geerts '2014)	Sustainability Accounting, Management and Policy Journal	Study how luxury brands incorporate sustainability in digital storytelling to engage younger consumers.	Case studies, interpretive analysis, qualitative	B2C, fashion	Switzerland

Table 2: *Journals included in the review*
Source: *Own research and edition, 2025*

Journal / Conference Proceeding	Study No(s).	No. of Studies
Journal of Business Ethics	15, 24, 28, 30, 40, 58	6
Sustainability	3, 11, 29, 51	4
Journal of Business Research	12, 26, 37, 46	4
Journal of Marketing	13, 14, 20	3
Journal of Brand Management	18, 21	2
Public Relations Review	25, 43	2
Journal of Strategic Marketing	27, 57	2
Journal of Marketing Communications	41, 57	2
Journal of Retailing and Consumer Services	39, 53	2
Corporate Communications: An International Journal	54, 61	2
International Journal of Advertising	22, 42	2
Journal of Marketing Management	47, 57	2
RAUSP Management Journal	1	1
SAGE Open	2	1
Sustainable Production and Consumption	4	1
International Journal of Contemporary Hospitality Management	5	1
International Journal of Environmental Research and Public Health	6	1
Journal of Research in Interactive Marketing	7	1

Turkish Journal of Marketing	8	1
The International Encyclopedia of Media Psychology	9	1
Digital Content Marketing	10	1
Harvard Business Review	16	1
Marketing Letters	17	1
Journal of Sustainable Tourism	19	1
Industrial Marketing Management	23	1
Journal of Communication Management	31	1
International Journal of Innovation Science	33	1
IGI Global	34	1
International Journal of Sustainability in Higher Education	35	1
Administrative Sciences	36	1
European Management Journal	38	1
Journal of Digital & Social Media Marketing	44	1
Business Strategy and the Environment	45	1
Corporate Social Responsibility and Environmental Management	48	1
Technological Forecasting and Social Change	49	1
Journal of International Marketing	50	1
European Journal of Marketing	52	1
Journal of Interactive Marketing	55	1
Journal of Cleaner Production	56	1
Journal of Advertising	59	1
Tourism Management Perspectives	60	1
Sustainability Accounting, Management and Policy Journal	62	1

Table 3 demonstrates the evidence on which the correlation between content marketing and online customer engagement, in the context of sustainability communication, is based. The results not only clarify what content resonates with audiences, but also how this content affects online audience engagement when brands meet audience expectations regarding sustainability-themed content. As demonstrated in Table 3, sustainability content marketing impacts online audience engagement through various ways, including engagement, brand perception, behavioural change, community and social involvement, educational impact, mixed or negative outcomes, and trust building and loyalty.

Enhanced engagement and strengthened brand perception represent two different facets of audience interaction. On the one hand, enhanced engagement is characterised by direct user actions, such as sharing content, commenting, and actively participating in brand-related activities. On the other hand, strengthened brand perception hinges on shifts in audience attitudes, including greater brand trust and a more favourable image. Typically, this is achieved through credible and transparent messaging, which fosters a positive brand perception. Similarly, behavioural change and educational impact also differ significantly, though they both aim to influence audience behaviour. Specifically, behavioural change refers to concrete actions taken by consumers, such as adopting sustainable consumption practices or engaging in eco-friendly behaviours. These actions are often driven by emotional appeals and the perceived authenticity of the content. In contrast, educational impact primarily involves raising awareness and deepening understanding of sustainability issues. Often, this occurs through informative and instructive content without necessarily prompting immediate action. Therefore, while both

categories affect audience behaviour, the former directly inspires action, whereas the latter informs and educates. Moreover, community and social involvement, as a category, focuses on fostering collective participation and dialogue. It encourages stakeholders to actively take part in sustainability conversations. In contrast, trust-building and loyalty emphasise the establishment of long-term relationships between the brand and the consumer. This relationship is cultivated through consistent, transparent messaging that fosters reliability and brand commitment. As a result, while community involvement seeks to build collective engagement, trust-building aims to nurture one-on-one brand loyalty. In addition, content quality and presentation significantly impact how audiences perceive and interact with content. High-quality, aesthetically appealing, and well-organised content often leads to higher engagement rates. Conversely, mixed or negative outcomes arise when content lacks authenticity or consistency, leading to disengagement or criticism, particularly when it is perceived as greenwashing or misleading. Thus, presentation quality is crucial in determining whether content positively or negatively affects audience engagement. In essence, these categories reflect the diverse pathways through which content marketing strategies can influence online audience engagement. They range from direct actions and attitude shifts to community involvement and content quality perceptions. By understanding these distinctions, marketers can more effectively tailor their strategies to achieve desired outcomes.

Table 3 shows that content marketing, as a sustainability communication strategy, significantly impacts online audience engagement, primarily through enhanced engagement and strengthened brand perception. Notably, 24 studies report enhanced engagement (e.g., Braga et al., 2024; Du Plessis, 2022; Feng & Ye, 2023), often driven by storytelling, interactive content, and emotional appeals. This indicates that emotionally resonant content that fosters interaction is more likely to drive online participation. Moreover, strengthened brand perception, identified in 15 studies (e.g., Munaro et al., 2024; Kapoor et al., 2021; Suki et al., 2022), highlights the importance of credible and transparent messaging in building consumer trust. In particular, brands that consistently demonstrate authenticity through their content are more likely to cultivate positive brand perceptions. In addition, behavioural change is evident in 10 studies (e.g., Hartmann & Apaolaza-Ibáñez, 2012; White et al., 2019; Pomering, 2017) in which content marketing promotes sustainable consumption and eco-friendly actions. Typically, this change is achieved through relatable narratives and appeals to consumer values. Similarly, educational impact, found in 6 studies (e.g., Nosratabadi et al., 2019; Cammarota et al., 2023; Di Tullio et al., 2021), reflects how informative content raises awareness without necessarily prompting immediate behavioural shifts.

Furthermore, the findings show that community and social involvement, evident in 7 studies (e.g., Castelló et al., 2013; Moraes et al., 2019; Wang & McCarthy, 2021), plays a crucial role in fostering collective engagement through stakeholder dialogues and collaborative efforts. On the other hand, content perceived as inconsistent or misleading leads to negative outcomes, as seen in 4 studies (e.g., Reilly & Hynan, 2014; Kapferer & Michaut-Denizeau, 2014; Torelli et al., 2019), particularly when audiences detect greenwashing. Additionally, content quality and presentation, as noted in 3 studies (e.g., Sabate et al., 2014; Pelet & Lecat, 2011), indicate that visually appealing, well-structured content can significantly boost engagement. Finally, trust-building and loyalty, highlighted in 5 studies (e.g., Gatti et al., 2021; Islam et al., 2020; Schmuck et al., 2018), emphasise the importance of forming long-term relationships when brands consistently communicate their sustainability efforts with transparency.

