

Strategic Leadership in the Age of Digitalization: Transformation and Sustainable Growth

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Abstract

Purpose : The accelerating convergence of digital transformation, sustainability imperatives and stakeholder expectations is fundamentally reshaping the strategic leadership landscape. Existing research study remains fragmented across digital leadership, organisational transformation, dynamic capabilities and sustainability domains, limiting a holistic understanding of how strategic leaders can simultaneously drive digital transformation and sustainable organisational growth. This study develops an integrative perspective on the leadership capabilities and organisational mechanisms required to align digital innovation with long-term sustainability outcomes.

Design/methodology/approach : A systematic literature review (SLR) guided by the PRISMA framework was conducted. A corpus of 124 peer-reviewed journal articles published between 2010 and 2024 was systematically examined across the intersecting domains of strategic leadership, digital transformation, sustainability, organisational capabilities and ESG. The analysis is theoretically anchored in Dynamic Capabilities Theory, Upper Echelons Theory, Stakeholder Theory, Organisational Ambidexterity and Servant Leadership.

Findings : Effective strategic leadership in digitally transforming organisations depends on the integration of five interrelated capabilities: digital strategic vision, organisational agility, innovation orchestration, stakeholder-centric governance and sustainability-oriented decision-making. Digital transformation generates sustainable value only when technological investments are complemented by human capital development, organisational learning, ethical governance and environmental and social accountability. The study proposes the Strategic Digital Leadership for Sustainable Growth (SDLSG) framework, which explains the co-evolutionary relationship between strategic leadership, digital capabilities, organisational transformation, ESG integration and sustainable competitive advantage.

Originality/value: The study extends strategic leadership and dynamic capabilities perspectives by positioning leadership as a critical integrative mechanism linking digital transformation with sustainability outcomes. The proposed SDLSG framework provides actionable implications for senior executives, boards, policymakers and management educators seeking to develop digitally resilient, innovation-driven and sustainability-oriented organisations.

Keywords: Strategic leadership; Digital transformation; Sustainable growth; Dynamic capabilities; ESG; Organisational ambidexterity

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How to cite this article: Mishra P.K., Singh A., (2026). Strategic Leadership in the Age of Digitalization: Transformation and Sustainable Growth, Commerce Research Review 3(2) 84-107.

DOI: <https://doi.org/10.21844/crr.v3i02.1152>

Source of support: Nil

Conflict of Interest: None

Received: 10-03-2026 **Accepted:** 26-05-2026 **Published:** 20-06-2026

Introduction

In the early years of the twenty first century, organisational leaders have found themselves at a crossroads between two unprecedented and mutually influencing forces: digital technological disruptions and ecological and social sustainability. Modern businesses are facing a strategic conundrum: they have to use digital technology to gain competitive edge, while also meeting rising expectations from customers, shareholders, and other stakeholders regarding environmental protection, social justice, and corporate responsibility (Correani et al., 2020; Weill and Woerner, 2018).

The two concepts of digital innovation and sustainability have been considered as separate and autonomous spheres of action for the majority of the twentieth century, and were dealt with in different organizational silos, management systems and accountability systems. However, these two strands are now more and more recognised to require each other and successful integration of digital transformation and sustainability strategy is one of the greatest challenges in strategic leadership in the modern world.

Digital transformation is happening at an unprecedented speed and scale in the industries. Industries are being reinvented, customer interaction is changing, value creation is reimaged, and the organisations are being restructured at the core from a technological perspective, such as artificial intelligence (AI), cloud computing, the Internet of Things (IoT), blockchain, and advanced robotics and big data analytics (Bharadwaj et al., 2013; Vial, 2019). For instance, continuous research shows that digital transformation is not simply a technology adoption or systems integration exercise, but a transformational change in organizational strategy, culture, capabilities and leadership (Kane et al., 2019; Sia et al., 2021). Without understanding this complexity and reducing digital transformation to IT modernisation, leaders will miss out on transformative results.

At the same time, sustainability has moved from a side-of-the-business corporate social responsibility (CSR) issue to a business core strategic focus with real financial consequences. The Corporate Sustainability Reporting Directive (CSRD) introduced by the European Union, the Task Force on Climate-related Financial Disclosures (TCFD) and the new mandatory ESG disclosure regimes across the globe mean that organisations need to build their capacity to measure, manage and communicate their sustainability performance. Institutional investors have set ESG performance as a necessary prerequisite for investment decisions, establishing direct connections between sustainable leadership and corporate valuation (Eccles et al., 2014; Friede et al., 2015). The evidence of the financial materiality of sustainability has now grown to a critical mass and is becoming a key factor in any serious strategic leadership framework.

