



Integrating Digital Green Accounting into Business Education: A Review and Future Directions for Sustainable E-Business Learning

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Sejarah Artikel	Abstrak
Diterima: 22 Januari 2026 Disetujui: 14 Juli 2026 Dipublikasikan: 1 Agustus 2026	Integrasi akuntansi hijau digital ke dalam e-bisnis dan pendidikan bisnis merupakan langkah kritis untuk menyelaraskan inovasi teknologi dengan tuntutan keberlanjutan. Studi ini melakukan tinjauan literatur naratif terhadap penelitian yang diterbitkan antara tahun 2005 dan 2025, mengkaji bagaimana alat digital seperti blockchain, kecerdasan buatan, IoT, dan big data sedang mengubah praktik akuntansi untuk meningkatkan transparansi, akuntabilitas, dan pengelolaan lingkungan. Temuan menunjukkan bahwa meskipun bisnis elektronik semakin mengadopsi akuntansi hijau untuk selaras dengan kerangka kerja Lingkungan, Sosial, dan Tata Kelola (ESG) serta Tujuan Pembangunan Berkelanjutan (SDGs), tantangan seperti kekakuan kurikulum, keterbatasan keahlian tenaga pengajar, dan kendala teknologi menghambat adopsi yang luas dalam pendidikan bisnis. Meskipun demikian, praktik pedagogis inovatif termasuk pembelajaran berbasis pengalaman, simulasi, dan kemitraan industri menawarkan jalur yang menjanjikan untuk mengintegrasikan literasi keberlanjutan dan keterampilan digital ke dalam kurikulum. Sebuah kerangka konseptual diusulkan untuk memandu integrasi akuntansi hijau digital ke dalam program akademik, dengan menyoroti masukan, proses, keluaran, dan dampak jangka panjang. Studi ini menyimpulkan bahwa kolaborasi antara akademisi, industri, dan pembuat kebijakan sangat penting untuk mempersiapkan para pemimpin bisnis masa depan agar dapat menyeimbangkan profitabilitas dengan keberlanjutan serta mendorong transformasi sistemik.
Keywords: <i>Digital Green Accounting, E-Business, Business Education, ESG, Sustainability Literacy, Sustainable Development Goals (SDGs)</i>	Abstract <i>The integration of digital green accounting into e-business and business education represents a critical step toward aligning technological innovation with sustainability imperatives. This</i>

	<i>study conducts a narrative literature review of research published between 2005 and 2025, examining how digital tools such as blockchain, artificial intelligence, IoT, and big data are reshaping accounting practices to enhance transparency, accountability, and environmental stewardship. Findings reveal that while e-businesses increasingly adopt green accounting to align with Environmental, Social, and Governance (ESG) frameworks and the Sustainable Development Goals (SDGs), challenges such as curriculum rigidity, limited faculty expertise, and technological constraints hinder widespread adoption in business education. Nonetheless, innovative pedagogical practices including experiential learning, simulations, and industry partnerships which offers promising pathways for embedding sustainability literacy and digital skills into curricula. A conceptual framework is proposed to guide the integration of digital green accounting into academic programs, highlighting inputs, processes, outputs, and long-term impacts. The study concludes that collaboration among academia, industry, and policymakers is essential for preparing future business leaders to balance profitability with sustainability and drive systemic transformation.</i> © 2026 Universitas Negeri Semarang
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INTRODUCTION

The rise of digital technologies has reshaped the global business landscape, offering innovative tools that contribute to sustainability while simultaneously presenting new challenges. Technologies such as artificial intelligence (AI), the Internet of Things (IoT), and data analytics enhance operational efficiency, optimize resource use, and reduce greenhouse gas emissions (Abdulghani & Winkler, 2023; Avasthi et al., 2025; Schrade-Grytsenko et al., 2025). Despite these benefits, digital transformation can also increase energy consumption and carbon emissions during its early adoption stages (Du & Li, 2024; Fu et al., 2025). This dual impact underscores the need for frameworks that align technological adoption with sustainable practices.

Within this context, green accounting has emerged as an important methodology for integrating environmental and social costs into financial decision-making. It provides businesses with the tools to evaluate their ecological footprint, communicate the hidden costs of environmental degradation, and promote long-term sustainability (Azwin Md Nasir et al., 2024; S. Singh et al., 2019a). Moreover, green accounting strengthens transparency and accountability, both of which are vital for aligning corporate strategies with sustainability imperatives (Dutta et al., 2020).