The evidence of the correlation between content marketing as a sustainability communication strategy and online audience engagement:

Table 3: *The evidence of the correlation between content marketing as a sustainability communication strategy and online audience engagement*
Source: *Own research and edition, 2025*

Study No & Authors	Impact on Online Audience Engagement	Reason for Impact
1. Braga et al. (2024)	Enhancing diverse audience engagement	Storytelling, credibility, and alignment with values enhance audience engagement.
2. Du Plessis (2022)	Increasing behavioural engagement, such as sharing, commenting, and brand interaction.	Educational and emotional content formats
3. Feng & Ye (2023)	Positively influencing brand attitude and engagement	Eco-friendly content on social media and message congruency with consumer values
4. Munaro et al. (2024)	Driving sustainable consumption, building trust and interaction	Authenticity and relatability of influencers, as well as emotional content
5. Kapoor et al. (2021)	Enhancing engagement in hospitality brands	Emotional/rational appeals and credible sources.
6. Suki et al. (2022)	Strengthening engagement and sustainable consumption behaviours.	Interactive features on social media and sustainability alignment
7. Crapa et al. (2024)	Increasing social media interaction and consumer trust	Strong green messaging, consistency and appealing presentation
8. Tarhan & Dursun (2024)	Increasing audience engagement across sectors	Real-time interaction and channel-specific tailoring
9. Gomez (2020)	Building emotional connections and involvement online.	CSR communication, transparency and dialogue principles
10. Taiminen & Ranaweera (2019)	Digital content fosters trust and loyalty in B2B sustainability contexts.	Value-driven thought leadership encourages sustained relational engagement.
11. Nosratabadi et al. (2019)	Reinforcing consistent user engagement.	Integrated sustainability strategies, holistic embedding of sustainability within messaging
12. Cammarota et al. (2023)	Raising audience involvement in environmental causes.	Brand activism through content, social alignment and emotional resonance
13. Lemon & Verhoef (2016)	Optimising sustainability engagement touchpoints.	Customer experience models, journey mapping to ensure relevance and being timely
14. Brexendorf & Keller (2017)	Strengthening engagement and improving brand affinity.	Integrating sustainability into brand identity, innovation and cohesive storytelling

15. Hartmann & Apaolaza-Ibáñez (2012)	Increasing purchase intent and attention.	Emotional branding for green products and communicating the psychological benefits linked to green identity
16. White et al. (2019)	Enhancing sustainable content engagement.	Behavioural nudges, social proof and simplicity in messaging
17. Kapitan & Silvera (2016)	Increasing sustainable brand effectiveness and enhancing content reception	Influencer credibility, attributions and trustworthiness of the messenger
18. Lundqvist et al. (2013)	Improving engagement	Storytelling, creating lasting emotional ties, narrative structure and origin stories
19. Font & McCabe (2017)	Increasing appeal and participation.	Tourism sustainability communication and contextualised storytelling align with tourists' personal values.
20. Berger & Milkman (2012)	Increasing audience engagement with sustainability content	Emotional content, boosting emotions like awe and inspiration
21. Kapferer & Michaut-Denizeau (2014)	Limited engagement.	Perceived conflict between luxury and sustainability values reduces trust and interest.
22. De Veirman et al. (2017)	Increasing audience engagement with sustainability content	Authentic influencer-brand fit.
23. Järvinen & Taiminen (2016)	Improving click-through rates, lead quality, and engagement duration.	Automation enables the delivery of relevant content at optimal times and personalised content marketing
24. Du et al. (2015)	Enhancing employee advocacy and increasing online consumer engagement	Employees become brand ambassadors when CSR aligns with personal values, amplifying messages online.

Table 3: *(continued)*

Study No & Authors	Impact on Online Audience Engagement	Reason for Impact
25. Reilly & Hynan (2014)	Inconsistent sustainability messaging on social media causes confusion and consumer backlash.	Lack of a coherent strategy and transparency led to accusations of greenwashing.
26. Kumar & Christodoulopoulou (2014)	Integrated sustainability-branding content fosters stronger consumer-brand connections, reflected in increased social media engagement.	Combining emotional brand identity with ethical messaging appeals to consumer values.
27. Pomering (2017)	Static CSR reports have limited direct engagement but support credibility that	Formal reports signal responsibility but lack the

	enhances other content channels.	interactive elements that drive audience engagement.
28. Janssen et al. (2015)	Ethical marketing messages are met with distrust by cynical consumers, leading to disengagement or negative commenting.	Consumers with high scepticism interpret CSR as a manipulative marketing tool.
29. Lim et al. (2020)	Sustainability ads with emotional appeals and credible sources generate more shares, comments, and positive attitudes.	Emotional storytelling and trusted messengers build psychological engagement and motivate action.
30. Peloza et al. (2013)	Ethically framed content prompts self-reflection, leading to positive word-of-mouth and social endorsement behaviours.	Self-accountability nudges consumers to engage with and promote ethical consumption.
31. Biloslavo et al. (2013)	Content with critical reflection on sustainability generates thoughtful engagement among informed audiences.	Eco-critical approaches foster deeper conversations but may not attract general audience participation.
32. Castelló et al. (2013)	Multi-stakeholder dialogue on social media boosts engagement through co-created narratives and shared meanings.	Polyphonic communication invites diverse voices, making users feel included and valued.
33. Thakur et al. (2025)	Digital content that integrates sustainability themes and customer experience increases sustainable purchase intentions and user engagement.	Positive digital experiences reinforce credibility and encourage behavioural engagement.
34. Murtarelli et al. (2023)	Balanced corporate-consumer interactions on sustainability build trust and drive sustained engagement.	Open two-way dialogue humanises brands and fosters loyalty.
35. Abuzeinab et al. (2024)	Informative website content increases awareness but fails to stimulate meaningful online interaction.	Static formats limit interactivity, making them less engaging than social media content.
36. Di Tullio, La Torre, & Rea (2021)	Social media use by universities for sustainability reporting enhances audience engagement by transforming passive information delivery into interactive, educational communication.	The shift from one-way reporting to dialogic communication (e.g., Q&As, polls, comments) encourages participation, builds community, and promotes co-learning, making sustainability content more engaging and impactful.
37. Müller & Christandl (2019)	Story-based and emotionally driven sustainability content	Stories tap into personal values and empathy, making messages more memorable and actionable.

