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Sustainable Cloud Architectures As Strategic Enterprise Infrastructure: An ESG-Driven Reinterpretation Of Digital Hosting Paradigms

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Abstract: The rapid migration of enterprise information systems from locally managed, on-premise hosting environments to distributed cloud infrastructures represents one of the most profound transformations in the history of organizational computing. This transition is not merely technical but deeply institutional, environmental, and strategic in nature, reshaping how organizations conceptualize risk, capital investment, innovation, and sustainability. The convergence of cloud computing with Environmental, Social, and Governance frameworks has further complicated this transformation, creating new imperatives for digital infrastructure decision-making that go far beyond cost efficiency and computational scalability. The present study advances a comprehensive, theoretically grounded reinterpretation of enterprise cloud adoption through an ESG-centered lens, arguing that sustainability, ethical governance, and long-term social responsibility have become central drivers of infrastructure selection alongside traditional business metrics.

Drawing on a wide body of cloud computing literature, including foundational technical definitions, business adoption models, and emerging paradigms such as serverless computing and scientific cloud architectures, this article situates contemporary cloud infrastructures within a broader socio-technical system. Particular attention is devoted to the strategic ESG framing articulated by Goel and Bhatiya, who demonstrate that cloud platforms offer measurable environmental efficiencies, governance transparency, and social resilience advantages over traditional hosting models. Their argument is not treated as an isolated sustainability claim but as part of a structural realignment of enterprise technology governance in which carbon accountability, regulatory compliance, and ethical data stewardship are inseparable from operational performance.

The research employs an interpretive, literature-driven methodology that synthesizes economic, technological, and governance perspectives. Rather than relying on numerical modeling, it reconstructs the logic of cloud sustainability through comparative institutional analysis, tracing how traditional data centers and modern hyperscale cloud facilities differ in energy sourcing, resource pooling, security governance, and life-cycle emissions. This approach allows the study to reveal how cloud infrastructures increasingly function as shared public-private utilities rather than isolated corporate assets, thereby enabling higher levels of efficiency, accountability, and innovation.

The findings demonstrate that cloud computing is no longer simply an outsourcing mechanism but a strategic sustainability platform that allows firms to externalize energy-intensive operations into professionally managed ecosystems optimized for environmental performance and regulatory compliance. The analysis further shows that serverless architectures, workflow-oriented scientific clouds, and semantic cloud layers amplify these ESG benefits by reducing idle resource consumption and improving data governance. However, the study also critically engages with counter-arguments regarding data sovereignty, vendor lock-in, and opaque governance, demonstrating that while cloud adoption does not eliminate risk, it fundamentally redistributes and professionalizes it.

By integrating ESG theory with cloud computing scholarship, this article contributes a novel conceptual framework for understanding digital infrastructure as a sustainability instrument rather than merely a cost center. The study concludes that organizations that continue to rely on traditional hosting models face not only economic disadvantages but also increasing ethical, regulatory, and environmental liabilities in an era where digital

operations are inseparable from global sustainability goals.

Keywords

Cloud computing, ESG governance, sustainable IT infrastructure, enterprise systems, digital sustainability, green data centers

INTRODUCTION: The evolution of enterprise computing from localized, hardware-intensive data centers to globally distributed cloud platforms marks one of the most consequential shifts in the political economy of digital technology. Historically, organizations treated computing infrastructure as a physical asset similar to buildings, machinery, or transportation fleets, investing capital in servers, networking equipment, cooling systems, and power redundancy in order to secure operational continuity and data control. This paradigm emerged in an era when digital systems were comparatively limited in scale and complexity, making local ownership appear both rational and strategically necessary. However, as business operations became increasingly data-driven, interconnected, and environmentally consequential, the limitations of traditional hosting became structurally visible in ways that transcend technical inefficiency and extend into the domains of sustainability, governance, and social responsibility, a transformation extensively discussed in contemporary cloud literature (Marston et al., 2011; Plummer et al., 2008).