In the light of this, the academic research field of strategic leadership is in a great need of a paradigm shift from "simple" technical competency and hierarchy-based models to new models that incorporate the wider and integrative perspective in which leaders are both creators of digital transformation and guardians of sustainable societal values. Four interrelated research objectives of this paper are as follows: (a) critically examine the existing theories of digital leadership and the relationship between strategic management and digital leadership; (b) explore how leading organisations are successfully embedding the concepts of digital transformation and sustainability strategy; (c) discover the competencies and behaviours of effective digital leaders; and (d) develop an integrated conceptual model of Strategic Digital Leadership for Sustainable Growth (SDLSG) as a theoretical and practical tool for strategic leadership in the digital age.

The rest of the paper is organised as follows. Section 2 provides an overview of the current literature on both digital leadership and sustainability leadership as two separate and complementary bodies of research. The systematic research methodology is presented in section 3. Section 4 sets the theoretical backdrop. Section 5 is a look at the link between digital transformation and leadership. Part 6 covers sustainability as a leadership challenge. The SDLSG framework is developed and supported by empirical illustrations in Section 7. Theoretical, Practical and Policy implications are discussed in Section 8. Conclusions and future directions are given in Section 9.

Literature Review

This section provides a summary of the two streams of study to which the present paper is drawn: the first with a focus on digital leadership and organisational transformation; the second with a focus on sustainability and strategic leadership for ESG. Before the gap is identified between the streams which will lead to the SDLSG framework presented in Section 7, each stream is discussed individually.

The basics of digital leadership and organisational change.

The field of digital leadership has expanded at a rapid pace along with the wider digital transformation body of literature. Bharadwaj et al. (2013) argued that digital strategy cannot be separated from business strategy in contrast to the view of digital strategy as an IT-related issue, and later, Vial's (2019) systematic review of 282 studies confirmed that leadership was the dominant factor identified as a determinant of digital transformation outcomes. The articulation of a coherent digital business model and strategy is highlighted by Weill and Woerner (2018) and Hess et al. (2016); organisational and cultural readiness, not technology sophistication per se, is what distinguishes successful from unsuccessful transformations, according to Kane et al. (2019) (based on large-sample survey research); and digital transformation is an ongoing process of strategic renewal, not a discrete project with a fixed endpoint, as Warner and Wäger (2019) argue. Converging evidence from case-based studies such as Sia et al. (2021) on the success of Sia's transformation at DBS Bank suggests that success in transformation relies on aligning technology investment with organisational redesign.

A related stream examines the specific competencies and behaviours associated with effective digital leadership. Schwarzmüller et al. (2018) and Porfirio et al. (2021) document shifts in required leadership behaviour toward greater comfort with ambiguity and distributed decision-making, while Nadkarni and Prügl's (2021) review synthesise findings on the cognitive and compositional attributes of top management teams that predict digital transformation performance. Correani et al. (2020), drawing on three in-depth transformation case studies, highlight the practical difficulty organisations face in translating digital strategy into implementation, and Rost and Hutber (2022) more recently call for a dedicated digital leadership research agenda, noting that the construct remains theoretically underspecified relative to its practical importance. Taken together, this literature establishes leadership rather than technology adoption alone as the central explanatory variable in digital transformation research, but it addresses this leadership challenge largely independently of the sustainability imperatives discussed next.

Sustainability and ESG-oriented leadership

A parallel and largely separate literature has established sustainability performance as a material strategic concern rather than a peripheral compliance matter. Eccles et al.'s (2014) 18-year longitudinal comparison of matched firms provided influential early evidence that firms adopting substantive environmental and social policies outperformed peers on both market and accounting measures; this finding has since been corroborated and extended across large meta-analytic samples by Friede et al. (2015) and, using a regression-discontinuity design that addresses reverse-causality concerns, by Flammer (2015). Khan et al. (2016) refine this picture by showing that the financial materiality of ESG performance depends on which specific issues are material to a given industry, and Flammer et al. (2019) examine how linking executive compensation to ESG criteria affects firm outcomes. Hahn and Kühnen (2013) and Adams et al. (2020) address the governance and disclosure side of this agenda, documenting the determinants of sustainability reporting practice and the move toward integrated reporting frameworks, respectively.

More recent contributions extend sustainability leadership research study into the digital economy specifically. Nidumolu et al. (2009) were among the first to argue, based on case evidence, that sustainability constraints can themselves be a source of innovation rather than only a cost. Dyllick and Muff (2016) propose a typology distinguishing genuine business sustainability from business-as-usual CSR activity, a distinction later echoed in the European Commission's (2021) Industry 5.0 framework, which positions human-centricity and ecological regeneration as design principles for industrial systems rather than secondary constraints on efficiency. This literature is grounded overwhelmingly in stakeholder-theoretic reasoning (Freeman, 1984; Freeman et al., 2010) and, like the digital leadership literature reviewed above, has developed with limited direct engagement with the specific leadership demands introduced by digital transformation.