	increases comments, shares, and emotional reactions.	
38. Sabate et al. (2014)	Visually appealing branded content related to sustainability gets higher likes and comments on Facebook.	Visual richness and entertainment value improve shareability and engagement.
39. Wang & McCarthy (2021)	Informative and positively framed sustainability posts improve behavioural intentions, such as brand support and information seeking.	Optimistic framing and useful content reduce defensiveness and encourage proactive responses.
40. Chung & Lee (2019)	Twitter-based CSR communication improves consumer trust and fosters dialogic engagement (replies, retweets).	Real-time, transparent communication increases perceived authenticity and responsiveness.
41. Beckmann et al. (2017)	Content that frames sustainability as a win–win fosters greater engagement from consumers and stakeholders.	Positive framing resolves perceived trade-offs between profit and sustainability, increasing trust and participation.

Table 3: *(continued)*

Study No & Authors	Impact on Online Audience Engagement	Reason for Impact
42. Du & Vieira (2012)	CSR content increased engagement as firms used it to build legitimacy.	Companies in controversial sectors (e.g., oil) use sustainability narratives to regain public trust, making audiences more responsive.
43. Colleoni (2013)	Strategic CSR communication on social media led to higher stakeholder interaction.	Using dialogue and transparency in messaging enhances organisational legitimacy and engagement.
44. Pelet & Lecat (2023)	Social networks improved engagement in niche markets, such as wine sales, when linked to sustainability.	Digital communities provided platforms for storytelling around ethical production and local heritage, which resonated with values-driven consumers.
45. van der Waal & Thijssens (2020)	Reporting on SDGs via content marketing improved stakeholder engagement.	SDG alignment made content more relevant for global-minded audiences and increased perceived brand responsibility.
46. Moraes et al. (2019)	Ethical consumption content drove co-creation and deeper involvement.	Consumers were motivated to co-construct meaning and value around sustainability, fostering a sense of ownership.
47. Cervellon & Carey (2014)	Reviews and sustainable product features increased post-experience sharing.	Perceived congruence between hedonic and sustainable attributes boosted satisfaction and content sharing.

48. Gatti et al. (2021)	CSR content positively influenced engagement by enhancing brand credibility.	High-quality CSR communication strengthened corporate reputation and motivated supportive consumer actions.
49. Islam et al. (2020)	Congruity in sustainability messaging boosted online brand community engagement.	When brand values aligned with consumer beliefs, content felt authentic, increasing participation.
50. Torelli et al (2019)	Content perceived as greenwashing led to reduced engagement and scepticism.	Consumers penalise inauthentic sustainability messaging, perceiving it as manipulative.
51. Chen et al. (2021)	Interactive green advertising increased consumer engagement.	Interactivity enhanced perceived control and immersion, making the content more compelling.
52. Bucic et al. (2014)	Millennials showed higher engagement with ethical content.	Value alignment with ethical consumption motivated sharing and discussion.
53. Alalwan (2021)	Sustainability messages with multimedia features led to greater engagement.	Visual and personalised formats captured attention and encouraged interaction.
54. Sjöström & Jansson (2017)	Trust in CSR messages significantly enhanced engagement.	Trust acted as a mediator between CSR communication and audience responsiveness.
55. Yuan & Wu (2022)	Storytelling in green marketing boosted consumer engagement.	Narrative transportation allowed consumers to connect and stay engaged emotionally.
56. Petrescu-Mag et al. (2015)	Educational sustainability content improved awareness but had mixed effects on engagement.	Overly technical content informed but lacked emotional appeal, limiting interactive responses.
57. Bradu et al. (2020)	Authentic CSR storytelling increased consumer trust and engagement.	Perceived authenticity made audiences more likely to trust and respond positively to content.
58. Parguel et al. (2015)	Independent sustainability ratings boosted engagement and reduced backlash over greenwashing.	Third-party validation increased credibility and minimised consumer doubt.
59. Schmuck et al. (2018)	Misleading green ads reduced engagement and triggered negative emotions.	Cognitive dissonance and perceived deception undermined message effectiveness.
60. Kim & Hall (2022)	Green brand communication enhanced consumer engagement in the hospitality sector.	Messaging focused on tangible environmental actions increased consumer trust and emotional connection.
61. Lim et al. (2021)	Consistent sustainability content on social media led to higher user interaction and brand advocacy.	Regular updates and content diversity kept audiences informed and emotionally engaged.
62. Geerts (2014)	Environmental certification communication affected engagement positively when backed by credible proof.	Credible certifications provided assurance, increasing audience receptivity to sustainability claims.

The results summarised in Table 3 highlight patterns and associations between sustainability content marketing strategies and various dimensions of online audience engagement, including brand loyalty, emotional connection, brand perception, and word-of-mouth (WOM). However, it is important to emphasise that these associations should not be interpreted as evidence of causation. The included studies primarily employed observational, cross-sectional, or descriptive designs, which are inherently limited in their ability to establish causal relationships. While many of the findings suggest strong and consistent correlations, these do not account for potential confounding variables or the directionality of influence. Therefore, any influence that content marketing has on increased audience engagement should be considered tentative and contingent on further empirical validation through experimental or longitudinal research.

The research methodologies used in the studies included in the final sample:

Table 1 shows the characteristics and range of methodologies and research approaches used by the authors in the sample. The findings indicate that 30 studies employed a quantitative research design, 22 used qualitative approaches, 6 adopted mixed-methods designs, and 4 were conceptual studies. The preference for empirical methodologies underscores the field's focus on quantifying engagement outcomes while recognising the need for qualitative insights.
Surveys were the most commonly used method, accounting for a significant portion of quantitative studies. These surveys gathered customer perceptions, behaviours, and engagement metrics, providing a broad understanding of how content marketing influences online audience engagement. Additionally, statistical modelling techniques, including structural equation modelling and regression analyses, were employed to establish correlations between content marketing efforts and engagement indicators such as likes, shares, and purchase intentions. A subset of studies (n=10) utilised experimental designs to assess the direct impact of content features, such as personalisation, interactivity, and storytelling, on engagement levels.