Cloud computing, initially framed as a technological innovation that allowed computing resources to be provisioned on demand, has matured into a complex institutional infrastructure that reshapes how organizations relate to energy systems, regulatory environments, and ethical accountability (Mell and Grance, 2011; Vogels, 2008). Early discussions of the cloud emphasized scalability, virtualization, and cost flexibility, presenting it as a superior alternative to static, underutilized servers located in corporate data rooms (Haynie, 2009; Sun Microsystems, 2009). Over time, however, scholars began to recognize that cloud platforms also centralize expertise, security governance, and environmental management, enabling levels of operational optimization that are nearly impossible for individual firms to replicate on their own (Wang et al., 2008; Zhao et al., 2008).

The emergence of Environmental, Social, and Governance frameworks in corporate reporting and investment evaluation has radically expanded the criteria by which technology infrastructures are assessed. ESG no longer represents a peripheral concern but a core dimension of organizational legitimacy, access to capital, and long-term survival. Within this context, the choice between cloud computing and traditional hosting is no longer merely a question of performance or cost but a decision that materially affects carbon footprints, regulatory compliance, data ethics, and social trust (Hassan et al., 2022). The work of Goel and Bhatiya explicitly positions cloud computing as a strategic ESG instrument, arguing that hyperscale cloud environments achieve superior environmental efficiency, governance transparency, and social resilience compared to fragmented on-premise data centers, thereby redefining the infrastructure calculus of modern enterprises (Goel and Bhatiya, 2025).

From a theoretical perspective, this shift reflects a broader transformation in how organizations conceptualize infrastructure. Traditional hosting embeds computing within the physical boundaries of the firm, making energy consumption, hardware disposal, and security governance largely invisible in strategic decision-making, even though these processes generate significant environmental and social externalities (Marston et al., 2011). Cloud computing, by contrast, externalizes infrastructure into a professionally managed ecosystem that is subject to public scrutiny, regulatory oversight, and competitive sustainability pressures, thereby aligning digital operations with global ESG expectations (Plummer et al., 2008; Goel and Bhatiya, 2025). This does not eliminate risk or responsibility but redistributes it in ways that fundamentally alter the governance of technology.

The literature on cloud adoption has traditionally focused on organizational readiness, perceived usefulness, and risk, framing cloud migration as a managerial decision driven by technical and economic variables (Hassan et al., 2022; Haynie, 2009). While these factors remain relevant, they are increasingly insufficient for explaining why governments, financial institutions, and multinational corporations now prioritize cloud-based architectures even when traditional hosting might appear cheaper in the short term. The missing dimension is sustainability and institutional legitimacy, which has become a decisive force in infrastructure selection, as organizations face growing pressure from investors, regulators, and the public to demonstrate responsible digital practices (Goel and Bhatiya, 2025; Marston et al., 2011).

A critical gap in the existing literature lies in the insufficient integration of ESG theory with cloud computing scholarship. Technical studies explore virtualization, serverless computing, and scientific workflows, while business research examines adoption drivers and cost structures, yet relatively few works systematically analyze how these technological architectures produce measurable environmental and governance outcomes at the institutional level (Baldini et al., 2017; Wang et al., 2008). Goel and Bhatiya's contribution is therefore significant because it explicitly links cloud infrastructure to ESG metrics, arguing that the shift to cloud computing represents not just an efficiency upgrade but a strategic realignment with sustainability-oriented capitalism (Goel and Bhatiya, 2025).

Furthermore, traditional hosting models were designed in an era when environmental externalities were rarely priced into corporate decision-making. Data centers consumed electricity drawn largely from fossil-fuel-based grids, generated electronic waste through rapid hardware obsolescence, and required extensive cooling systems that contributed to water and energy depletion, yet these costs remained external to corporate accounting (Sun Microsystems, 2009; Vogels, 2008). Cloud providers, in contrast, operate at a scale that makes investments in renewable energy, advanced cooling, and resource optimization economically viable, enabling them to achieve dramatically lower per-unit environmental impacts, a dynamic central to the ESG argument advanced by Goel and Bhatiya (2025).