The integration gap

By reading these literatures together, it is evident that each has grown up considerably in a consistent manner: As an independent stream, but neither tackles digital transformation leadership and sustainability. Stress constraints are an integral part of the systemic-evolutionary demands on the same leaders under the same resource and stress constraints is an inherent part of the system of leadership. attention constraints. Parida et al.'s (2019) overview of digitalisation, business model innovation and access to digital innovation. sustainable industry explicitly states that these topics are usually taught separately from each other. Even though the organisations that pursue digital and integrative strategies are few and far between, as observed by another, Correani et al. (2020), these types of organisations are not to be taken for granted. Often sustainability initiatives are separated from the business in terms of structure and reporting lines. Strategic incoherence between the two agendas. Kreutzer et al. (2015) add a governance perspective, showing how organisational control mechanisms designed for one strategic initiative can inadvertently undermine a concurrently pursued initiative when the two are not structurally integrated.

This gap between a well-developed digital leadership literature and a well-developed sustainability leadership literature that rarely cite or build on one another is the specific space this paper addresses. The remainder of the paper proceeds by first outlining the systematic review methodology used to compile the evidence base for this synthesis, then presenting the theoretical foundations that inform the integration,

before developing the SDLSG model as an explicit response to the integration gap identified here.

Research Methodology

This paper employs a Systematic Literature Review (SLR) methodology, adhering to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol for management research as specified by Tranfield et al. (2003) and further elaborated by Denyer and Tranfield (2009). The SLR methodology was selected because the research questions require the integration and synthesis of knowledge spanning multiple scholarly disciplines strategic management, information systems, organisational behaviour, sustainability science and corporate governance none of which individually provides a comprehensive account of the phenomenon under investigation.

Search strategy and database selection

Systematic literature searches were conducted across four major academic databases: Web of Science (WoS), Scopus, EBSCO Business Source Premier and Google Scholar. For primary analysis, only journal articles indexed in outlets listed in Scopus (Q1 and Q2 outlets, based on SCImago Journal Rankings) were included, as they are the most academically rigorous and peer-reviewed. review quality. Boolean combinations of the following terms were used in the search queries: digital the research identified key research gaps in the application of digital technology for business growth and sustainable development, including topics such as 'Leadership', 'Strategic leadership and digital transformation', 'Sustainable growth and digital'. "strategy", "CEO & digital transformation", "ESG & leadership", "Industry 4.0 leadership", decision making," and "elevated ethical standards" are among the most frequent responses. the most common answers are "Industry 5.0 leadership", "organisational ambidexterity and digitalisation", "data-driven decision making", and "elevated ethical standards". The two concepts are "leadership" and "dynamic capabilities and sustainability". The 2010-2024-time frame was used. applied to the post-mobile and post-cloud era, where digital transformation has come into the picture. As a strategic priority of organisations of all sizes and sectors.

Inclusion and exclusion criteria

Articles were included in the review corpus if they: (i) were published in peer-reviewed journals with a Scopus-listed SCImago Journal Rank (SJR) of Q1 or Q2; (ii) addressed leadership, digital transformation, strategic management or sustainability as primary themes; (iii) presented empirical or conceptual findings derived from rigorous scholarly methodology; and (iv) were available in full text in English. Articles were excluded if they were conference proceedings not subsequently published in peer-reviewed journals; technical papers without explicit leadership or organisational dimensions; published in non-peer-reviewed or predatory journals; or lacked coherent theoretical grounding (Kitchenham and Charters, 2007). Following these criteria, the final corpus comprised 124 peer-reviewed journal articles and 18 authoritative practitioner reports and books.

Analytical methods

Thematic The major analytical approach used was thematic analysis (Braun and Clarke, 2006), and this proved to be helpful. facilitating the identification of theoretical reoccurrences, empirical patterns and

emerging. The conceptual frameworks that have been identified in the literature on the subject. Bibliometric mapping was carried out using VOSviewer software for visualisation of co-citation networks and for the identification of the theoretical pillars most the research questions are at the heart of the research (van Eck and Waltman, 2010). Thematic and general public education, training and awareness-raising activities. The data were supplemented with practitioner intelligence from McKinsey Global. The research is from Institute, World Economic Forum, Deloitte Insights and Gartner research and ensure that the final SDLSG framework is both scholarly rigorous and applicable (Rousseau et al., 2008).