Case studies and in-depth interviews were the dominant qualitative methods. These approaches provided insights into industry-specific applications of content marketing, particularly within sustainability communication and brand storytelling. Thematic analyses were used to identify emerging trends in audience responses to content marketing strategies. Moreover, systematic literature reviews contributed to the conceptual understanding of the role of sustainability content marketing in digital engagement. A smaller portion of studies combined qualitative and quantitative approaches to provide a more comprehensive view of engagement mechanisms. These studies integrated survey data with case studies or content analysis, allowing researchers to validate findings across different methodological lenses. Several studies employed a conceptual framework approach, using literature reviews, theoretical discussions, and conceptual model development to examine the effectiveness of content marketing. These studies provided foundational theories and identified gaps in empirical research, guiding future studies toward more robust methodological designs.

To classify the selected studies into quantitative, qualitative, and conceptual categories, we applied methodological criteria grounded in academic research standards. Specifically, studies were categorized as quantitative if they utilized structured data collection methods, such as surveys, experiments, or statistical modelling, to analyse numerical data; qualitative if they employed interviews, case studies, thematic analyses, or document reviews to explore subjective insights; and conceptual if they primarily presented theoretical frameworks, narrative literature review, or model development without empirical data collection. In cases where a study combined qualitative and quantitative methods, it was classified as mixed-methods.
The initial categorisation was conducted through a combination of AI-based content screening and manual review by the lead researcher. However, inter-rater reliability testing was not

conducted, and a second independent reviewer was not used to cross-validate these classifications, which represents a methodological limitation, and it will be discussed in the limitations section. Nonetheless, every effort was made to ensure transparency and consistency in applying classification criteria across the reviewed literature.

Discussion

The findings of this scoping review affirm that content marketing functions as an effective sustainability communication strategy for enhancing online audience engagement. Across 62 studies, engagement outcomes were consistently associated with content that is emotional, authentic, visually compelling, and value-aligned (Braga et al., 2024; Du Plessis, 2022; Feng & Ye, 2023). Emotional storytelling and influencer-driven content emerged as powerful drivers of audience participation, resonating with theories such as the Elaboration Likelihood Model (Petty & Cacioppo, 1986) and Self-Determination Theory (Ryan et al., 2019). The dialogic capabilities of social media, central to Relationship Marketing Theory (Berry, 1983), enable brands to build trust through two-way interactions (Chen et al., 2023; Munaro et al., 2024). This trust was particularly enhanced when sustainability narratives were transparent, relevant, and aesthetically tailored (Suki et al., 2022; Crapa et al., 2024). Studies also indicated that eco-friendly content boosted brand perception and purchase intention, reinforcing Social Exchange Theory's notion of value-based engagement (Zafar et al., 2022). Audience behavioural change was more likely when content was informative, visually engaging, and framed positively, aligning with the Theory of Planned Behaviour (Ajzen, 1991) and Uses and Gratifications Theory (Katz et al., 1973) (White et al., 2019; Wang & McCarthy, 2021). Educational impacts, while less direct, increased awareness and critical reflection (Nosratabadi et al., 2019; Di Tullio et al., 2021). However, perceptions of greenwashing or misaligned brand messages led to disengagement, suggesting that authenticity remains critical (Reilly & Hynan, 2014; Torelli et al., 2019). Despite growing empirical support, causality remains tentative due to methodological limitations; most studies employed cross-sectional or descriptive designs. Future research should explore longitudinal and experimental methods to validate causal pathways and address underexplored B2B contexts.

Research implications

This review advances the theoretical foundation of sustainability-oriented content marketing by emphasising the need to distinguish it from broader social media marketing, since both employ distinct mechanisms to drive online engagement. Clarifying these boundaries is essential for refining engagement models within sustainability communication. Findings also suggest that content marketing effectiveness is context-dependent, influenced by industry type and regional culture. Incorporating these moderating variables into future models will enhance the generalizability of sustainability engagement frameworks. Additionally, customer-to-customer (C2C) interactions emerged as a critical, yet under-theorised, factor in amplifying engagement with eco-content. Theorising these peer dynamics can better capture how sustainability narratives gain traction through co-creation and social sharing. Furthermore, cross-disciplinary integration, especially with psychology and communication, can deepen understanding of how sustainability content influences engagement via emotional and cognitive routes, such as trust and perceived relevance. Finally, qualitative and mixed-method research remains limited but vital. Capturing the lived experiences of how audiences respond to sustainability messaging can inform more nuanced, consumer-centred engagement theories.

Practical implications

This review offers strategic insights for practitioners aiming to enhance online engagement through sustainability content. Brands should leverage platform-specific content formats—using short, emotional, and interactive posts for social media (e.g., reels, polls), and long-form educational content for blogs or websites (Du Plessis, 2022; Crapa et al., 2024). Emotional storytelling, consistent green messaging, and user-generated content were keys to boosting trust and interaction (Feng & Ye, 2023; Munaro et al., 2024). In addition, marketers must ensure content is credible and transparent to avoid perceptions of greenwashing, which can damage trust and reduce engagement (Reilly & Hynan, 2014; Torelli et al., 2019). Incorporating influencers with authentic sustainability values can further strengthen audience resonance and behavioural response (Kapoor et al., 2021). Moreover, performance metrics should go beyond basic likes and shares. Practitioners are encouraged to adopt a comprehensive KPI framework that includes sentiment analysis, conversion rates, and long-term indicators such as brand advocacy and loyalty (Chen et al., 2023; Gatti et al., 2021). Furthermore, tailoring strategies to sector-specific needs is critical. For instance, hospitality brands may focus on emotional appeals tied to tangible environmental actions (Kim & Hall, 2022), while educational institutions benefit from dialogic, informative content (Di Tullio et al., 2021). Finally, organisations should invest in real-time optimisation tools and A/B testing to fine-tune content strategies dynamically. Aligning sustainability narratives with audience values and expectations is essential for fostering both engagement and pro-environmental behaviours.

