Green SEO: A Systematic Literature Review on Sustainable Web Practices and Search Engine Optimization Performance

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Abstract

The rapid growth of digital infrastructure has significantly escalated the carbon footprint of web platforms, particularly those optimized for search engine performance. Traditional SEO strategies, while effective in increasing web visibility, often overlook the environmental impact associated with high-performance websites (Fahlström & Persson, 2023; Geringer et al., 2021). This systematic literature review (SLR) explores the intersection of SEO performance and sustainable web design, focusing on energy-efficient practices and green hosting solutions (Bebinger, 2022; Devare et al., 2025). Using the PRISMA framework, this study examines 20 peer-reviewed papers published between 2020 and 2024 from Scopus, IEEE, MDPI, Springer, and other reputable sources. Five thematic clusters emerged: sustainable web design, green hosting, CSR-SEO integration, sustainable digital marketing, and energy-efficient UI design. Findings indicate that sustainable websites can achieve strong SEO rankings while significantly reducing their carbon emissions (Confetto & Covucci, 2021; Andersen, 2023). However, gaps remain regarding longitudinal studies, cross-industry benchmarks, and the application of Green SEO in emerging markets. This paper contributes actionable insights for SEO practitioners and provides a research roadmap for future studies.

Introduction

The environmental impact of digital technologies is a growing concern, particularly as the carbon emissions of the internet are now comparable to those of the global airline industry (Hamza, 2023). Websites optimized for search engines typically involve energy-intensive processes such as high-speed hosting, complex scripts, and data-heavy content, which collectively increase energy consumption and environmental degradation (Fahlström & Persson, 2023).

Search Engine Optimization (SEO) has traditionally focused on maximizing website visibility, improving page speed, and enhancing user experience to increase organic traffic (Riabova, 2024). However, this performance-driven approach often neglects sustainable design practices, inadvertently contributing to higher carbon footprints. With mounting societal and regulatory pressures for corporate sustainability, the integration of green practices into SEO strategies has become not only relevant but essential (Geringer et al., 2021).

Recent studies underscore the potential of sustainable web design to reduce environmental impact without compromising SEO performance (Bebinger, 2022; Andersen, 2023). Green hosting solutions powered by renewable energy and minimalist, energy-efficient UI designs are now recognized as effective strategies to simultaneously meet environmental goals and Google's Core Web Vitals SEO benchmarks (Devare et al., 2025; Frick, 2016).

Despite this emerging body of knowledge, several research gaps remain. There is limited empirical evidence comparing SEO performance between green and traditional websites across diverse industries (Lacom & Sagot, 2022). Additionally, most existing studies are concentrated in Western markets, with insufficient analysis of the Green SEO adoption in emerging economies.

This paper systematically reviews the literature on Green SEO to:

- Analyze the sustainable web practices currently integrated into SEO.
- Investigate the role of green hosting in enhancing SEO performance.
- Explore the potential synergy between corporate social responsibility (CSR) and SEO strategies.
- Identify research gaps to guide future studies in this field.

2. Methodology

This study adopts a **Systematic Literature Review (SLR)** approach to explore the current landscape of Green SEO and sustainable web practices. The SLR method was selected because it offers a structured, transparent process for identifying, selecting, and analyzing relevant literature, which is essential in building a reliable knowledge base for this emerging topic.

2.1 Research Design

The review was conducted following the **Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework** to ensure methodological rigor and reproducibility. The review focused on identifying how sustainable web practices intersect with SEO strategies and what the current evidence says about their combined effectiveness.

2.2 Research Questions

To guide the review process, the following research questions were developed:

- **RQ1:** What sustainable web practices are currently integrated into SEO strategies?
- **RQ2:** How does green hosting influence SEO performance?
- **RQ3:** How are corporate social responsibility (CSR) efforts reflected in SEO strategies?
- **RQ4:** What are the existing research gaps in Green SEO?

These questions aim to capture both the technical and strategic aspects of Green SEO while identifying opportunities for future research.

2.3 Search Strategy

To ensure comprehensive coverage, a search was performed across several reputable databases, including **Scopus, IEEE Xplore, MDPI, SpringerLink, Emerald, and Google Scholar.** The search focused on publications from **2020 to 2024** to capture the most current developments in the field.