The social dimension of ESG further complicates the infrastructure debate. Cloud platforms facilitate remote work, global collaboration, and digital inclusion by making sophisticated computing resources accessible to organizations and individuals that lack the capital to build their own data centers (Wang et al., 2008; Anand et al., 2010). At the same time, they raise concerns about labor practices, data privacy, and algorithmic governance, which must be addressed through robust institutional frameworks rather than isolated corporate policies (Bamiah et al., 2012; Hassan et al., 2022). Traditional hosting offers a false sense of control in this regard, as smaller firms often lack the resources to implement comprehensive security and compliance systems, exposing users and stakeholders to hidden risks.

Governance, the third pillar of ESG, is perhaps where the contrast between cloud and traditional hosting is most pronounced. Hyperscale cloud providers operate under intense regulatory and market scrutiny, investing heavily in compliance, auditing, and security certification, while many on-premise data centers remain opaque and poorly standardized (Mell and Grance, 2011; Bamiah et al., 2012). This does not imply that cloud providers are inherently more ethical, but it does mean that governance failures are more visible, contestable, and subject to institutional correction, a key advantage highlighted in the ESG-oriented analysis of cloud infrastructure (Goel and Bhatiya, 2025).

In light of these transformations, the central problem addressed by this study is the inadequacy of traditional cost-performance frameworks for evaluating digital infrastructure in an ESG-driven economy. Organizations that continue to rely on locally hosted servers may achieve short-term savings or perceived control, but they also assume disproportionate environmental, social, and governance liabilities that are increasingly incompatible with regulatory expectations and stakeholder demands (Marston et al., 2011; Hassan et al., 2022). Cloud computing, when properly governed, offers a pathway to align digital operations with sustainability objectives while preserving flexibility and innovation.

The purpose of this article is therefore to provide a deeply elaborated, theoretically grounded analysis of cloud computing as an ESG-aligned infrastructure paradigm, synthesizing insights from technical, business, and sustainability literature. By critically engaging with both supportive and skeptical perspectives, the study aims to demonstrate that the choice between cloud and traditional hosting is no longer merely a technological decision but a strategic commitment that shapes an organization's environmental footprint, social legitimacy, and governance integrity in the digital age (Goel and Bhatiya, 2025; Plummer et al., 2008).

METHODOLOGY

This study adopts a comprehensive interpretive research design, integrating theoretical, historical, and analytical approaches to examine cloud computing as a strategic ESG-aligned infrastructure paradigm. Unlike empirical research that relies primarily on quantitative metrics or experimental manipulations, the methodology here emphasizes detailed, text-based analysis, allowing for a nuanced understanding of the interplay between technological innovation, environmental sustainability, and organizational governance. The methodological rationale is grounded in the recognition that cloud computing functions as a socio-technical system: its impacts cannot be fully captured by isolated technical or economic measures alone but require a holistic evaluation of institutional, environmental, and strategic dimensions (Marston et al., 2011; Zhao et al., 2008).

Research Design and Rationale

The design of this study is a synthesis-oriented, literature-driven framework intended to achieve three primary objectives. First, it seeks to integrate ESG considerations into the evaluation of cloud and traditional hosting models, assessing how energy efficiency, governance transparency, and social resilience are operationalized within contemporary infrastructure choices (Goel and Bhatiya, 2025; Bamiah et al., 2012). Second, it examines technological configurations—including virtualization, serverless computing, and semantic cloud layers—through the lens of organizational sustainability, focusing on how resource utilization, idle reduction, and lifecycle management contribute to measurable ESG outcomes (Baldini et al., 2017; Anand et al., 2010). Third, it critically evaluates counter-arguments regarding risks such as vendor lock-in, data sovereignty, and compliance opacity, situating these challenges within the broader context of strategic decision-making (Hassan et al., 2022; Plummer et al., 2008).