Limitations

Despite its contributions, this study has several limitations. First, the scope of the included studies may not fully capture the rapid evolution of content marketing and sustainability communication trends. Second, reliance on existing literature may introduce publication bias, as studies with positive findings are more likely to be published. Third, methodological inconsistencies across the reviewed studies may affect the reliability of the synthesised conclusions. Fourth, inter-rater reliability testing was not conducted, and a second independent reviewer was not used to cross-validate the research methodologies classification. Furthermore, future reviews should consider employing intercoder agreement measures, such as Cohen's kappa, to enhance the reliability of research methodology classifications. Nonetheless, every effort was made to ensure transparency and consistency in applying classification criteria across the reviewed literature. Finally, a key limitation of this review lies in the nature of the available evidence. The majority of the studies included are based on observational or cross-sectional data and do not employ experimental or longitudinal designs capable of testing causal relationships. As a result, the review identifies correlational, rather than causal associations between sustainability-oriented content marketing and online audience engagement. Although the consistency of these associations across diverse contexts and industries strengthens the credibility of the observed relationships, the findings cannot rule out the influence of external or unmeasured variables.

Future research directions

Future studies should move beyond descriptive and cross-sectional designs by employing longitudinal and experimental methods to establish causal links between sustainability content marketing and audience engagement. More empirical work is also needed in B2B contexts, which remain underexplored compared to B2C settings. Additionally, cross-cultural research can reveal how regional and cultural factors influence the effectiveness of content. Investigating consumer-to-consumer (C2C) interactions and their mediating role in content impact could enrich engagement models. Furthermore, integrating interdisciplinary perspectives, from

psychology, communication, and data science, can illuminate the cognitive and emotional mechanisms that drive sustainable engagement online.

Future research should also deepen cross-cultural comparisons by examining how national values, institutional contexts, and regulatory frameworks mediate the relationship between content marketing and audience engagement. Comparative studies could reveal whether engagement strategies that succeed in Western markets are equally effective in collectivist or emerging economies. Mapping such regional trends would help develop culturally sensitive frameworks for sustainability communication.

Conclusion

This scoping review aimed at exploring how content marketing functions as a sustainability communication strategy and how it affects online audience engagement.

First, to characterise the existing studies, the review identified 62 peer-reviewed articles published between 2012 and 2025, spanning diverse industries and global regions. Most studies were situated in B2C contexts and emphasised digital and social media channels as primary tools for sustainability communication. Second, regarding the evidence of correlation between content marketing and online audience engagement, the analysis revealed consistent associations between sustainability-oriented content and positive engagement outcomes. Emotional, authentic, and visually compelling content led to increased audience engagement, stronger brand perception, and, in some cases, a behavioural shift toward sustainable consumption. On the other hand, inauthentic or inconsistent content, especially greenwashing, tended to diminish engagement and trust. Third, regarding the methodological range of the studies, quantitative approaches dominated, particularly surveys and experiments, whereas qualitative and mixed-methods studies remained underrepresented. Moreover, the frequent reliance on cross-sectional designs limited the ability to draw causal inferences, highlighting the need for more longitudinal and experimental research.

Overall, the findings confirm that content marketing is an effective sustainability communication strategy when messages are credible, emotionally resonant, and aligned with consumer values. Future research should further explore cultural and geographical variations and adopt mixed-methods and longitudinal approaches to clarify the causal relationships between sustainability content and engagement outcomes.

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Sustainability in brewing - What are the most effective strategies for reducing water usage in large-scale brewing?

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Abstract

Water is a key ingredient and raw material in beer production. On average, large-scale breweries consume between 4 and 6 litres of water for the production of every litre of beer. Nowadays, sustainability is becoming increasingly important worldwide in this industry. As manufacturers strive to meet new demands from customers and communities, in line with the sixth Sustainable Development Goal, which aims to ensure access to water and sanitation for all, reducing water usage has become a key focus for environmental and operational efficiency. This study investigates the most effective strategies for minimising water consumption in large-scale brewing operations. Through a combination of literature review, case studies, and industry data analysis, the research identifies best practices across several stages of the brewing process, such as water recovery and reuse, clean-in-place optimisation, real-time monitoring technologies, and dry-cleaning methods for equipment. Case studies from global leaders such as Anheuser-Busch InBev SA/NV and Heineken N.V. illustrate how innovations in water recycling and brewery processes contribute to substantial water savings. The findings suggest that while technology plays a critical role, organisational culture and strategic investment are also key to achieving long-term reductions. In this research, I would like to look at domestic trends as well as those of the major international manufacturers.

Keywords: sustainability, brewing industry, water conservation, SDG 6, clean-in-place

JEL Classification: Q25, Q01, L66

Introduction

Nowadays, sustainability has become a key topic for the global food and beverage industry, including beer production, due to growing environmental pressures, resource shortages, and increasingly demanding consumer expectations. Among the most important questions, water consumption is particularly critical in brewing, where global production reached 1.88 billion hectolitres (hl) in 2023, led by China, the United States, and Brazil (Statista, 2025). Since water is not only used as a raw material in the production of these products, but also for the cleaning, washing and packaging processes, this type of production highlights the water-intensive nature of beer production. Thanks to these, large-scale breweries play a prominent role in both production and resource use. World's largest brewing conglomerates such as Anheuser-Busch InBev SA/NV (AB InBev), Heineken N.V. (Heineken), Carlsberg A/S (Carlsberg), Molson Coors Beverage Company (Molson Coors), China Resources Snow Breweries Ltd. (CR Snow), and Tsingtao Brewery Co., Ltd. (Tsingtao) operate hundreds of breweries around the world, often in water-stressed regions. Considering these circumstances, increasing and improving the efficiency of water use is an important aspect for these companies, and would be an important condition for our long-term successful operation, in addition to their environmental responsibility.

This research will focus exclusively on large-scale, commercial brewing companies, which typically have higher absolute water consumption and greater access to water-saving

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technologies than small craft beer producers. The selected large-scale companies account for nearly 60% of global beer production, so their practices are highly significant. AB InBev leads the list with an annual beer output of 506 million hl, followed by Heineken with 243 million hl, Carlsberg with 101 million hl, Molson Coors with 84 million hl, CR Snow with 112 million hl and Tsingtao with 74 million hl (Figure 1, Statista, 2024).

Figure 1: *Beer output of the world's largest brewing conglomerates (million hl)*
Source: *https://www.statista.com/chart/25485/the-worlds-largest-beer-brewing-companies/*

"The brewery industry is among the most water-intensive sectors, typically consuming 4–6 L of water for every litre of beer produced, necessitating a strong focus on water sustainability." (Diro, Angassa, Gebremeskel, Abewaa, & Mengistu, 2024, p. 1) This value may vary depending on the facility design, location, manufacturing technology used and local regulations. However, the majority of this amount is used not for product production but for clean-in-place (CIP) systems, boiler feedwater, packaging, and wastewater treatment. The potential inefficiency of these processes contributes to higher water consumption, which is especially important in production units that are already located in water-scarce areas. To reduce this, these conglomerates are paying closer attention to reducing water use during product manufacturing.