E-business represents both an opportunity and a challenge for sustainability. On one hand, it is a driver of digital transformation, enabling organizations to harness digital tools for efficiency and value creation (Avasthi et al., 2025; Schrader-Grytsenko et al., 2025; Vrontis et al., 2022). On the other hand, e-business contributes to environmental burdens through electronic waste and increased energy use (Du & Li, 2024; Guo et al., 2025). Integrating digital green accounting into e-business practices provides a systematic means of assessing and mitigating these impacts, offering businesses a pathway to sustainable development (Abdullaeva et al., 2025a; S. Ergasheva, 2025a).

By embedding these principles into business education, future leaders can be equipped with both digital competencies and sustainability literacy, enabling them to balance technological advancement with environmental stewardship. This integration aligns business curricula with the Sustainable Development Goals (SDGs), particularly those related to climate action and responsible consumption.

Business education plays a crucial role in preparing professionals to meet the challenges of the rapidly changing global economy. Central to this mission is the development of sustainability awareness and digital skills, both of which are essential for addressing pressing environmental and technological demands.

Sustainability education is a cornerstone of this preparation. Business education fosters essential skills for managers by integrating sustainable business models (SBMs) into curricula, helping students develop a deep understanding of long-term environmental and social impacts (Fontanella et al., 2024; Fontantella et al., 2024). Experiential learning approaches, including sustainability-focused business games, have proven effective in teaching students how to design and implement sustainable strategies in practice (Fontanella et al., 2024; Fontantella et al., 2024).

At the same time, digital skills are increasingly vital as the accounting and business professions undergo rapid technological transformation. The incorporation of digital tools in education enhances students' creative problem-solving capabilities and prepares them for emerging roles that demand high levels of technological adaptability (Al-Hattami, 2025; Kee, 2024). Business schools are responding by embedding digital technologies into their curricula, thus ensuring effective teaching and promoting lifelong learning in the digital era (Thomas, 2021; Guş & Mangiuc, 2022a).

Despite the recognized importance of digital green accounting, its adoption in traditional business education remains limited. Many business schools struggle to integrate sustainability into accounting and finance programs, often due to the dominance of traditional, quantitative approaches and strict adherence to professional standards that overlook sustainability concerns (Mburayi & Wall, 2018a). Additionally, the hidden curriculum in accounting education reinforces conventional views of the profession, prioritizing compliance and technical rigor over innovation and sustainability (Sebele-Mpofu, 2024).

To bridge this gap, comprehensive frameworks are required to embed digital sustainability principles into business curricula. Such frameworks would enable universities to align their strategies with global sustainability objectives while fostering competencies necessary for responsible leadership (AIDhaen, 2023; S. Ergasheva, 2025b). Furthermore, fostering global citizenship within business

education calls for a paradigm shift from profit maximization to a holistic approach that integrates sustainability and digital competencies as fundamental elements of learning (Van Rompay-Bartels & Tuninga, 2023).

In summary, the integration of digital green accounting into business education is imperative for preparing future professionals to address the complex challenges of the modern business environment. By equipping students with sustainability literacy and digital skills, business schools can foster responsible leaders who are capable of driving sustainable innovation. However, the current lack of integration of digital green accounting concepts in curricula highlights a pressing need for innovative teaching approaches and comprehensive educational frameworks that align with global sustainability goals (Fontanella et al., 2024; Mburayi & Wall, 2018a; AlDhaen, 2023; S. Ergasheva, 2025b; Van Rompay-Bartels & Tuninga, 2023).

The research questions guiding this review are formulated as follows: what is the current state of the literature on digital green accounting in e-business; how sustainability and green accounting are being integrated into business education; what challenges and opportunities exist for embedding digital green accounting into curricula; and what future directions can support sustainable e-business learning. Taken together, these questions frame the synthesis presented in the following sections.

To review literature on digital green accounting in e-business and explore its integration into business education.