The rationale for employing an interpretive approach rests on three considerations. Firstly, ESG impacts are multi-dimensional and often context-dependent; environmental efficiencies, social outcomes, and governance processes are influenced by local regulations, corporate culture, and market expectations. Quantitative modeling alone may obscure these subtleties. Secondly, cloud infrastructure adoption is a long-term strategic process influenced by historical investment patterns, technological evolution, and regulatory pressures. Interpretive analysis allows for the tracing of these longitudinal dynamics and the construction of a conceptual framework that situates ESG impacts within organizational trajectories (Mell and Grance, 2011; Wang et al., 2008). Thirdly, the literature on cloud computing is highly interdisciplinary, spanning computer science, information systems, business management, and sustainability studies. Synthesizing these perspectives is essential for producing a coherent, publication-ready argument that addresses both technical and strategic dimensions.

Data Collection and Source Selection

The study's evidence base is derived entirely from secondary sources, including peer-reviewed journals, technical reports, white papers, and authoritative conceptual analyses. The selection of sources follows a purposive strategy, prioritizing works that provide detailed accounts of cloud architecture, adoption models, ESG integration, and organizational impact. Priority is given to contemporary sources reflecting the latest developments in cloud sustainability, such as the work of Goel and Bhatiya (2025), which provides empirical and theoretical grounding for the ESG perspective. Complementary sources include foundational definitions and frameworks for cloud computing (Mell and Grance, 2011; Plummer et al., 2008), early technical and scientific cloud studies (Wang et al., 2008; Zhao et al., 2008), and analyses of business adoption and risk management (Haynie, 2009; Hassan et al., 2022).

The literature corpus also incorporates specialized analyses of serverless computing, semantic cloud layers, and workflow-optimized scientific clouds (Baldini et al., 2017; Anand et al., 2010), enabling the study to engage with emerging technological paradigms that amplify ESG outcomes. By including both historical and contemporary sources, the methodology situates cloud adoption within a temporal continuum, highlighting how organizational understanding of sustainability, governance, and social responsibility has evolved alongside technological innovation.

Analytical Procedure

The analytical procedure is structured in four stages, each designed to maximize the depth of insight while maintaining rigorous scholarly coherence.

1. Conceptual Mapping: The first stage involves mapping key concepts across the literature, including definitions of cloud computing, ESG criteria, and traditional hosting architectures. This stage establishes a taxonomy of infrastructure characteristics, identifying both functional attributes (e.g., virtualization, elastic scalability, serverless deployment) and strategic implications (e.g., carbon intensity, regulatory transparency, social accessibility) (Marston et al., 2011; Goel and Bhatiya, 2025).

2. Comparative Analysis: Next, cloud and traditional hosting models are compared along multiple dimensions, including environmental performance, governance mechanisms, and social implications. This comparison employs a qualitative, evidence-based approach that synthesizes technical descriptions with ESG impact assessments. Key variables include energy sourcing, resource utilization, lifecycle emissions, compliance processes, and stakeholder accessibility (Bamiah et al., 2012; Mell and Grance, 2011).

3. Critical Synthesis: The third stage involves a critical synthesis of literature, emphasizing areas of consensus, contestation, and emerging debate. Here, counter-arguments regarding data sovereignty, vendor dependence, and operational risk are systematically examined, highlighting both the limitations and strategic advantages of cloud adoption (Hassan et al., 2022;

Plummer et al., 2008). The synthesis integrates technical, economic, and governance perspectives to construct a holistic understanding of cloud infrastructure as an ESG-aligned system.

4. Interpretive Modeling: Finally, the study constructs an interpretive model of ESG-aligned cloud adoption, articulating causal and correlative relationships between infrastructure choices, operational performance, and sustainability outcomes. This model is descriptive rather than predictive, designed to guide strategic decision-making rather than generate statistical forecasts. It demonstrates how cloud computing enables resource efficiency, governance transparency, and social resilience, while also identifying potential risks and limitations (Goel and Bhatiya, 2025; Baldini et al., 2017).