The aim of the research is to identify and examine the most efficient water use strategies applied in the sector. With the evaluation of the practices from the six major breweries, the study aims to:

- Compare their current water efficiency metrics.
- Examine the strategies and technologies that they use.
- Practical challenges in implementation.

Literature review

During the keyword search in the Scopus database, the research used the following criteria (Table 1) for the period between 2005 and 2025:

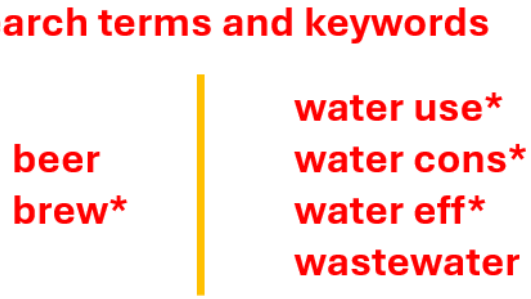

Table 1: *Scopus search terms and keywords*
Source: *Author's own compilation for Scopus database search of the research topic (2005–2025)*

This resulted in 3881 documents, mainly technical papers on brewery wastewater treatment and CIP system optimisation (for example: Fillaudeau et al., 2006; Olajire, 2020); however, the number of comprehensive comparative assessments is low. In addition, companies are constantly working to improve this area by introducing new technical solutions and processes to reduce their water consumption.

Water conservation has become a pressing sustainability issue in the brewing industry as global demand for beer continues to grow while water scarcity worsens. Brewing is inherently water-intensive; studies estimate that an average of 3 to 7 litres of water is required to produce one litre of beer, depending on the operational efficiency of the producer and the plant design or technologies (Olajire, 2020). An important metric in water conservation within the brewing sector is the water-to-beer ratio (litres of water/litre of beer, L/L) – the volume of water used per litre of beer produced. This ratio varies across companies and geographies. Another important metric is water footprint. In the context of brewing, the water footprint refers to the total volume of freshwater used directly and indirectly in the production of beer. This includes direct water use within the brewery – such as for brewing, cleaning, and cooling – as well as indirect water use associated with raw material cultivation (e.g., barley and hops), packaging production, distribution and logistics. A comprehensive understanding of the water footprint helps breweries identify opportunities for water conservation across the entire supply chain, not just at the production site (Hoekstra et al., 2011).

Literature review and company reports suggest that more standardised benchmarking and comparative data are needed across firms and regions to enable better performance comparisons within the industry, due to different reporting solutions (companies use partly different measurement solutions, and the results may differ significantly between regions) and local regulatory requirements. Existing literature presents various strategies to reduce water consumption, for example, CIP (Clean-in-Place) optimisation, membrane bioreactor systems (MBRs) for wastewater treatment and reuse, dry conveyor lubrication, and real-time monitoring with IoT sensors (Olajire, 2020).In addition to the Scopus search, the research also included a review of the annual sustainability reports of the 6 selected companies, which I accessed on the companies' websites. In the case of AB InBev, Heineken, Carlsberg, CR Snow, and Tsingtao, their 2024 annual sustainability reports were already available during the research preparation phase, but for Molson Coors, only the 2023 annual report was available. The objective of this research is to identify and evaluate the most effective and innovative water-reduction strategies from these companies. In addition to the companies' self-reported data, this study also incorporates insights from independent research and international organisations to enhance objectivity. Global assessments from the World Bank (2021), Organisation for Economic Co-operation and Development (OECD, 2018), and World Wide Fund for Nature (WWF, 2024) highlight water scarcity challenges and industry benchmarks beyond company disclosures. These external perspectives provide a valuable counterbalance to corporate self-reporting.

Conceptual framework

This research paper adopts the Triple Bottom Line framework (Elkington, 1998), which emphasises the interdependence of environmental, economic, and social dimensions in evaluating sustainability. In this approach, environmental objectives are addressed from the perspective of the planet, social goals from the perspective of people, and economic goals from the perspective of profit.

The water conservation strategies employed by large-scale beer producers reflect these three dimensions. Environmentally, they reduce ecological impact by lowering water consumption, reducing wastewater discharge, and improving resource efficiency. Economically, such strategies can lower operational costs, reduce compliance risks, and enhance long-term resilience in water-scarce regions. Socially, initiatives such as community water replenishment, stakeholder engagement, and alignment with SDG 6 (Clean Water and Sanitation) contribute to community well-being and the social license to operate. By framing water-use reduction within the Triple Bottom Line framework, this study can evaluate not only technical efficiency but also broader implications for sustainable development. This framework provides a useful structure for comparing the efforts of different firms and understanding their alignment with global sustainability goals, particularly in water-stressed areas. Moreover, the integration of the Triple Bottom Line framework with empirical performance metrics – such as water-to-beer ratio, reuse rates, and watershed engagement – offers a balanced approach to analysing sustainability practices in the brewing industry.

Methodology

Research Design

This research uses a comparative case study approach to evaluate the effectiveness of water-reduction strategies among the global leaders of the brewing industry: AB InBev, Heineken, Carlsberg, Molson Coors, CR Snow (China Resources Snow Breweries), and Tsingtao Brewery. The study uses the companies' annual sustainability and ESG reports as the basis for comparison, supported by relevant academic literature. The goal is to systematically compare each company's performance and practices, identify best-in-class strategies, and evaluate their potential for broader industry adoption.

Data Sources

Primary data is the company's official sustainability or annual ESG reports for: according to the following:

- AB InBEV – 2024 Annual Report,
- Heineken – Annual Report 2024,
- Carlsberg – Annual Report 2024,
- Molson Coors – 2024 Our Imprint Report (2023 progress),
- CR Snow – 2024 Environmental, Social and Governance report,
- Tsingtao – 2024 Environmental, Social and Governance report.

These reports were selected because they represent each company's most recent and comprehensive self-disclosure on environmental performance, water use, and sustainability initiatives. This study also considered verification data to validate company reports. Sources such as the Global Reporting Initiative (GRI, 2023) and Aqueduct Water Risk Atlas (WRI, 2023) were reviewed to provide reliability to the figures disclosed by companies.