Digital green accounting refers to the integration of digital technologies with traditional green accounting practices to strengthen sustainability management and environmental accountability. It allows organizations to measure, track, and disclose environmental costs and resource utilization in a more accurate and transparent (Abdullaeva et al., 2025b; S. Ergasheva, 2025c; S. Singh et al., 2019b). This field has evolved as businesses increasingly recognize the importance of sustainability and the necessity of transparent reporting mechanisms. Key to this evolution is the adoption of technologies such as blockchain, artificial intelligence (AI), the Internet of Things (IoT), and big data, which collectively transform how sustainability information is collected, analyzed, and communicated (V. K. Singh, 2022; P. De Silva et al., 2025; Lodhia et al., 2025).

Blockchain technology plays an important role in enhancing transparency and traceability, as it ensures immutable records of sustainability-related transactions and data (V. K. Singh, 2022; Tian et al., 2024). AI contributes through predictive analytics, data processing, and automated sustainability assessments, leading to improved accuracy and efficiency (V. K. Singh, 2022; P. De Silva et al., 2025; Lodhia et al., 2025). Similarly, IoT enables real-time monitoring of energy consumption, carbon emissions, and resource use, providing businesses with dynamic and responsive tools for environmental management (P. De Silva et al., 2025; Lodhia et al., 2025). Big data, by facilitating the analysis of large and complex environmental datasets, supports more comprehensive and detailed sustainability reporting (P. De Silva et al., 2025; Lodhia et al., 2025).

Digital green accounting significantly enhances Environmental, Social, and Governance (ESG) reporting by ensuring accurate, standardized, and comprehensive disclosure of environmental data (Chopra et al., 2024; Che Kasim

et al., 2024; Singhania et al., 2025). This improvement strengthens investor confidence, reduces risk, and promotes corporate accountability. Furthermore, digital green accounting supports businesses in aligning their operations with the United Nations Sustainable Development Goals (SDGs), particularly those related to climate action and responsible consumption (Weber & ElAlfy, 2024; Orozov et al., 2025a). Integration with reporting standards such as the Global Reporting Initiative (GRI) and the Sustainability Accounting Standards Board (SASB) ensures comparability and consistency across organizations, thereby enabling informed decision-making and sustainable investment strategies (Weber & ElAlfy, 2024; Pizzi et al., 2024; Surbeck & Tyson, 2024).

E-business has complex environmental impacts that can be both beneficial and detrimental. On the positive side, e-commerce can reduce carbon emissions and energy use through more efficient logistics and a decreased reliance on physical retail outlets (Yi & Thomas, 2006; Xie et al., 2023; Gay et al., 2005). For instance, studies in the personal computer industry have shown that e-commerce reduced life cycle energy use and pollutant expenditures by 40–50% compared to traditional retail strategies (Gay et al., 2005). However, e-business also increases waste, particularly through packaging, and raises energy consumption due to reliance on large-scale data centers (Pinto et al., 2023; Kozhoshev et al., 2025; Yu et al., 2024). Its overall environmental impact is shaped by multiple factors, including transportation efficiency, consumer behavior, and the degree of reliance on digital infrastructure (Yu et al., 2024; Gee et al., 2020).

Green supply chain management integrates environmental objectives into supply chain processes, emphasizing eco-friendly practices such as renewable energy adoption, sustainable packaging, and efficient logistics (Taghipour & Lu, 2024). Cloud computing supports these objectives by reducing energy consumption and enabling operational efficiency within supply chains (Priyanshu et al., 2024; Shirzad Talatappeh & Lakzi, 2020). Additionally, Green IT practices such as virtualization, optimized data centers, and AI-based green computing that can help to reduce carbon footprints and enhance sustainability outcomes (Mukerji & Ghose, 2010; Sathish et al., 2025). Collectively, these technologies and practices foster environmentally responsible e-business ecosystems.