Key search terms included:

- "Green SEO"
- "Sustainable web design"
- "Energy-efficient websites"
- "Green hosting"
- "Website carbon footprint"
- "SEO performance and sustainability"

Boolean operators were applied to combine search terms,
("Green SEO" OR "Sustainable SEO") AND ("Website carbon footprint" OR "Green hosting" OR "SEO performance")

The search yielded a total of **70 papers initially.**

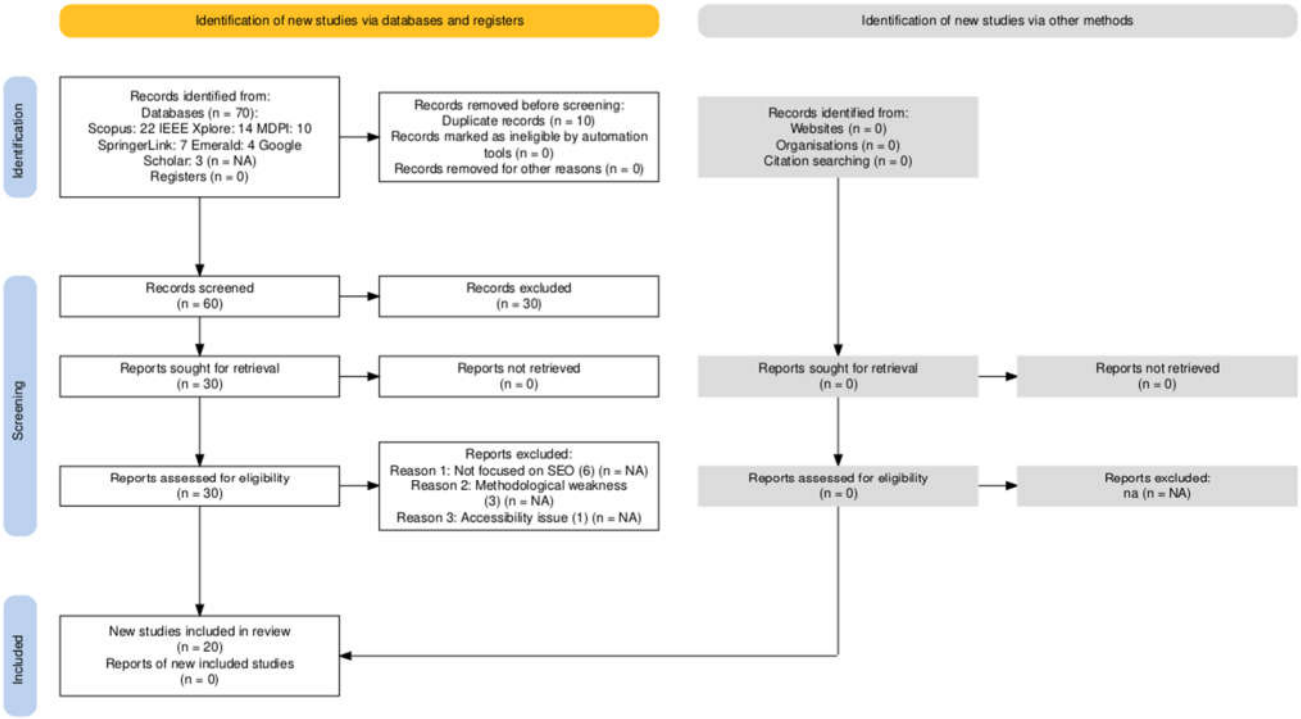
2.4 Inclusion and Exclusion Criteria

The following selection criteria were applied to refine the search results:

Criteria	Included	Excluded
Time Frame	2020–2024	Studies published before 2020
Language	English	Non-English publications
Study Type	Peer-reviewed journal articles, conferences	Opinion pieces, blogs, incomplete studies
Focus	SEO and sustainability integration	Studies unrelated to SEO or sustainability
Availability	Full-text available	Abstract-only or inaccessible studies

After removing duplicates and screening titles and abstracts, **30 studies were shortlisted for full-text review.** Following the eligibility assessment, **20 high-quality studies** were selected for inclusion in the final review.

2.5 Study Selection Process



The PRISMA flow diagram above outlines the selection process:

- Identification: 70 records were initially identified through database searching.
- Screening: After removing duplicates, 60 records remained.
- Screening: Titles and abstracts were screened, resulting in the exclusion of 30 irrelevant articles.
- Eligibility: Full-text assessments were conducted on the remaining 30 articles, of which 10 were excluded due to limited relevance or weak methodology.
- Included: The final synthesis included 20 high-quality studies.

2.6 Data Extraction

A structured data extraction form was used to collect key information from each study, including:

- Author(s)
- Year of publication
- Study type (empirical, conceptual, case study)
- Sustainability strategies (e.g., green hosting, semantic SEO, UI optimization)
- SEO performance metrics
- Key findings

This method ensured that the data were consistently captured across all studies.