As secondary data, the research uses Peer-reviewed academic literature on water usage in brewing (e.g., Olajire, 2020; Fillaudeau et al., 2006) and international frameworks:

- The Water Footprint Assessment Manual by Hoekstra et al. (2011),
- United Nations Sustainable Development Goals (specifically SDG 6: Clean Water and Sanitation).

Data collection

The following document review method was used to analyse and interpret data from the reports. The process included the identification and recording of reported water-to-beer ratios such as hectolitre/hectolitre (hl/hl), or equivalent water use metrics such as cubic meter/kilolitre (e.g., m^3/kL), extracting descriptions of water reduction strategies, including technological innovations (e.g., dry lubrication, membrane bioreactors), management systems (e.g., real-time monitoring), and community projects (e.g., watershed restoration), and recording regional or site-specific water initiatives (particularly in water-stressed areas). Performance metrics (e.g., water-to-beer ratio) were compared across companies.

Limitations

This study is based on self-reported company disclosures, which may vary in detail, format, and verification standards. Differences in reporting methods — such as the use of different measurement units (e.g., hl/hl vs. m^3/kL) — complicate direct comparisons across firms. In addition, water footprint assessments are not applied or reported uniformly, which means some data are only approximately comparable. The analysis primarily focuses on operational water consumption — that is, water used within the brewery facilities for production, cleaning, and packaging processes. However, indirect water consumption, including water used in the cultivation of raw materials like barley and hops, or in the production of packaging materials, also contributes significantly to a brewery's total water footprint. These upstream and downstream impacts are not fully captured in this study. To address this gap, future research should incorporate Lifecycle Assessment (LCA) methodologies to account for water use across the full value chain. This would enable a more comprehensive evaluation of sustainability performance and provide a better understanding of each company's overall water impact. Moreover, future analyses should extend beyond operational water use to systematically include supply chain impacts, particularly in raw material cultivation (e.g., barley, hops), packaging production, and logistics activities. Studies show that indirect, supply chain-related water consumption can far exceed direct operational water use, often accounting for over 70% of the total water footprint of brewing (Hoekstra & Mekonnen, 2012; Ridoutt & Pfister, 2010).

Strategies and results for water reduction

Major global brewers have adopted a range of strategies to improve water efficiency, reduce consumption, and mitigate water stress in their supply chains. A central metric for assessing operational sustainability in brewing is the water-to-beer ratio, typically measured in hectolitres of water per hectolitre of beer (hl/hl) or litres of water per litre of beer (l/l). This indicator is an accepted tool for comparing efficiency across the entire sector, so the performance of different production plants within conglomerates is also compared using it. The 2024 reports reveal notable variations across the six companies:

AB InBev

AB InBev has prioritised water stewardship, especially in high-stress areas. In 2024, the company reported a 20% improvement in water-use efficiency compared to its 2017 baseline, reaching 2.47 hectolitres of water per hectolitre of beer (hl/hl), which means a 2.47:1 ratio.

Moreover, 89% of AB InBev's sites targeted for its 2025 goals were showing measurable improvements in watershed health (AB InBev, 2024).

Heineken

Heineken operates under its "Brew a Better World 2030" framework and achieved an average water usage of 3.1 hl/hl globally in 2024 (3.1:1 ratio), with 3.0 hl/hl in water-stressed areas (3.0:1 ratio). It is on track to meet its 2030 targets of 2.9 hl/hl globally (2.9:1 ratio) and 2.6 hl/hl in water-stressed regions (2.6:1 ratio). The company's approach includes brewery-level water optimisation programmes and community water balancing efforts across 36 sites (Heineken, 2024).

Carlsberg

Carlsberg has made substantial improvements in water efficiency through its "Together Towards ZERO and Beyond" (TTZAB) strategy. The group reported usage rates of 2.5 hl/hl globally (2.5:1 ratio) and 2.2 hl/hl in high-risk areas (2.2:1 ratio), representing 31% and 44% improvements, respectively, compared to its 2015 baselines. It also initiated off-site water replenishment projects in China and Laos to enhance local water resilience (Carlsberg Group, 2024).

Molson Coors

Molson Coors reported a global water-to-product ratio of 3.41 hl/hl in 2023 (3.4:1 ratio). Its best-performing site in Trenton, Ohio, achieved a water usage rate of 2.56 hl/hl (2.56:1 ratio). The company attributes these results to automated clean-in-place (CIP) systems, local watershed investments, and performance monitoring tailored to regional risk profiles (Molson Coors, 2024).

CR Snow

CR Snow, operating under the China Resources Beer group, implemented an extensive efficiency program through its Green Factory Plan. Its national average water consumption was 2.88 cubic meters per kilolitre of beer (m^3/kL), surpassing many Western competitors (2.88:1 ratio). CR Snow's measures include water recycling, advanced bottle washing systems, and government-aligned environmental audits (China Resources Beer, 2024).

Tsingtao

Tsingtao Brewery aims to reduce water use per unit of beer by 23% by 2025 (compared with 2019 levels). Initiatives include internal water recycling, rainwater harvesting, and process upgrades across 57 operational facilities. The brewery incorporates water risk into its broader ESG framework and has received third-party assurance for its disclosures (Tsingtao Brewery, 2024).

Companies' comparison table and key strategic themes

Companies like Heineken use MBR to filter and treat wastewater to a level which is suitable for non-production activities. AB InBev and Carlsberg implemented dry lubrication systems that eliminate the use of water-based lubricants on bottling lines. CIP systems, which account for a large share of water consumption, are being upgraded with automation and rinse-water reuse, reducing total cycles and improving efficiency. Molson Coors and AB InBev have adopted AI-based monitoring tools to refine CIP schedules further and detect inefficiencies (AB InBev 2024, Molson Coors 2024).