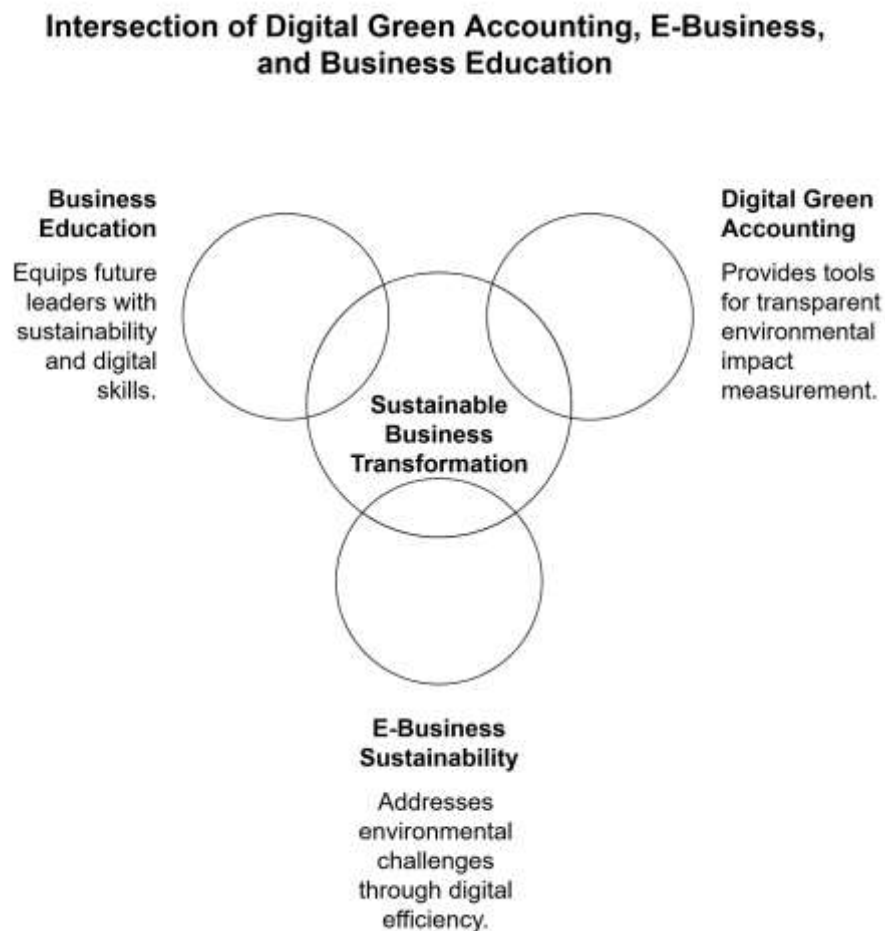
Higher education institutions (HEIs) are increasingly embedding the Sustainable Development Goals (SDGs) into their teaching, research, and operations. This integration is often implemented through sustainability-focused workshops, new course offerings, and project-based learning that enables students to apply theoretical knowledge to real-world problems (Torres, 2021; Amorós Molina et al., 2023; Alfathy et al., 2024; Verhulst & Van Doorsselaer, 2015). While high-income countries have focused more on academic and theoretical integration of the SDGs, low- and middle-income countries have prioritized practical, problem-solving approaches to sustainability (Amorós Molina et al., 2023). Regardless of context, this shift is recognized as critical for preparing students to address global sustainability challenges.

The growing importance of green skills highlights the need for graduates capable of addressing complex environmental challenges within their professions (McCarthy & Eagle, 2021; Opoku & Egbu, 2018). Sustainability literacy ensures that students understand the environmental and social implications of business activities,

while digital literacy equips them with the technological expertise required in an AI-driven and digital economy (Kayyali, 2025; Wang & Wu, 2024). The intersection of digital literacy and sustainability education is particularly vital, as it enables students to design and implement innovative solutions to pressing global issues (Kayyali, 2025; Mat Ishah et al., 2023). Educational institutions play a pivotal role in nurturing these skills through innovative teaching methods, integrated curricula, and cross-disciplinary projects (Verhulst & Van Doorselaer, 2015; Suklun & Bengü, 2024; Salimova & Soldatova, 2021).

The conceptual background demonstrates that digital green accounting, e-business sustainability practices, and sustainability-focused education are interlinked pillars for achieving global sustainability objectives. Digital green accounting leverages advanced technologies for accurate and transparent reporting; e-business requires green supply chains and energy-efficient systems to reduce environmental harm; and higher education must integrate sustainability, digital literacy, and green skills to prepare future leaders. Together, these elements support the advancement of sustainable business models aligned with ESG reporting frameworks and the SDGs.

Figure 1. Intersection of Digital Green Accounting, E-Business, and Business Education



The intersection of digital green accounting, e-business sustainability, and business education represents a critical nexus for achieving sustainable business transformation. Digital green accounting provides the technical foundation through tools such as blockchain, AI, IoT, and big data, enabling organizations to measure and disclose environmental impacts with transparency. E-business serves as the operational arena where these tools address pressing challenges such as carbon emissions, packaging waste, and data center energy use, while fostering greener supply chains and digital efficiency. Business education functions as the catalyst, equipping future leaders with sustainability literacy and digital competencies through experiential learning, simulations, and integrated curricula. Together, these three pillars converge to balance technological advancement, operational sustainability, and leadership preparation, reinforcing ESG frameworks and the SDGs. This convergence is illustrated in Figure 1, where the overlapping domains highlight their collective contribution to systemic sustainable business transformation.