Limitations of Methodology

While the interpretive methodology allows for rich, context-sensitive analysis, it carries inherent limitations. The reliance on secondary sources precludes the generation of new empirical data, limiting the ability to provide precise numerical estimates of carbon reduction or cost savings. Additionally, the qualitative framework depends on the accuracy, reliability, and representativeness of existing literature; biases in source selection or reporting may influence conclusions. The scope of ESG integration is also constrained by the variability in measurement standards across organizations and industries, which may hinder the generalizability of findings. Nevertheless, the methodology's strength lies in its capacity to integrate technical, strategic, and ethical dimensions of cloud computing into a coherent, theoretically robust argument, offering insights that remain inaccessible to purely quantitative or technical analyses.

RESULTS

The analytical synthesis reveals several key findings regarding the ESG-aligned performance of cloud infrastructures relative to traditional hosting. First, from an environmental standpoint, cloud platforms significantly reduce per-unit energy consumption through economies of scale, advanced cooling technologies, and renewable energy sourcing. Goel and Bhatiya (2025) demonstrate that hyperscale cloud facilities achieve carbon efficiencies that are often unattainable in decentralized, firm-specific data centers, largely due to underutilization, energy-intensive redundancy, and hardware lifecycle inefficiencies. These reductions are not merely incremental but represent structural advantages, suggesting that organizations that maintain legacy hosting infrastructures may be operating at a systemic disadvantage in terms of environmental accountability.

Second, social implications are evident in the broader accessibility and operational flexibility afforded by cloud platforms. By providing elastic, on-demand computing resources, cloud services democratize access to high-performance computational capacity, enabling smaller firms and emerging markets to participate in data-driven innovation without incurring prohibitive capital expenditures (Wang et al., 2008; Anand et al., 2010). Additionally, the cloud facilitates distributed work, digital inclusion, and collaborative research, all of which contribute to social resilience, particularly in contexts where physical infrastructure investment is constrained. In contrast, traditional hosting models tend to concentrate technological benefits within individual organizations, limiting broader social impact.

Third, governance advantages are structurally embedded in cloud platforms. Professional management, compliance auditing, and centralized security protocols create transparent accountability structures that are difficult for individual firms to replicate (Bamiah et al., 2012; Mell and Grance, 2011). Goel and Bhatiya (2025) emphasize that cloud providers' adherence to ESG principles is both an operational and strategic feature, as market and regulatory pressures incentivize the professionalization of governance processes. While cloud adoption introduces new forms of dependence on vendors, it simultaneously redistributes risk, transforming what was previously invisible or unmanaged into measurable and accountable outcomes.

Fourth, emerging technological paradigms amplify these ESG benefits. Serverless computing reduces idle resource consumption by executing functions on-demand rather than maintaining constantly active servers, thereby lowering energy consumption and operational cost (Baldini et al., 2017). Semantic cloud layers facilitate optimized data retrieval and processing, enhancing computational efficiency and reducing redundant data storage (Anand et al., 2010). Scientific cloud workflows enable collaborative, resource-intensive research without the need for duplicated infrastructure investments, further illustrating the capacity of cloud systems to align operational performance with environmental and social objectives (Zhao et al., 2008).

Finally, the comparative analysis underscores that cloud adoption does not entirely mitigate risk. Data sovereignty concerns, potential vendor lock-in, and exposure to third-party failures remain relevant.

However, these risks are generally more visible, measurable, and manageable than the hidden externalities embedded in traditional hosting, such as undocumented energy waste, unmonitored emissions, and unaccounted social costs (Plummer et al., 2008; Hassan et al., 2022). Thus, the transition to cloud infrastructures represents a shift from opaque, unmanaged risk to structured, professionalized accountability, consistent with ESG objectives.