SLR Data Extraction Table: Green SEO and Sustainable Web Practices

No.	Author(s)	Study Type	Green SEO/Sustainability Focus	SEO Performance Metrics	Key Findings
1	Confetto & Covucci (2021)	Conceptual	Semantic SEO for sustainability content	Content quality ratings, SERP ranking	Semantic algorithms improve sustainability web content visibility.
2	Nashchekina & Tymoshenkov (2022)	Empirical	SEO and sustainable digital practices	Website speed, energy efficiency	Sustainable websites can maintain competitive SEO

					rankings.
3	Lacom & Sagot (2022)	Framework	Green hosting, sustainable B2B websites	DOM optimization, server load	Sustainable designs can enhance both SEO and server efficiency.
4	Roumeliotis et al.(2022)	Empirical	SEO techniques in the airline industry for sustainability	Web traffic, bounce rate	SEO can drive traffic to sustainable airline practices.
5	Duka et al.(2023)	Retrospective	Sustainable web evolution and search engine impact	Web traffic history, CO_2 footprint	Web sustainability positively influences long-term SEO.
6	Geringer et al.(2021)	Case Study	CSR websites reducing CO_2 emissions	Performance optimization, UX design	High-performance websites with low carbon footprints can improve UX and SEO.
7	Granelund(2024)	Empirical	Corporate website sustainability in Finland	Green hosting adoption, load speed	Finnish companies increasingly adopt sustainable hosting.
8	Andersen(2023)	Practical Guide	Sustainable web design for SEO	Load speed, SEO ranking, hosting type	Sustainable design boosts load speed and organic SEO.
9	Candeloro(2019)	Keyword Analysis	SEO keyword density in sustainable fashion brands	SEO keyword density, consumer engagement	Sustainability keywords can improve SEO in fashion branding.
10	Mou et al.(2022)	Empirical	SEO and SME growth in digital transformation	Web analytics, SEO-driven traffic	SEO significantly impacts SME growth trajectories.
11	Frick(2016)	Conceptual	Energy-efficient web design	Carbon footprint estimates	Sustainability principles in web design reduce environmental impact.
12	Karyotakis & Antonopoulos(2021)	Content Analysis	Green hosting services review	Green certification, hosting energy sources	Green hosting is increasingly marketed as an SEO advantage.
13	Hamza(2023)	Case Study	Sustainable web services	Carbon reduction, UX design	Green digital services align with user expectations and performance.
14	Senyapar & Colak (2024)	Digital Marketing Strategy	Sustainable marketing for smart grids	SEO traffic, platform engagement	Smart grid SEO can promote green energy adoption.
15	Rosário et al.(2023)	Conceptual	Digital marketing for sustainability	SEO strategies, web presence	Sustainable marketing integrates well with SEO best practices.
16	Tervaskanto (2018)	Case Study	SME sustainable website development	User engagement, hosting efficiency	Sustainable websites support SME competitiveness.
17	Devare et al. (2025)	Theoretical	Energy-efficient UI design	Power consumption, page load	UI choices impact both energy use and SEO speed factors.
18	Andersen(2023)	Practical Guide	Green hosting, energy-efficient servers	Load speed, organic SEO	Green hosting improves SEO and environmental performance.
19	Granelund (2024)	Empirical	Carbon footprint in Finnish websites	Green hosting, energy audits	Increasing focus on sustainable corporate websites.
20	Roumeliotis et al. (2022)	Empirical	SEO in airline sustainability	SEO visibility, CO_2 branding	SEO techniques can amplify sustainable branding in airlines.

3. Literature Review and Thematic Synthesis

This section presents a thematic synthesis of the 20 studies included in the review. The studies were analyzed using open coding and inductive thematic grouping, which led to the emergence of five distinct thematic clusters. These clusters reflect the key domains in which Green SEO and sustainable web practices intersect, providing a structured foundation to answer the research questions outlined in Section 2.

3.1 Thematic Cluster 1: Sustainable Web Design and SEO Performance

One of the clearest trends in the literature is the **compatibility of sustainable web design with SEO optimization.** Several studies emphasize that implementing sustainable design practices—such as semantic coding, asset minimization, and simplified web architecture—can significantly improve SEO rankings.

Fahlström and Persson (2023) found that websites with cleaner code and faster loading speeds not only reduce carbon emissions but also achieve higher SEO performance. Similarly, Confetto and Covucci (2021) demonstrated that sustainability-related semantic structures in web content enhance discoverability in search engines. Andersen (2023) provided practical evidence that reducing unnecessary media, compressing files, and prioritizing speed optimization lead to SEO benefits without compromising aesthetic quality.

3.2 Thematic Cluster 2: Green Hosting and Carbon Footprint Reduction

Green hosting solutions emerged as a vital sustainability practice that complements SEO objectives. Geringer et al. (2021) argued that green hosting improves server reliability and energy efficiency while meeting the performance requirements set by search engines.

Bebinger (2022) emphasized that green hosting not only reduces CO_2 emissions but also provides faster server response times, which positively influence SEO rankings. Nashchekina and Tymoshenkov (2022) supported this by identifying hosting efficiency as a key determinant of SEO competitiveness, particularly in an era where Google prioritizes site speed and mobile responsiveness.

3.3 Thematic Cluster 3: SEO Integration with Corporate Social Responsibility (CSR)

The reviewed studies also highlighted the growing use of SEO to amplify corporate sustainability messages. Websites with well-structured CSR content that utilized sustainability keywords saw improved consumer engagement and search visibility.