Table 2: *Comparison table for water-to-beer ratio and goal/target based on reports*
Source: *Author's compilation based on company sustainability/ESG reports (AB InBev, 2024; Heineken, 2024; Carlsberg Group, 2024; Molson Coors, 2024; China Resources Beer, 2024; Tsingtao Brewery, 2024)*

Company	Water-to-beer ratio (2024)	Goal/Target
AB InBev	2.47 hl/hl (global average)	2.0 hl/hl in water-stressed areas by 2025
Heineken	3.1 hl/hl (global), 3.0 hl/hl (stressed)	2.9 hl/hl globally by 2030
Carlsberg	2.5 hl/hl (global), 2.2 hl/hl (high-risk)	1.7 hl/hl in high-risk areas by 2030
Molson Coors	3.41 hl/hl (global); 2.56 hl/hl (best site)	2.8 hl/hl by 2030
CR Snow	2.88 m^3/kL (~2.88 hl/hl)	Improve factory-level standards annually
Tsingtao	Not disclosed; -23% by 2025 vs 2019	Targeted reduction in per-unit usage

This data (Table 2) shows that Carlsberg and AB InBev lead in overall efficiency, while Molson Coors and Heineken remain above the global best-practice threshold of 3.0 hl/hl. CR Snow's reported figure is highly competitive given its operational scale in China.
Key Strategic Themes Identified:

- Clean-in-place (CIP) optimisation: all companies deploy automated CIP systems that reduce rinse cycles and recycle final rinse water
- Water reuse and internal recycling: internal recycling systems to collect lightly used process water for reuse in cleaning, cooling, or utilities
- Digitalisation and real-time monitoring: all companies emphasise the use of IoT meters, sensors, and AI analytics
- Watershed and community engagement: leaders like AB InBev and Carlsberg engage in watershed replenishment projects in high-risk areas
- Policy-Driven Efficiency (CR Snow and Tsingtao): Chinese brewers operate under strict national water quotas and align with state environmental strategies

Stakeholder engagement

In addition to the efficient operation of companies, the appropriate level of stakeholder involvement and commitment in water management is key. Companies like AB InBev and Carlsberg have already initiated watershed projects in partnership with local communities and various non-governmental organisations (NGOs) to help restore natural water cycles and strengthen their connections with local communities. These initiatives show that sustainable beer production is not just a technical challenge, but also a social responsibility.

Findings

This research revealed that, while all six brewing companies have committed to reducing water usage, their strategies vary significantly across geographical differences, regulatory environments, technological maturity, and operational scale (Table 3). The results measured and achieved by companies differ from one another. Carlsberg achieved the lowest average water-to-beer ratio (2.5 hl/hl globally, 2.2 hl/hl in high-risk areas), closely followed by AB InBev at 2.47 hl/hl, and leads in watershed-based community engagement. Molson Coors lags slightly with a global average of 3.41 hl/hl but demonstrates the best regional practices (2.56 hl/hl at its Trenton facility). CR Snow and Tsingtao, despite less international exposure, report

competitive efficiency levels (~2.88 hl/hl and a 23% reduction target, respectively), heavily influenced by China's national environmental policies.

Table 3: *Effective strategies identified*
Source: *Author's synthesis based on company reports (AB InBev, 2024; Heineken, 2024; Carlsberg Group, 2024; Molson Coors, 2024; China Resources Beer, 2024; Tsingtao Brewery, 2024) and academic literature (Fillaudeau et al., 2006; Olajire, 2020)*

Strategy	Observed Effectiveness	Company Examples
Clean-in-Place (CIP) Optimisation	Reduced water use by 10–30% in cleaning operations	AB InBev, Carlsberg, Molson Coors
Water Reuse and Recycling	Up to 25–40% reuse in cleaning and cooling	All companies
Real-time Monitoring & IoT	Enabled leak detection and process improvements	Heineken, Tsingtao, AB InBev
Watershed Stewardship	Local water improvements beyond brewery gates	AB InBev, Carlsberg
Government Compliance & Factory Auditing	Improved performance via structured policy alignment	CR Snow, Tsingtao

As part of their technical leadership, Carlsberg's Fredericia pilot brewery achieved 1.4 hl/hl through full recycling and AI-led optimisation. AB InBev implemented a 7-step watershed assessment tool and extended the tool to 89% of its high-risk facilities. CR Snow deployed innovative mechanical solutions, such as intermittent spray washers. Chinese companies (CR Snow, Tsingtao) benefit from strong regulatory mandates under China's Green Factory certification system. European and U.S. firms (Carlsberg, Heineken, Molson Coors) generally provide more detailed and assured disclosures, while Chinese brewers report progress but with less consistent metrics or third-party verification. Geographic context plays a significant role in shaping corporate water strategies. Breweries in high-stress areas, such as parts of China and sub-Saharan Africa, are often subject to stricter regulatory oversight or community pressure. Companies like CR Snow benefit from China's top-down Green Factory certification, while European brewers face robust disclosure expectations from ESG frameworks. These factors contribute to the strategic diversity observed across firms.

Conclusion

This research concludes that no single strategy alone is sufficient to reduce water usage in large-scale brewing significantly. Instead, the most effective companies adopt a multi-tiered approach that combines operational efficiency, technological innovation, and external water stewardship. Carlsberg emerges as a best-practice leader due to its low water-to-beer ratios, ambitious targets, and implementation of circular water reuse systems. AB InBev excels in community-focused watershed programs and strong alignment with local water regulations. CR Snow and Tsingtao show that regulatory compliance and localised innovation can rival global sustainability standards. Heineken and Molson Coors have made steady progress but could benefit from more ambitious reuse strategies and deeper engagement in water-stressed regions. Lower-performing firms should prioritise site-specific benchmarking, accelerate the adoption of advanced technologies (e.g., AI-driven monitoring), and pursue cross-sector collaboration to improve water-use efficiency. Learning from industry leaders and adapting their successful practices will be essential for continued progress. To support this, the development of a comprehensive benchmarking tool is recommended. Such a tool should standardise performance metrics (e.g., hl/hl or m^3/kL), integrate data from reliable external sources (such

as regional water stress indicators), and allow comparison across company sites. This would enable regulators, companies, and stakeholders to identify top-performing facilities and promote the dissemination of best practices across the industry. A potential contribution of future research would be to pilot such a standardised benchmarking tool. This could integrate both company reports and independently verified data (e.g., GRI, WRI) and apply consistent metrics across firms. Piloting the tool in selected breweries or regions would allow for practical testing, refinement, and wider adoption across the industry (BIER, 2023).

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Abbreviations

The following abbreviations are used in this manuscript:

CIP	Clean-in-Place
GRI	Global Reporting Initiative
hl	Hectolitre
hl/hl	Hectolitre/hectolitre
kL	Kilolitre
LCA	Lifecycle Assessment
L/L	Litre/litre
MBRs	Membrane Bioreactor Systems
m^3	Cubic meter
m^3/kL	Cubic meters per kilolitre
OECD	Organisation for Economic Co-operation and Development
SDG	Sustainable Development Goals
SDG 6	Sustainable Development Goals, Clean Water and Sanitation
WWF	World Wide Fund for Nature

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