DISCUSSION

The findings of this study illustrate that cloud computing is not merely a technical upgrade but a profound organizational and strategic transformation, particularly when evaluated through an ESG lens. The theoretical implications are significant: cloud infrastructure redefines the relationship between firms and their operational environment, extending beyond computational efficiency to encompass environmental responsibility, social inclusivity, and governance transparency. By situating Goel and Bhatiya's (2025) ESG framework within the broader scholarly discourse on cloud computing, this discussion elaborates the conceptual, practical, and policy-level ramifications of cloud adoption relative to traditional hosting paradigms.

Theoretical Implications

From a theoretical perspective, the adoption of cloud computing can be framed as a structural innovation in socio-technical systems. Traditional hosting treats computing resources as discrete assets, controlled, operated, and disposed of within the firm's boundaries. This model is deeply embedded in industrial-era organizational theory, which emphasizes ownership, control, and capital amortization (Marston et al., 2011). By contrast, cloud infrastructure externalizes core computing functions into centralized or distributed service ecosystems. This redistribution of responsibility aligns with contemporary sustainability theory, which posits that organizations cannot be evaluated solely on internal metrics but must account for the environmental and social externalities of their operations (Goel and Bhatiya, 2025).

The ESG lens reinforces this theoretical reorientation. Environmental considerations in cloud computing extend beyond energy efficiency to include lifecycle assessment, water usage for cooling, renewable energy sourcing, and hardware recycling. Socially, cloud services facilitate digital equity, remote collaboration, and workforce flexibility, while governance mechanisms create structured accountability frameworks that are observable and auditable (Bamiah et al., 2012; Hassan et al., 2022). In essence, cloud computing operationalizes the principles of stakeholder theory in the digital infrastructure domain, integrating environmental stewardship, social responsibility, and governance into the core architecture of organizational operations.

Moreover, the integration of serverless computing, semantic cloud layers, and workflow-optimized scientific clouds represents an additional layer of theoretical sophistication. These emerging architectures not only enhance computational efficiency but also reinforce ESG outcomes by minimizing idle resource consumption, optimizing data flow, and facilitating collaborative, resource-light research (Baldini et al., 2017; Zhao et al., 2008; Anand et al., 2010). The combination of these technical innovations with ESG-driven decision-making creates a virtuous cycle in which efficiency gains reinforce sustainability and social responsibility, which in turn enhance organizational legitimacy and access to capital.

Comparative Analysis with Traditional Hosting Models

The juxtaposition of cloud computing against traditional hosting highlights several critical contrasts. Firstly, environmental impact is structurally lower in cloud infrastructures due to centralized energy management, resource pooling, and renewable energy integration (Goel and Bhatiya, 2025; Sun Microsystems, 2009). Traditional hosting often relies on fragmented energy sources, underutilized servers, and inefficient cooling systems, resulting in higher carbon footprints and unaccounted environmental externalities. These disparities are magnified in large-scale operations, where the relative inefficiency of traditional hosting can offset short-term cost savings.

Secondly, social impacts diverge significantly. Cloud platforms facilitate digital inclusion by lowering entry barriers to high-performance computing and supporting collaborative workflows across geographically distributed teams. Conversely, traditional hosting often concentrates technological benefits within individual organizations, limiting broader societal impact and reinforcing inequities in access to computational resources (Wang et al., 2008; Anand et al., 2010). This social dimension underscores the strategic importance of cloud adoption in an era where corporate legitimacy is increasingly measured by contributions to societal welfare.

Thirdly, governance mechanisms are markedly more robust in cloud infrastructures. Hyperscale providers maintain structured compliance systems, auditing protocols, and security certifications that exceed what individual firms typically implement internally (Mell and Grance, 2011; Bamiah et al., 2012). This professionalization of governance reduces operational opacity, distributes risk across specialized providers, and increases the accountability of infrastructure decisions. While concerns over vendor lock-in and data sovereignty persist, these risks are generally more manageable and transparent than the hidden liabilities embedded in legacy hosting systems (Hassan et al., 2022).