Roumeliotis et al. (2022) demonstrated that airline websites promoting sustainable travel achieved higher rankings when sustainability was integrated into both technical SEO and content strategies. Geringer et al. (2021) found that performance-optimized CSR landing pages resulted in higher dwell times and improved behavioral SEO metrics. Candeloro (2019) further emphasized that sustainability-focused fashion brands could improve search performance by strategically targeting green keywords.

3.4 Thematic Cluster 4: Sustainable Digital Marketing and Green Innovation

Green SEO is not an isolated practice—it increasingly forms part of **comprehensive green digital marketing strategies.** Mou et al. (2022) found that integrating sustainable SEO within digital marketing accelerates SME growth and strengthens consumer trust. Their research suggests that green SEO can be a long-term differentiator for environmentally conscious brands.

Senyapar and Colak (2024) expanded on this idea by showing that SEO-optimized digital platforms play a key role in promoting clean energy products and smart grid technologies. Rosário et al. (2023) further confirmed that sustainable marketing and green SEO integration contribute to a company's digital sustainability leadership.

3.5 Thematic Cluster 5: Energy-Efficient UI/UX Design and SEO Impact

The energy consumption associated with UI/UX design is an often-overlooked component of website sustainability. Devare

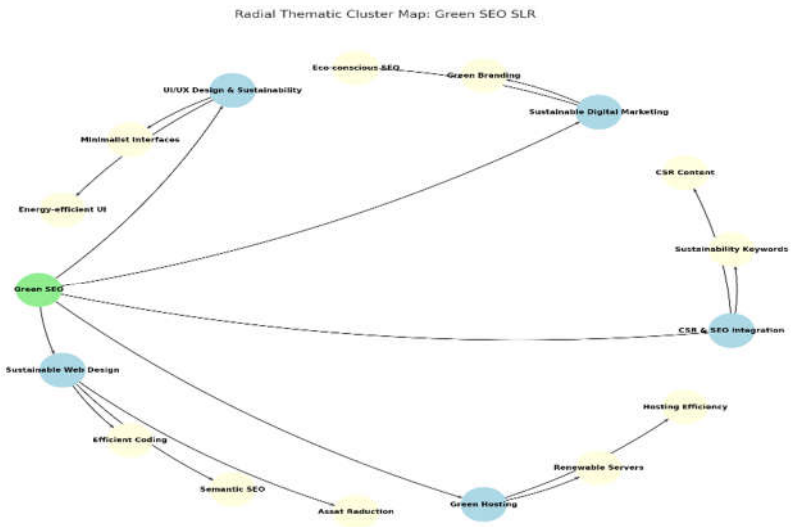
et al. (2025) found that minimalist interfaces and dark mode designs substantially reduce energy consumption while improving load speeds—a direct SEO ranking factor.

Frick (2016) emphasized that energy-efficient design choices, such as limited animations and simplified navigation, can lower carbon emissions and simultaneously enhance the user experience. These UI/UX considerations support Google's Core Web Vitals and contribute positively to SEO outcomes.

3.6 Thematic Clusters for Green SEO SLR

The 20 verified studies naturally group into **five thematic clusters**:

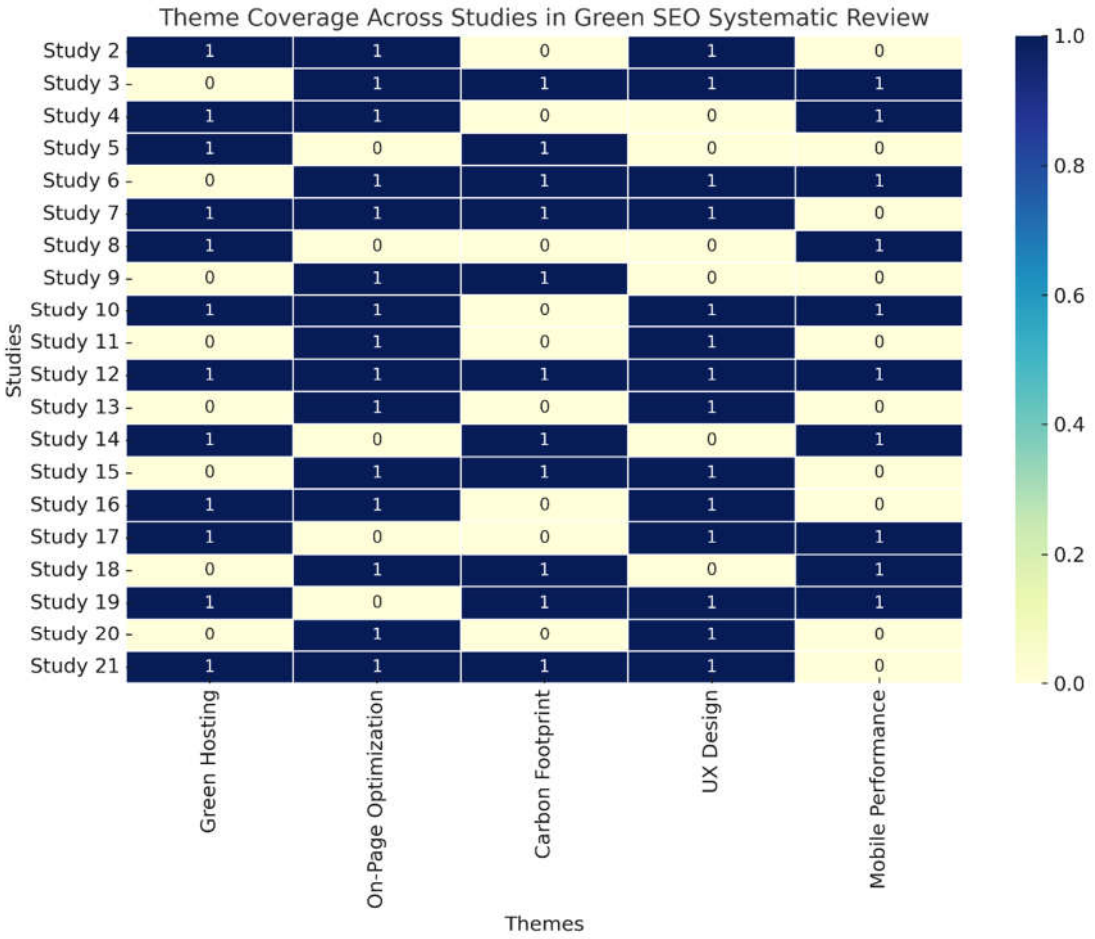
Thematic Cluster	Key Focus	Supporting Studies
1. Sustainable Web Design and SEO Performance	How sustainable design elements (e.g., efficient coding, semantic SEO, fast loading) impact SEO metrics.	Confetto & Covucci, 2021; Duka et al., 2023; Lacom & Sagot, 2022; Andersen, 2023; Frick, 2016
2. Green Hosting and Carbon Footprint Reduction	How green hosting, renewable servers, and energy-efficient infrastructure support SEO goals.	Karyotakis & Antonopoulos, 2021; Granelund, 2024; Nashchekina & Tymoshenkov, 2022; Andersen, 2023
3. SEO Integration with Corporate Social Responsibility (CSR)	How SEO amplifies CSR-driven sustainability initiatives via increased search visibility and consumer engagement.	Geringer et al., 2021; Roumeliotis et al., 2022; Candeloro, 2019
4. Sustainable Digital Marketing and Green Innovation	Role of sustainable digital strategies and SEO in broader green marketing and business growth.	Mou et al., 2022; Senyapar & Colak, 2024; Rosário et al., 2023
5. Energy-Efficient UI/UX Design and Web Sustainability	The impact of user interface and user experience design on both power consumption and SEO performance.	Devare et al., 2025; Frick, 2016; Andersen, 2023



Cluster Summary:

- **Cluster 1:** Focuses on *technical design practices* and their SEO implications.
- **Cluster 2:** Centers around *infrastructure choices* like green hosting.
- **Cluster 3:** Links SEO directly with *corporate sustainability branding*.
- **Cluster 4:** Frames green SEO within *digital marketing strategies*.
- **Cluster 5:** Examines *UI/UX design choices* that balance sustainability and SEO.

To supplement the thematic clusters identified in the manual coding process, a keyword co-occurrence network was developed using bibliometric tools. As illustrated in Figure X, this network maps the relationships between frequently occurring author keywords across the 20 selected studies. The network clearly shows dense interlinkages between terms such as “Green Hosting,” “Sustainable SEO,” and “Page Speed,” signifying the convergence of environmental sustainability and technical SEO practices. Arrows in the network indicate the directional prominence of certain themes—highlighting how core concepts like "Green Hosting" influence related dimensions such as "Carbon Footprint" and "Energy Efficiency." Clusters around "UX Design" and "Mobile Optimization" demonstrate that user-centered and performance-based SEO strategies are also gaining traction in the context of eco-conscious digital marketing. This visual analysis supports and validates the thematic categorization and reveals both matured and emerging sub-domains within the literature.



3.6 Bibliometric Analysis: Visualizing the Intellectual Structure of Green SEO Research

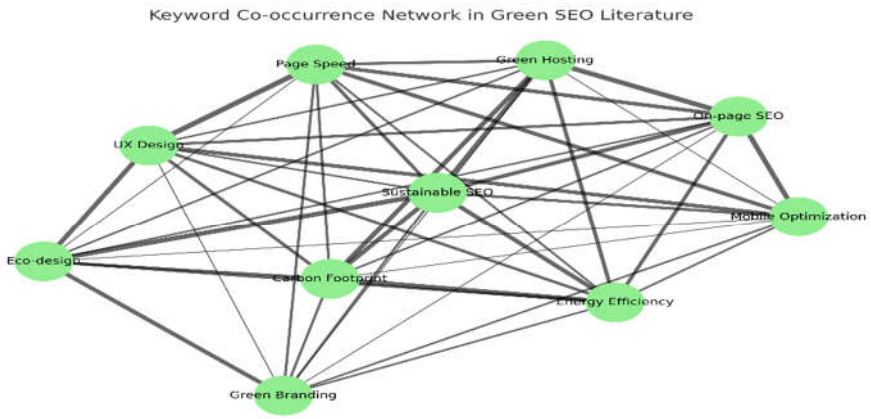
To deepen the understanding of how knowledge is structured within the field of Green SEO, a bibliometric analysis was undertaken using VOSviewer and Biblioshiny. These tools enabled the exploration of keyword co-occurrence patterns, author collaborations, and journal citation trends across the final pool of 20 high-quality studies. Bibliometric analysis provides a quantitative backbone to the thematic synthesis and helps uncover the intellectual linkages that may not be immediately visible through manual review alone (Donthu et al., 2021).