METODE

This study employs a narrative literature review approach to examine the integration of digital green accounting into e-business and business education. All reviewed materials were sourced exclusively from the Scopus database to ensure the inclusion of peer-reviewed and high-quality scholarly work. The review focused on literature addressing digital green accounting, sustainability in e-business, ESG reporting, and the incorporation of sustainability education within business curricula across both developed and developing countries.

The search process was conducted using targeted keywords such as "Digital Green Accounting," "E-Business," "Sustainability Education," "Business Education," "ESG," and "Green Skills." Articles published between 2005 and 2025 were included, with priority given to those offering contemporary insights, theoretical contributions, and empirical evidence relevant to the study's objectives.

No automated coding software was applied. Instead, the analysis was performed manually through close reading, categorization, and thematic organization of the selected papers. The review sought to identify trends, applications, challenges, and best practices in digital green accounting, with a particular emphasis on its pedagogical implications for business education. The findings were synthesized to highlight practical strategies and conceptual frameworks that can inform the integration of digital green accounting into both e-business operations and academic curricula.

RESULTS AND DISCUSSION

A. RESULTS

Digital green accounting is increasingly integrated into e-business practices, modernizing corporate accounting systems through advanced software, green investments, and sustainable trade practices (S. T. Ergasheva, 2025). Many companies adopt green accounting to account for costs linked to environmental goals such as reducing CO₂ emissions, transitioning to sustainable packaging, and implementing circular economy materials (Orozov et al., 2025b). These practices enhance operational sustainability while

improving transparency and accountability. Moreover, integrating green accounting into the marketing mix of e-businesses has strengthened operational flexibility and embedded environmental values into organizational strategies (Abdullaeva et al., 2025c). Importantly, the adoption of green accounting has also been shown to increase investment attractiveness by aligning financial performance with sustainability (Orozov et al., 2025b). The key contributions from these studies are summarized in Table 1.

Table 1. Summary of Digital Green Accounting in E-Business

Author(s) & Year	Focus Area	Method/Context	Key Findings/Contributions
Abdullaeva et al. (2025) (Abdullaeva et al., 2025c)	Digital platforms for sustainability	Conceptual review	Showed how digital tools support sustainable trade practices and enhance transparency.
Ergasheva (2025) (S. T. Ergasheva, 2025)	Modernization of accounting systems	Literature analysis	Highlighted that digital green accounting improves flexibility and embeds sustainability.
Orozov et al. (2025) (Orozov et al., 2025b)	Green accounting & investment appeal	Empirical study (emerging markets)	Found that adoption increases investor confidence and links financial & environmental goals.
Rahman et al. (2025) (Rahman et al., 2025)	Green balance sheets in enterprises	Case study (China, large corporation)	Identified compliance gaps and challenges in large-scale adoption of green accounting.
Popkova et al. (2025) (Popkova et al., 2025)	Agricultural sustainability platforms	Case studies (India & Nigeria)	Revealed how green accounting enables sustainability in low-support and resource-limited contexts.
Nguyen (2023) (Nguyen, 2023a)	CSR and regulatory influence	Case study (Vietnam, stock-listed firms)	Demonstrated how regulation and CSR pressures drive adoption, improving efficiency & reporting.

Sumber: Data Diolah (2026)

Several case studies illustrate the practical implementation of digital green accounting. In India and Nigeria, agricultural companies leverage digital platforms to implement green accounting, contributing to sustainable

development even in contexts with limited government support (Popkova et al., 2025). In China, the Zhu Ye Group developed balance sheets and profit sheets under green accounting standards, providing insights into compliance and highlighting challenges in large-scale adoption (Rahman et al., 2025). Similarly, in Vietnam, companies listed on the stock exchange integrated green accounting practices influenced by government regulations, corporate social responsibility, and social pressures, with positive impacts on efficiency (Nguyen, 2023a). These examples reveal the potential and limitations of applying digital green accounting across different economic and regulatory environments.