Counter-Arguments and Critical Perspectives

Despite the advantages highlighted, cloud adoption is not without challenges. Critics argue that centralizing infrastructure may create dependencies on a limited set of hyperscale providers, potentially exposing firms to monopolistic practices, service disruptions, or governance failures (Plummer et al., 2008). Data sovereignty is another critical issue, particularly for organizations operating across multiple jurisdictions with varying privacy laws, requiring complex contractual and technical safeguards to ensure regulatory compliance. These counterpoints underscore the importance of strategic vendor management and robust contractual governance in cloud adoption (Hassan et al., 2022).

Further, while ESG benefits are clear at the macro level, the micro-level outcomes depend on provider practices, energy sourcing decisions, and local infrastructure availability. Not all cloud platforms are equally efficient or socially responsible; some may still rely heavily on fossil fuels or operate in regions with weak regulatory enforcement (Goel and Bhatiya, 2025). Consequently, organizations cannot treat cloud adoption as a universal ESG solution but must engage in careful selection, monitoring, and reporting to realize the full sustainability potential.

Policy and Managerial Implications

From a policy perspective, the findings suggest that regulators and standard-setting bodies should incorporate cloud efficiency metrics, energy sourcing requirements, and governance transparency standards into ESG reporting frameworks. Firms that fail to adopt cloud infrastructures aligned with ESG principles may face increased regulatory scrutiny, investor pressure, and reputational risk. Managerially, these findings emphasize the need for strategic planning that accounts for both operational efficiency and sustainability outcomes, integrating cloud adoption into corporate ESG strategies rather than treating it as a purely technical choice (Goel and Bhatiya, 2025; Marston et al., 2011).

Future Research Directions

The study identifies several areas for future investigation. Empirical research is needed to quantify the environmental impact of cloud versus traditional hosting across different industries, geographies, and operational scales. Longitudinal studies could examine how ESG-aligned cloud adoption affects corporate performance, stakeholder satisfaction, and regulatory compliance over time. Additionally, interdisciplinary research bridging computer science, environmental science, and organizational studies could explore new architectures, such as AI-optimized energy management and blockchain-based governance frameworks, to further enhance ESG outcomes (Baldini et al., 2017; Zhao et al., 2008).

Finally, research should investigate the social dimension of cloud adoption more deeply, examining issues such as workforce digital literacy, equitable access to computational resources, and the ethical implications of centralized data control. Understanding these factors will be crucial for developing infrastructure strategies that are not only efficient and sustainable but also socially and ethically responsible.

CONCLUSION

This study demonstrates that cloud computing represents a transformative paradigm in enterprise infrastructure, particularly when evaluated through an ESG lens. The integration of environmental, social, and governance considerations into cloud adoption decisions redefines the strategic role of digital infrastructure, positioning it as a platform for sustainability, accountability, and innovation rather than merely a cost center.

Key findings indicate that cloud platforms outperform traditional hosting across multiple ESG dimensions, including energy efficiency, governance transparency, and social accessibility. Emerging technologies such as serverless computing, semantic cloud layers, and scientific workflows further amplify these benefits by reducing resource waste, enhancing operational flexibility, and enabling collaborative research. While risks associated with vendor dependence, data sovereignty, and regulatory complexity persist, cloud adoption generally redistributes and professionalizes these risks, rendering them more manageable than the hidden externalities of traditional hosting.

Ultimately, the strategic implications of this research suggest that organizations that continue to rely on on-premise infrastructures face not only operational inefficiencies but also increasing environmental, social, and governance liabilities. By integrating ESG principles into infrastructure planning, firms can achieve a dual objective: optimizing technological performance while simultaneously meeting contemporary expectations for sustainability and ethical accountability. The conceptual framework presented here provides a foundation for future research and practice, emphasizing that cloud computing is not merely a technical innovation but a strategic instrument for navigating the complex ethical, environmental, and organizational landscapes of the digital age (Goel and Bhatiya, 2025).

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