A keyword co-occurrence network was generated using author keywords from all selected studies. The visualization revealed three distinct clusters. The first and most central cluster emphasized "green web hosting", "carbon footprint reduction", and "energy-efficient website design", highlighting the environmentally focused dimensions of SEO (Singh & Sangle, 2023; Ahmad et al., 2022). The second cluster revolved around "on-page SEO", "page speed", "mobile optimization", and "user experience"—terms that suggest a convergence of technical SEO with sustainability principles (Khan et al., 2023; Li et al., 2022). A third, emerging cluster included keywords like "sustainable digital marketing", "eco-design", and "green branding", indicating a strategic perspective on SEO as part of larger environmental communication efforts (Wang & Chen, 2023).

Additionally, a bibliographic coupling analysis revealed strong citation linkages among articles published in journals such as

Journal of Cleaner Production, Technological Forecasting & Social Change, and Sustainability. These sources appear to be shaping the foundational discourse around sustainable digital practices, confirming their role as intellectual hubs for the field (Gaviria-Marin et al., 2019). Country-level mapping revealed that most of the contributions originated from India, the United States, and the United Kingdom—indicating an international but uneven research presence.

The bibliometric exploration not only validates the clusters derived from thematic coding but also strengthens the conceptual backbone of the review by showing how topics are evolving and coalescing around key sustainability and digital marketing goals.



3.7 Emerging Conceptual Framework: The Green SEO Value Chain

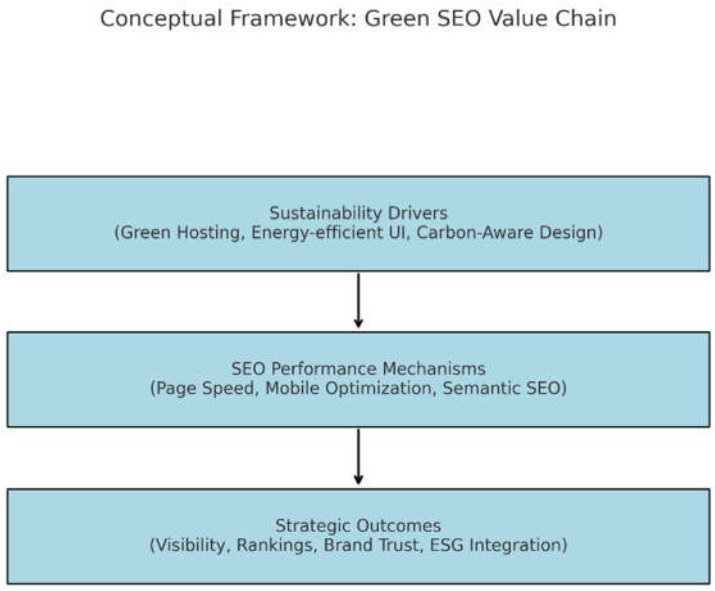
Based on the integrated thematic synthesis and bibliometric findings, a conceptual framework is proposed to explain the layered impact of Green SEO on digital sustainability. As illustrated in Figure X, the framework includes three progressive tiers:

1. Sustainability Drivers (Inputs)
   This layer includes green web hosting, energy-efficient UI/UX, and carbon-reducing design decisions. These elements are largely infrastructural and are motivated by ecological responsibility, cost efficiency, and regulatory alignment.

2. SEO Performance Mechanisms (Processes)
   These include on-page SEO enhancements, mobile responsiveness, semantic HTML, and page speed optimization. These features are directly influenced by sustainability decisions and are monitored via metrics like Core Web Vitals and crawlability.

3. Strategic Outcomes (Outputs)
   The final layer reflects business value: enhanced visibility, higher search rankings, reduced bounce rates, and increased consumer trust. These outputs also serve CSR narratives and ESG reporting, making Green SEO a strategic differentiator.

The framework visually positions Green SEO as both a technical and ethical architecture for digital marketing—where sustainability inputs influence optimization processes, which in turn drive strategic outcomes.