Sustainability accounting is still underrepresented in business and accounting education worldwide. Evidence suggests that accounting curricula at the secondary, university, and professional levels provide limited exposure to sustainability, resulting in graduates with uneven levels of preparedness (T.-A. De Silva & Nilipour, 2025). Nevertheless, some programs are beginning to integrate sustainability principles. For example, the PRME i5 framework emphasizes playful learning and hands-on approaches that address sustainable development challenges, marking an emerging trend in curriculum design (El-Bassiouny, 2025).

A variety of pedagogical innovations have been proposed and tested to enhance sustainability learning in business education. Experiential learning methods, including simulations, case studies, and problem-based learning, are particularly effective. Among these, simulations have been shown to be slightly more effective than case studies in teaching the multidimensional nature of sustainable development (Prado et al., 2020; Butler et al., 2019). Other innovative models incorporate lectures, virtual reality (VR)-aided site visits, physical site visits, and practicum-based projects, which have proven transformative in equipping students with sustainability competencies in fields such as green building education (Hou et al., 2023). A dialogic approach in environmental management accounting courses has also been shown to shift student perspectives and foster creative, critical thinking (Ahmad et al., 2025). Furthermore, incorporating sustainability audits into business curricula where students assess the sustainability performance of a fictional company which has been effective in developing sustainability knowledge, employability skills, and student engagement (Emblen-Perry, 2019). These different pedagogical approaches are summarized in Table 2.

Table 2. Pedagogical Approaches for Sustainability in Business Education

Teaching Method	Description	Advantages	Limitations
Case Studies	Real-world examples used to illustrate sustainability challenges and solutions.	Builds critical thinking; helps students connect theory to practice.	May oversimplify complex issues; often context-specific.
Simulations	Interactive exercises modeling	Engages students in active learning;	Resource-intensive;

	business and sustainability trade-offs.	slightly more effective than case studies in skill-building.	requires technological infrastructure.
VR / Site Visits	Virtual or physical tours of sustainable projects or green enterprises.	Provides immersive, experiential understanding of sustainability in practice.	Costly; limited scalability across large cohorts.
Dialogic Teaching	Structured discussions encouraging reflection and multiple perspectives.	Promotes critical and creative thinking; shifts perspectives on sustainability.	Outcomes depend heavily on facilitator skill and student engagement.
Sustainability Audits	Students assess sustainability performance of a (real or fictional) company.	Enhances employability skills; develops practical sustainability reporting competencies.	Time-intensive; may be challenging without industry collaboration.

One of the most persistent challenges is curriculum rigidity. Business schools often structure disciplines in silos, making it difficult to embed sustainability across accounting and finance courses (Mburayi & Wall, 2018b; Miesing et al., 2017). This lack of interdisciplinary integration limits the development of a holistic understanding of sustainability.

There is also a significant shortage of faculty members equipped with the expertise to teach integrated courses on sustainability and accounting. Without faculty trained in these areas, the effective implementation of sustainability principles in business education is difficult to achieve (Mburayi & Wall, 2018b; Ewis & Ghanem, 2025).

Students themselves often demonstrate limited awareness of sustainability's importance in accounting and finance. This can be attributed to insufficient curriculum emphasis on sustainability and a lack of experiential learning opportunities that make its relevance clear (Marota, 2024; Pargmann & Berding, 2025).

Finally, the integration of digital green accounting requires both significant financial investment and robust technological infrastructure. Many institutions and organizations, particularly in emerging economies, find it difficult to provide the necessary resources for effective implementation (Ewis & Ghanem, 2025; Marota, 2024; Nguyen, 2023b). These constraints often slow or prevent the widespread adoption of sustainability-focused practices.

Digital tools and cloud-based accounting platforms present opportunities to modernize business education. By incorporating these into blended learning models, schools can combine traditional teaching methods with digital

innovations to enhance accessibility, engagement, and sustainability awareness (S. Ergasheva, 2025d; Bruns, 2014).

Embedding Environmental, Social, and Governance (ESG) frameworks and the United Nations Sustainable Development Goals (SDGs) into business curricula offers students a comprehensive understanding of sustainability's broader impact. This integration allows them to see how accounting decisions influence social and environmental outcomes (Pargmann & Berding, 2025; Orozov et al., 2025c; Caraianni et al., 2015).