Theoretical Landscape

Key theoretical foundations

In the era of digital revolution, strategic leadership is modelled on a set of complementary theoretical frameworks. Together, each framework provides a unique way of explaining, yields a richly complex view of the leadership challenges that come with digital transformation and sustainability. Table 1 summarises the theories that support the underlying principles of the SDLSG model

Table 1. Theoretical frameworks informing strategic digital leadership

Framework	Core Proposition	Key Authors	Relevance to Digital-Sustainable Leadership
Dynamic Capabilities Theory	Sensing, seizing, reconfiguring resources enables sustained competitive advantage	Teece et al. (1997); Teece (2018)	Explains leaders' role in enabling continuous digital adaptation and capability reconfiguration
Upper Echelons Theory	Leader cognition, values and experience shape organisational strategy and performance	Hambrick and Mason (1984); Finkelstein et al. (2009)	Digital literacy and technology cognition of CEOs drives digital investment and transformation outcomes
Stakeholder Theory	Value creation for all stakeholders sustains long-term organisational performance	Freeman (1984); Freeman et al. (2010)	Anchors sustainability imperatives in leadership strategy and governance decisions
Ambidexterity Theory	Balancing exploration and exploitation resolve innovation paradox	O'Reilly and Tushman (2008); Birkinshaw and Gupta (2013)	Manages digital-legacy tension; enables simultaneous innovation and operational efficiency
Servant Leadership	Leader as enabler of follower growth and organisational purpose	Greenleaf (1977); Liden et al. (2014)	Sustains human-centric digital culture; critical for Industry 5.0 leadership
Institutional Theory	Organisations conform to institutional pressures for legitimacy	DiMaggio and Powell (1983); Scott (2008)	Explains ESG adoption dynamics and regulatory compliance in sustainability leadership

Note. Compiled from Teece et al. (1997), Hambrick and Mason (1984), Freeman (1984), O'Reilly and Tushman (2008), Greenleaf (1977), DiMaggio and Powell (1983).

Digital adaptation and dynamic capabilities

The framework of the dynamic capabilities proposed by Teece et al., 1997, and developed in great detail.

Perhaps the most theoretically rich and insightful source of understanding comes from Teece (2018). leadership in the digital era. Dynamic capabilities are capabilities of an organisation to sense adapt to external environment changes, take advantage of opportunities by investing Strategic commitment, and reconfigure existing resource configurations to be consistent with new strategies. competitive realities. With the concept of digital transformation comes the sensing capabilities which can be expressed in: leaders' ability to recognize technological signals of AI applications and platform business. Evaluate new innovations in the model and the potential of blockchain in the supply chain before it reaches the mainstream. commercial potential (Teece, 2018; Schilke et al., 2018). Leaders' Seizing Capabilities are: The readiness and authority of the institutions to invest in digital innovation, despite the challenges. Lack of organisation momentum and inconsistent returns. Reconfiguring capability - maybe the most demanding of the three require leaders to orchestrate comprehensive changes in business processes, skills and competencies of the workforce, organisational culture and technological architecture.

At the same time and without disrupting the continuous operation. One important lesson from the dynamic capabilities' literature is that these capabilities are not simply Organisational properties that can be obtained via technology investment - must be which were actively developed and sustained over time via leadership quality (Helfat and Peteraf, 1998). Organisations with complex technology can often deliver poor results in digital transformation and the lack of leadership quality to mobilise them. As a theoretical matter, in some instances organisations with less extensive technologizing resources get the job done Superior transformation outcomes due to outstanding leadership (Bharadwaj et al., 2013; Warner and Wäger, 2019). The finding makes the role of leadership development very significant in the context of this. One of the key investment priorities in digital transformation programmes, just after technology procurement. This course builds upon Upper echelons theory and digital cognition. this course builds on Upper echelons theory and digital cognition.

Upper echelons theory and digital cognition

The Upper Echelons Theory was introduced by Hambrick and Mason (1984) and significantly expanded upon by them in later work. Proposed by Finkelstein et al. (2009) and later researchers, is that the organisational strategic decisions and performance is systematically planned using cognitive schemas, values and experiential backgrounds of the top management team.

In the digital According to the Upper Echelons Theory, digital literacy is of paramount importance in the context of leadership. the capacity to be able to interact with technology experts and evaluate technologically-based claims critically. and conceptualize technology possibilities into strategy as a basic cognitive skill. Studies have shown that the ability to engage in positive social interactions in the virtual sphere is a prerequisite to effective digital leadership (Joshi and Boh, 2020; Tumbas et al., 2017).

Empirical experiences achieve better outcomes than those without them. this theory has been confirmed by research time and time again: CEOs with technology educational experiences outperform those without them. backgrounds, experience in technology intensive industries or proven prior digital experience, transformation experience invest significantly more aggressively in digital capabilities, adopt more sophisticated digital technologies sooner and better results in various performance measures. Financial and operational information (Li et al., 2021; Solberg et al., 2020). The implications of UET do not only affect the

individual CEOs, but also the The Board of Directors' and the whole top management team composition. Research by Nadkarni and Prügl (2021) shows that cognitive diversity of the top management team specifically the Breadth of technological experience, international exposure and functional heterogeneity Grows decisively to moderate the quality of strategic decisions under digital transformation contexts. Organisations that deliberately compose their top management teams to include digital natives Experienced operational leaders are more likely to be better equipped to deal with ambidexterity challenges inherent in in digital transformation (Heavey et al., 2015).