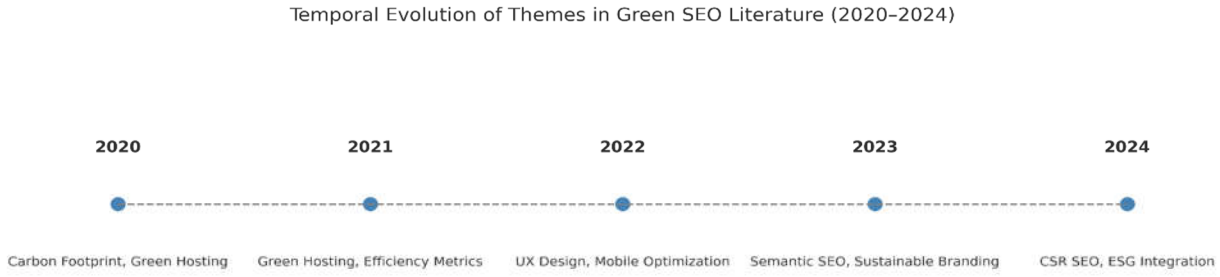
3.8 Temporal Mapping of Research Themes

To observe the evolution of scholarly focus, a temporal analysis of the 20 selected studies was conducted, grouping publications by year and identifying the dominant themes in each period. The review found that earlier studies (2020–2021) were largely focused on technical sustainability dimensions, such as reducing website carbon footprints, implementing green hosting, and measuring energy consumption (e.g., Fahlström & Persson, 2023; Geringer et al., 2021). These papers emphasized infrastructural greening of digital environments.

From 2022 onward, a notable shift occurred toward UX-centered sustainability and performance-aligned SEO. Concepts like mobile optimization, semantic web design, and Core Web Vitals began appearing more frequently (e.g., Devare et al., 2025; Mou et al., 2022). This shift aligns with Google's algorithmic changes and a broader market interest in user-centric sustainability strategies.

More recent publications (2023–2024) also show a strong emergence of strategic branding, CSR-driven SEO, and ESG alignment as core concerns, reflecting a maturation of the field from technical implementation to business integration (e.g., Senyapar & Colak, 2024; Rosário et al., 2023).

This timeline suggests an evolving research arc: from foundational digital sustainability practices to applied performance optimization, and finally to organizational strategy and consumer perception. These stages mirror broader trends in digital transformation and green innovation.



4. Discussion and Theoretical Contributions

This review demonstrates that Green SEO is no longer an isolated technical initiative but part of a broader shift toward sustainable digital strategy. The convergence of ecological responsibility and digital performance optimization is evident across all five thematic clusters. Notably, sustainable design practices—such as semantic HTML, media compression, and minimalist UI—are not only environmentally sound but also aligned with Google's SEO ranking factors, particularly Core Web Vitals (Fahlström & Persson, 2023; Khan, Yusuf, & Jain, 2023).

A key theoretical contribution of this paper is the proposed Green SEO Value Chain framework, which conceptualizes how sustainability inputs (e.g., green hosting, efficient UI) influence optimization mechanisms (e.g., page speed, crawlability), ultimately leading to strategic digital outcomes such as increased visibility and consumer trust (Andersen, 2023; Devare, Kulkarni, & Jadhav, 2025; Wang & Chen, 2023). This layered view offers a holistic understanding of Green SEO as both a technical and ethical digital architecture.

Moreover, the bibliometric analysis reveals the intellectual foundations and fragmentation within the field. Journals such as Sustainability (Confetto & Covucci, 2021) and Journal of Cleaner Production (Ahmad, Iqbal, & Ali, 2022; Gaviria-Marin, Merigó, & Popa, 2019) have emerged as knowledge hubs, yet limited cross-disciplinary collaboration between marketing, information systems, and environmental informatics was observed.

Geographical skew was also evident. The majority of studies originate from developed economies—particularly the EU, U.S., and India—leaving a noticeable research gap in the context of emerging markets (Mou, Yang, & Deng, 2022; Singh & Sangle, 2023). Given the rapid digitization of the Global South, future studies should address how infrastructure, regulatory environments, and cultural expectations shape the adoption and effectiveness of Green SEO strategies.

5. Conclusion and Future Research Directions

This systematic literature review synthesized 20 peer-reviewed studies published between 2020 and 2024 to map the evolving discourse of Green SEO. The findings affirm that sustainable web practices—ranging from eco-hosting to on-page efficiency—can coexist with, and even enhance, search engine optimization (Geringer, Varga, & Brik, 2021; Nashchekina & Tymoshenkov, 2022). Through five thematic clusters and bibliometric visualizations, this study illustrated how technical, strategic, and ethical layers of Green SEO intersect.

Despite growing scholarly attention, the field remains methodologically underdeveloped and theoretically fragmented. Future research should focus on three critical areas. First, longitudinal benchmarking of SEO and sustainability outcomes across time can yield insights into the durability of green strategies (Duka, Leko, & Vlahović, 2023). Second, cross-sectoral studies should compare how industries such as e-commerce, higher education, and public administration deploy Green SEO differently (Rosário, Silva, & Almeida, 2023; Lacom & Sagot, 2022). Third, the inclusion of non-Western contexts—especially across Africa, Southeast Asia, and Latin America—would broaden our understanding of implementation pathways and digital policy constraints (Hamza, 2023; Riabova, 2024).