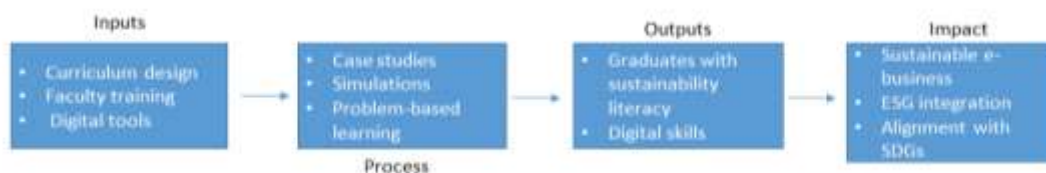
Partnerships with industry are another effective approach, providing experiential learning opportunities such as internships and project-based collaborations. These partnerships bridge the gap between theory and practice, allowing students to gain hands-on experience in sustainable business operations. Initiatives such as the G3 Sustainability Compass highlight how collaborations between academia and industry can prepare students to address real-world sustainability challenges (Mburayi & Wall, 2018b; Miesing et al., 2017).

The literature highlights both progress and limitations in the integration of digital green accounting into business practice and education. In e-business, companies are adopting green accounting to align operations with sustainability goals, with case studies from India, Nigeria, China, and Vietnam demonstrating diverse approaches. In education, adoption remains limited but is growing, supported by innovative pedagogical methods such as simulations, VR, dialogic teaching, and sustainability audits. Significant challenges including curriculum rigidity, limited faculty expertise, low student awareness, and financial and technological barriers that hinder integration. However, opportunities exist through blended learning, embedding ESG and SDGs in curricula, and fostering partnerships with industry. Addressing these challenges while leveraging best practices can accelerate the integration of sustainability into business education and prepare students for future sustainability leadership roles.

B. DISCUSSION

To embed digital green accounting into business education, a conceptual model can be developed around four core components: inputs, process, outputs, and impact. This framework ensures that students gain both sustainability literacy and digital skills, ultimately preparing them for roles in Environmental, Social, and Governance (ESG) reporting and sustainable business leadership. The proposed framework is visualized in Figure 2.

Figure 2. Proposed Framework for Integrating Digital Green Accounting into Business Education



The first element of the framework focuses on inputs. Curriculum design plays a central role, requiring the integration of green accounting and digitalization topics into academic programs to strengthen sustainable development across sectors (S. Ergasheva, 2025e). Courses should cover theoretical foundations of e-business, emphasizing how digital green accounting can be applied to business processes (Abdullaeva et al., 2025d). Additionally, attention should be placed on the transformative role of digital technologies in reshaping accounting functions and expanding the scope of managed data (Guşe & Mangiuc, 2022b). Faculty training is also essential, as educators must be equipped with knowledge of the latest digital tools and their applications in sustainability-focused accounting. Training initiatives should include the use of automation and digital platforms for green accounting practices (Busulwa & Evans, 2021; S. Ergasheva, 2025e). Finally, adopting digital tools such as cloud-based systems can enhance teaching and learning by hosting digital content for sustainable entrepreneurship and supporting the integration of green accounting into e-business models (Abdullaeva et al., 2025d; Cocu et al., 2025).

The process component highlights the integration of green accounting into e-business through practical and applied learning. Developing case studies that showcase how digital green accounting supports decarbonization and climate resilience provides students with concrete insights into real-world applications (Saipidinov et al., 2025). These case studies can also use simulations and problem-based learning to demonstrate the impacts of digital transformation on accounting practices (Busulwa & Evans, 2021). Additionally, incorporating examples of how green accounting improves investment attractiveness ensures students understand the broader financial and strategic implications of sustainability (Orozov et al., 2025d).

The outputs of this framework focus on preparing students with both sustainability and digital literacy. Through exposure to curricula and case-based applications, students gain the knowledge and technical skills needed to leverage digital technologies for green accounting and sustainable development (S. Ergasheva, 2025e; Guşe & Mangiuc, 2022b). This preparation ensures that graduates are equipped for roles requiring ESG reporting, where the ability to integrate financial, social, and environmental data is increasingly vital (Busulwa & Evans, 2021).