The stakeholder theory and integration of sustainability

As both Freeman (1984) and Freeman et al. (2010) have continued to build on this approach, the stakeholder theory has been further developed. the essential context for the theme of digital sustainability as offered by several modern scholars. normative basis for "real" sustainability as a leadership challenge, It's more than just a legal requirement. According to the theory of stakeholders, the purpose of an organisation goes beyond. In addition to creating financial value for shareholders, value generation for must also include 'value for'. All groups with interests that are “materially” affected by the activities of the organisation, such as: employees, customers, suppliers, communities and the natural environment. Digital Age, The Universe of the stakeholders has grown significantly, and now includes those who use digital platforms, data subjects, increasingly material stakeholders of the algorithmic governance become stakeholders of the future, who are not yet born. the stakeholders of the algorithmic governance become increasingly material and future generations are not yet born. In strategic decision-making, constituents play a role (Donaldson and Preston, 1995; Harrison et al., 2015). Leaders who truly embrace the stakeholder theory don't see ESG as a side issue for reporting purposes. They integrate stakeholder value creation into the essence of their business, but rather, they embrace the burden, It is the process of developing strategies and the measurement system of its performance. architecture.

Digital Transformation and the Leadership Imperative

Redefining strategic leadership for the digital age

Classical Classical leadership theories have been based on the assumption of an organization's rationality and stable hierarchical structures. Authority structures and extended strategic planning cycles are clearly not sufficient to addressing the speed, complexity and fundamental unpredictability of the contemporary digital This is an environment that is competitive, (Uhl-Bien and Arena, 2018). The ground-breaking systematic review of digital A compilation of 282 studies from 1992 to 2018 undertaken by Vial (2019), known as transformation research, Leadership is the most common factor associated with digital transformation, according to identifies. Leadership's importance in addressing the paradoxical tension inherent in the school's various roles became evident in success. in transformation: stability versus agility, exploration versus exploitation, centralised strategic control versus decentralised.in transformation: stability versus agility, exploration versus exploitation, centralised strategic control versus decentralised. Coherence versus operational responsiveness (decentralised). Others have responded to the leadership scholars. Instead, they have to enact this empirical reality through creating a distinctly digital leadership paradigm, which is different from. They differ significantly from their classic predecessors (Schwarz Müller et al., 2018; Porfirio et al., 2021).

There are a number of unique features of digital leadership that set it apart from leadership in other forms. From the previous leadership models. Digital leaders need to have and continually grow: not the expertise of engineers or data scientists - technological fluency, capacity to ask incisive questions, critically evaluate competing technological claims and engage Collaboratively with industry experts in all areas of digital technology (Weill and Woerner, 2018). Second, digital leaders have a responsibility of the organisation to build ambidextrous organisations that can simultaneously defend their established competitive positions and exploring the radically new digital opportunities in fundamentally new and often disrupted ways. Of course, the market spaces of O'Reilly and Tushman (2008) and Birkinshaw and Gupta (2013) are also relevant. Third, and perhaps Digital leaders need to show, “most distinctly”, what Ancona et al (2019) call their sense making capacity refers to the capacity to make sense of the extraordinarily complex in terms of organisational meaning. In an uncertain and fast-changing technological and competitive situation.

Organisational culture as a digital transformation lever

This is where organisational culture can become a digital transformation lever. This is where organisational culture can become a digital transformation lever. The organisational behaviour literature is converging on an intriguing finding: digital technology improves organisational behaviour. the organisational behaviour literature is coming together on an intriguing finding: digital technology improves organisational behaviour. Organisational culture is the most powerful aspect of digital transformation, whereas the surface phenomenon is. Westerman et al. (2014); Hess et al. (2016) identify enabler and the biggest hurdle in this process. Leaders who Consistently deliver enhanced digital transformation results, demonstrate a sophisticated Recognising that cultural change, alongside technology, is a key component of success in transformation, and often more challenging to achieve in a similar time period. The cultural dimensions Most consistently cited in the peer-reviewed literature as a successful indicator of digital transformation. Psychological safety is the common organisation belief that interpersonal risk-taking, errors and failures are acceptable. acknowledgement and dissent from prevailing views are free from punitive consequences A customer centricity and growth mindset (Dweck, 2006; Newman et al., 2017) were the two other factors that were connected to the two most frequently occurring factors. Pfeffer and Sutton, 2006).

In particular, psychological safety has been identified as an important cultural prerequisite to digital innovation. Teams in digitally transformed organisations are successful when they demonstrate Reported higher levels of psychological safety in a systematic manner than those reported by their counterparts in less transformed groups. This is because organisations have an opportunity to create psychologically safe spaces for their people, and it is the leaders who are investing in doing so. Build environments where: Digital experimentation, failure and iterative innovation can take place. can flourish (Edmondson and Lei, 2014; Frazier et al., 2017). Leadership behaviours that are consistently associated with success. Model intellectual humility and error acknowledgement, actively seek and openly take in critical feedback, establish team processes that encourage critical feedback. provide equal opportunities for participation, irrespective of hierarchical level (Carmeli et al., 2010).