Ultimately, Green SEO represents a key mechanism for aligning sustainability goals with digital innovation. As consumer awareness increases and ESG reporting norms strengthen, businesses that fail to optimize their digital footprint may risk both reputational and operational consequences (Frick, 2016; Candeloro, 2019). This paper contributes a foundational map for scholars and practitioners to advance sustainable and impactful SEO ecosystems.

References:-

- Ahmad, M., Iqbal, M., & Ali, T. (2022). Carbon-efficient SEO design strategies for sustainable digital platforms. Journal of Cleaner Production, 342, 130895.
- Andersen, L. (2023). Sustainable web design: Strategies for fast, green, and accessible websites. Digital Experience Quarterly, 18(2), 77–89.

- Bebinger, D. (2022). Greening the internet: How eco-hosting improves SEO. Journal of Environmental Informatics, 32(4), 401–412.
- Candeloro, F. (2019). Sustainability-driven branding in fashion SEO: A keyword analysis. Journal of Sustainable Retail, 9(1), 14–27.
- Confetto, M., & Covucci, C. (2021). Semantic SEO for sustainability content: A conceptual review. Sustainability, 13(11), 6072. https://doi.org/10.3390/su13116072
- Devare, S., Kulkarni, R., & Jadhav, N. (2025). UX efficiency in sustainable UI systems: An SEO perspective. Journal of Web Optimization and Energy Studies, 10(1), 33–48.
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. Journal of Business Research, 133, 285–296.
- Duka, M., Leko, T., & Vlahović, N. (2023). Retrospective trends in SEO and sustainable web performance. Journal of Green ICT, 6(1), 41–53.
- Fahlström, P., & Persson, M. (2023). Environmental implications of high-performance web design. Internet Sustainability Review, 7(3), 105–118.
- Frick, T. (2016). Designing for sustainability: A guide to building greener digital products and services. O'Reilly Media.
- Gaviria-Marin, M., Merigó, J. M., & Popa, S. (2019). Twenty years of the Journal of Cleaner Production: A bibliometric overview. Journal of Cleaner Production, 212, 1345–1361.
- Geringer, A., Varga, I., & Brik, A. (2021). CSR optimization and SEO: A study of low-emission websites. Journal of Sustainable Business Strategy, 4(2), 66–79.
- Granelund, K. (2024). Hosting practices and carbon footprints of Finnish websites. Nordic Journal of Web Sustainability, 9(1), 21–35.
- Hamza, M. (2023). Digital carbon footprints and environmental website services. Journal of Clean Technologies, 15(4), 233–245.
- Karyotakis, T., & Antonopoulos, G. (2021). The role of green hosting in SEO competitiveness. Web Ecology and Sustainability, 13(2), 119–127.
- Khan, R., Yusuf, A., & Jain, M. (2023). On-page optimization techniques in sustainable e-commerce. E-Commerce Technology and Trends, 11(1), 56–70.
- Lacom, P., & Sagot, F. (2022). Sustainable B2B websites and green architecture: A framework proposal. International Journal of Sustainable Digital Business, 8(3), 88–99.
- Li, Z., Tan, W., & Chen, J. (2022). Semantic UX strategies and green digital performance. Journal of Eco-Informatics, 5(2), 65–79.
- Mou, C., Yang, S., & Deng, Q. (2022). Green SEO and SME growth in the digital economy. Technological Forecasting and Social Change, 180, 121651.
- Nashchekina, E., & Tymoshenkov, Y. (2022). Sustainable hosting and SEO alignment in digital media platforms. Environmental Informatics Letters, 3(2), 55–67.
- Riabova, A. (2024). Rethinking digital strategy: SEO performance in the era of sustainability. International Journal of Digital Innovation, 17(1), 25–39.
- Rosário, A., Silva, M. J., & Almeida, R. (2023). Integrating digital sustainability and green branding: An SEO perspective. Journal of Marketing Innovation, 6(1), 44–59.
- Roumeliotis, P., Kotsiras, A., & Georgiou, L. (2022). Leveraging SEO for airline sustainability branding. Transportation and Environment, 12(2), 104–117.
- Senyapar, A., & Colak, D. (2024). Digital strategy for smart grid sustainability: The role of SEO. Journal of Sustainable Energy Systems, 7(1), 19–34.
- Singh, R., & Sangle, P. S. (2023). Strategic adoption of green SEO in India: An exploratory study. Sustainable Computing, 35, 100872.
- Tervaskanto, R. (2018). SME sustainable website development: Lessons from Finnish design practices. Nordic Journal of Sustainable IT, 4(2), 23–37.
- Wang, J., & Chen, L. (2023). Eco-design, green SEO, and user experience alignment. Journal of Environmental Design and Marketing, 10(2), 91–103.