The ultimate impact of this framework is the development of sustainable e-business practices and alignment with the Sustainable Development Goals (SDGs). By applying green accounting through digital platforms, businesses are encouraged to adopt sustainable practices such as decarbonization and climate resilience strategies (S. Ergasheva, 2025e; Abdullaeva et al., 2025d; Saipidinov et al., 2025). At the same time, aligning education with the SDGs ensures that curricula address environmental, social, and economic sustainability goals. This alignment fosters the creation of business models that integrate digital and green accounting principles, reinforcing global sustainability objectives (Guşe & Mangiuc, 2022b; Orozov et al., 2025d).

Future research should examine the effectiveness of integrating digital green accounting into business education. Evidence shows that digitalization enhances accuracy, transparency, and efficiency in accounting, which are

essential for embedding sustainability in teaching and practice (S. Ergasheva, 2025e; Abdullaeva et al., 2025d). At the same time, the use of digital tools in green accounting bridges technological advancement with ecological sustainability, making it a promising research area to explore further (S. Ergasheva, 2025e; Abdullaeva et al., 2025d). Another critical area for investigation is assessing student learning outcomes. Interactive and experiential approaches, particularly those used in Principles for Responsible Management Education (PRME) signatory institutions, have been shown to effectively embed sustainability into business education (Paulino Pires Eustachio et al., 2025; Stachowicz-Stanusch et al., 2024). Evaluating how these pedagogies translate into digital green accounting can provide insights into students' preparedness to drive sustainable transformation across industries (Paulino Pires Eustachio et al., 2025; Stachowicz-Stanusch et al., 2024).

From a practical perspective, universities and business schools should adapt their curricula to include digital green accounting, equipping students with digital skills, ethical decision-making abilities, and sustainability strategies that align with the evolving demands of the profession (N et al., 2024; Tsiligiris & Bowyer, 2021). Collaborations with industry are especially valuable, as they provide students with opportunities for real-world application and allow institutions to stay aligned with market needs (Stachowicz-Stanusch et al., 2024; Mukhi, 2023). Partnerships also enhance research and development efforts, fostering innovations in digital green accounting while ensuring its practical relevance to organizations (Stachowicz-Stanusch et al., 2024; Mukhi, 2023).

At the policy level, accrediting bodies such as AACSB and EQUIS should revise their standards to integrate sustainability into curricula, encouraging the systematic adoption of digital green accounting in business education (Langan et al., 2024; Landrum, 2021). Such policies would ensure that graduates are equipped with the competencies needed to address sustainability challenges in professional practice. Moreover, education reforms should explicitly align with Sustainable Development Goal 4 (Quality Education) and Goal 12 (Responsible Consumption and Production). By linking curricula to these SDGs, institutions can promote inclusive, equitable, and sustainability-oriented education that prepares students to foster responsible management practices (Jordan, 2020; Brissett, 2022; Tonegawa, 2023; Piazza et al., 2025). Integrating digital green accounting into programs thus not only advances sustainability education but also contributes directly to the global sustainability agenda.

CONCLUSION

This study underscores the transformative potential of digital green accounting as both a corporate practice and an educational imperative. In e-business, the adoption of digital green accounting tools enhances transparency, aligns operations with ESG frameworks, and supports the pursuit of Sustainable Development Goals (SDGs). Case studies from diverse contexts reveal that while implementation challenges persist such as regulatory gaps, technological barriers, and financial constraints. The benefits in terms of efficiency, accountability, and investment attractiveness are substantial.

In the realm of business education, the research highlights a significant gap between the growing importance of sustainability and the limited integration of green accounting into curricula. Although innovative pedagogical approaches such as experiential learning, simulations, and industry partnerships are beginning to bridge this divide, issues of curriculum rigidity, faculty expertise, and resource limitations remain critical obstacles.

The proposed framework presented in this study offers a pathway for embedding digital green accounting into academic programs, emphasizing the integration of sustainability literacy with digital competencies. By adopting this approach, business schools can prepare graduates who are not only skilled in financial and technological domains but also capable of driving sustainable innovation.

Ultimately, the convergence of digital green accounting, sustainable e-business practices, and education reform has the potential to redefine the role of business in society. Future progress depends on collaborative efforts among academia, industry, and policymakers to mainstream sustainability into both practice and pedagogy. Doing so will ensure that future business leaders are equipped to balance profitability with environmental stewardship, advancing the global sustainability agenda in meaningful and measurable ways.

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Ethics Approval: Not applicable. This study is a literature review.

Consent to Publish: Not applicable. This study does not contain any data from individuals.

Data Availability Statement: The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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