5.3 Data-driven leadership and artificial intelligence integration

The proliferation of big data analytics, machine learning and AI technologies has introduced a The integration of algorithmic principles into strategic leadership practice is rhetorically new dimension. Rhetorically new dimension is the integration of algorithmic aspects in strategic leadership practice. Transforming intelligence into decision-making processes that have been traditionally based on individual Judgment, executive intuition and accumulated managerial experience (Davenport and Ronanki, 2018; Haefner et al., 2021). Organisations with leaders who have been effective in blending strategic vision Organizations with high-level data analytics tools can make measurably better decisions about: a variety of key areas such as when to enter the market, which products to prioritise in development, The stages of talent acquisition and management, along with dynamic risk assessment (Siegel, 2016; Waller and) form the core of the chapter. Fawcett, 2013). However, the proper implementation of AI in organizational decision-making poses a few challenges. but the proper implementation of AI in organizational decision-making presents some challenges.

a constellation of governance challenges, which require nuanced leadership responses to mere technology adoption. One of the most significant dangers of AI-based decision making is algorithmic bias: AI Historically biased information systems perpetuate and can even exacerbate these inequalities. inconsistent practices in hiring, loan approval and denial, etc. medical diagnosis (Noble, 2018; O'Neil, 2016). Many modern AI systems are opaque, making it difficult to understand their decision-making processes. Therefore, so-called "black box" problem causes gaps in accountability in organisational governance that needs to be addressed. be clearly addressed by the leadership's decisions on transparency and explainability of AI, Standards and human oversight mechanisms (Doshi-Velez and Kim, 2017). Leaders who approach Managing the ethics of AI systems proactively with ethics review boards and investing in explainable AI. Proactively managing ethics of AI systems with ethics review boards and investing in explainable AI. assessed and fully understood. capabilities and organisational cultures that allow for critical assessment and understanding of algorithmic outputs. Those who are interrogated and not simply taken at their word are much better equipped to grasp the While delivering the benefits of AI, handling social and reputational risks (Floridi et al., 2018; Taddeo and Floridi, 2018).

Digital leadership and decentralized decision-making.

Another key trait of good digital leadership is the intentional shift of decision-making power within an organization's hierarchy. Traditional command-and-control leadership models rely on information asymmetry, which is in favour of senior management, which is fundamentally Not well suited to digital world where technological skills required for the task are scattered, Changes in market conditions happen faster than the hierarchical decision cycles can react. centricity requires empowered front-line decision making (Mäkinen et al., 2020; Spillane, 2005). Theoretically, this shift can be supported by distributed leadership theory (Spillane, 2005) which posits that leadership is not a sole responsibility of any one individual, but is distributed across the school community. that leadership should be shared among several people. Involve organisational actors in a manner that takes advantage of various knowledge and that allows for adaptation in a responsive way. Digital leaders who create distributed leadership capacity, establishing governance structures that Enable agile teams to make impactful product, process and customer decisions without consulting the rest of the organization. Hierarchical pre-authorisation always proves to be more

effective than the 'centralised' variety. Digital transformation means that they have control over it (Rigby et al., 2016; Dikert et al., 2016).

Sustainability-A Strategic Leadership Imperative

The ESG leadership mandate

The Environmental, Social and Governance (ESG) factors have become an integral part of corporate strategy, and are arguably the biggest shift in expectations of corporate leaders in the last ten years and across all sectors and regions. A well-designed and long-term empirical study by Eccles et al. (2014), based on 180 companies tracked for 18 years, gives very solid empirical evidence that companies with voluntary comprehensive environmental and social policy in the 1990s have significantly performed better on stock market returns and accounting metrics over the next 20 years compared to their matched counterparts. The empirical foundation that was established in this foundational finding has been replicated and extended in a number of later studies using different methodologies and samples (Friede et al., 2015; Khan et al., 2016; Flammer, 2015), thus confirming the finding with a varied array of studies.

The ESG leadership mandate is delivered in several reinforcing ways, which all have a financial impact on organisations of all sizes and all contribute to the sustainability performance being financially material. In the regulatory dimension, increasingly more complex sustainability reporting obligations, such as the European Union's recently proposed Corporate Sustainability Reporting Directive (CSRD), the SEC's climate disclosure rules and similar legislation in Asia-Pacific jurisdictions are making it increasingly impossible for companies to not develop their capacities to measure, certify and publish their ESG reports, something that was missing from the majority of corporate governance frameworks 10 years ago (Hahn & Kühnen, 2013; Adams et al., 2020). The dynamic of the capital markets has seen ESG-related investment approaches become more and more established and influential, bringing sustainability performance into the very center of the institutional investment decision-making process (Eccles and Klimenko, 2019).

Business models and their impact on sustainability in the digital era

The digital economy, at the same time, raises unique sustainability threats, and presents new opportunities for sustainability-related innovation, which strategic leaders need to manage to the same degree. On the risk side, the environmental impact of digital infrastructure has become a material issue: data centres worldwide use an estimated 1-1.5% of the world's electricity - and this is set to increase significantly as AI workloads are deployed at a rapidly increasing rate, a process that uses a much larger amount of computing power than previous digital applications (IEA, 2023; Andrae and Edler, 2015). Aside from energy use, the social sustainability issues embedded in the business models of the digital platforms are becoming more material risks for reputational and regulatory reasons, and forward-thinking leaders should take the lead in addressing them: precarious working conditions for persons involved in gig economy labour, issues of transparency in algorithmic governance, digital privacy rights, and the epistemic harms of the proliferation of disinformation (De Stefano, 2016; Zuboff, 2019).

Digital technologies provide strong tools for identifying and amplifying sustainability value chain impacts

at the industry and ecosystem level and throughout value chains. AI-based supply chain optimisation platforms help to cut back on material waste and energy use by uncovering inefficiencies that were not apparent to human planners (Lasi et al., 2014). Circular economy digital platforms include peer-to-peer sharing and resale models, which prolongs the life cycle of a product and lowers the number of materials being moved through the system (Geissdoerfer et al., 2017). Precision agriculture systems using IoT sensor networks and satellite-based data successfully decrease water, fertiliser and pesticide consumption without affecting productivity (Liaghat and Balasundram, 2010). Leaders who recognise and invest in such sustainability opportunities will deliver "sustainability-driven innovation" which in turn will enhance organisational ESG performance, lower operational costs and deliver increasingly compelling value propositions that will resonate with sustainability-minded customers, investors and employees.

Industry 5.0 and human-centric sustainable leadership

The industry 5.0 paradigm, put forward by the European Commission (2021), goes beyond Industry 4.0 and gives a more explicit definition of how the concept of human-centric design, coupled with ecological sustainability, is an integral part of the next industrial revolution rather than the mere impact optimisation options. Now Industry 5.0 is about designing industrial systems to complement human capabilities, creativity and well-being through the explicit use of advanced technologies such as collaborative robots, human-machine interfaces and AI augmentation for efficiency gains. At the heart of Industry 5.0 lies a paradox, a normative vision to achieve both human flourishing and a restoration or enhancement of ecological and social capital, as well as an organisational design challenge: how should organisations be designed so that digital technologies can truly support them to achieve these goals? (Breque et al., 2021; Xu et al., 2021).

In the context of Industry 5.0, leaders need to rethink the purpose of their organisations and think beyond the shareholder primacy paradigm that has guided managerial thinking over the past century to a multi-capital value creation paradigm that acknowledges human and social and natural capital as assets that create financial value for the organisation (Mayer, 2018; Dyllick and Muff, 2016). This purpose reconceptualization is more than just catchy rhetoric it has real implications for governance architecture, performance measurement systems, capital allocation decisions and executive incentive design. Through the leadership of leaders who involve multi-capital thinking in these organisational systems, the structural conditions are created which allow sustainable leadership to be organizationally supported, not just through individual leadership commitment (Eccles et al., 2014; Integrated Reporting Committee, 2021).

The Strategic Digital Leadership for Sustainable Growth (SDLSG) Model

Model development and rationale

Though there is a significant and growing number of articles on digital leadership and sustainability leadership, no integrated conceptual framework that combines the two constructs of digital leadership and sustainability leadership under one umbrella has been developed to date (Parida et al., 2019; Rashid and Barnes, 2017). It is a conceptual gap that is both theoretically relevant and practically relevant, as organisations that adopt a digital transformation and sustainability strategy separately, in separate organizational units, with different performance measures and different allocation of resources miss the

potential benefits of synergies that can be achieved when the two strategies are linked, and often experience strategic incoherence, which weakens the effectiveness of both strategies (Correani et al., 2020; Kreutzer et al., 2015). As a result of the abductive theoretical synthesis process that involved the 124 scholarly articles and 18 practitioner reports that make up the SLR corpus, the SDLSG model was developed explicitly to address this integration gap by outlining four distinct leadership domains and competency needs for each.

In line with the SDLSG model, the four domains are presented.

Digital vision and technological stewardship (Domain 1):

The first domain of the SDLSG model is the role of fundamental leadership in defining a compelling, coherent and future-focused digital vision, which gives direction to an organisation in times of great technological uncertainty and rapid competitive change. The SDLSG conception of digital vision goes beyond technocentric narratives about when and how to adopt digital technologies, or about how to optimize the value of investments in technologies for financial return, but it emphasizes the need to build a digital vision that involves the development of a compelling organisational story that links digital technological potential with the ability to create unique value for customers, employees and society (Westerman et al., 2014; Matt et al., 2015). Technological Stewards must always scan the digital horizon and stay on top of new technologies to systematically observe and gather them in a process of environmental scanning, establish technological expert advisory networks and develop organizational processes for the conversion of technological intelligence into strategic possibilities (Hess et al., 2016). At an institutional level, technological stewardship is facilitated by the presence of dedicated organisational structures such as Chief Digital Officers (CDOs), digital innovation laboratories, corporate venture capital units and external technology advisory boards (Tumbas et al., 2017; Singh and Hess, 2017).

Agile organisational design and cultural architecture (Domain 2):

The second domain focuses on how leaders' structure and culturally embrace their responsibilities in creating organisations that can adapt continuously a functional need for sustained digital transformation success in contexts where uncertainty is persistent and technology is rapidly changing (Overby et al., 2006; Tallon and Pinsonneault, 2011). Organisation leaders build organisation architectures, such as SDLSG, that enable digital innovation activities to be structurally separated from core operational activities, and allows innovation units to operate with the agility, experimentation-orientation and risk tolerance that is suitable for the exploration of digital frontiers without being systematically suppressed by the pressure to be efficient that is legitimate for established business operations (O'Reilly and Tushman, 2008; Raisch and Birkinshaw, 2008). Such structural decisions need to be reinforced by deliberate and explicit cultural decisions: SDLSG leaders develop organisational cultures that foster psychological safety, intelligent risk-taking and systematic learning from failures and experiment outcomes (Edmondson, 1999; Newman et al., 2017).

Governance and sustainability (Domain 3):

The third domain reflects the SDLSG model's recognition that sustainability must be embedded in the foundational governance architecture of the organisation the systems, processes and accountability structures through which organisational decisions are made and performance is measured rather than treated

as a supplementary reporting function or communications exercise (Eccles et al., 2014; Adams et al., 2020). SDLSG leaders operationalise stakeholder theory through substantive governance tools: materiality assessments that rigorously identify the ESG issues most consequential to specific stakeholder groups; sustainability-linked executive compensation structures that align leadership incentives with ESG performance outcomes alongside financial metrics; and board-level ESG oversight committees with genuine expertise, authority and accountability for sustainability strategy and performance (Khan et al., 2016; Flammer et al., 2019). Equally, Domain 3 encompasses the governance of digital transformation as a sustainability process in its own right addressing AI ethics, data privacy, algorithmic accountability and the governance of platform labour relations as emerging frontiers of corporate governance (Mittelstadt et al., 2016).

Domain 4: Regenerative value creation and sustained growth.

The fourth and culminating domain of the SDLSG model focuses on the ultimate strategic objective toward which the integration of digital transformation and sustainability leadership is directed: the creation of sustained, regenerative value that generates enduring organisational performance while simultaneously contributing to the restoration and enhancement of ecological and social systems (Fullerton, 2015; Dyllick and Muff, 2016). Regenerative value creation draws on ecological principles to reconceptualise the organisational mission beyond sustainability as "doing less harm" toward active organisational participation in the restoration of natural and social capital. SDLSG leaders in this domain define organisational purpose through the productive interaction between digital capabilities and sustainability aspirations creating business model innovations, product innovations and value chain configurations in which business success and positive societal outcomes are structurally mutually reinforcing rather than fundamentally in tension (Bocken et al., 2014; Geissdoerfer et al., 2017).

Table 2. Evolving leadership competency requirements in the digital era

Leadership Competency	Traditional Context	Digital Era Requirement	Sustainability Dimension
Visioning	Long-range strategic planning based on stable environmental assumptions	Dynamic, scenario-based foresight incorporating technological disruption	Planetary boundary awareness; multi-capital value creation orientation
Decision-Making	Hierarchical, slow-cycle deliberation with expert input	Data-driven, real-time agility with AI augmentation	Stakeholder-inclusive governance; ESG risk integration
Communication	Top-down broadcasting of strategic direction	Networked, multi-channel dialogue with diverse stakeholders	Transparent ESG disclosure; authentic sustainability narrative
Learning Orientation	Periodic formal training with episodic knowledge updates	Continuous, AI-augmented organisational learning	Systems thinking; ecological and social capital literacy
Risk Management	Primary focus on financial and operational risks	Cyber, reputational, AI and platform risks	Climate risk; biodiversity loss; transition risk management
Team Management	Co-located, functionally siloed hierarchical teams	Distributed, cross-functional agile squads	Inclusive, psychologically safe, neurologically diverse teams

Note. Compiled by the authors based on synthesis of Teece et al. (1997), Westerman et al. (2014), Eccles et al. (2014), European Commission (2021) and O'Reilly and Tushman (2008).

Empirical support and organisational illustrations

Systematic examination of digital data and evidence. The SDLSG model is empirically credible because it is based on a systematic examination of digital data and evidence. Multiple applications of transformation leadership - in various industries and national settings. Microsoft's digital transformation launched by CEO Satya Nadella since his arrival in 2014 is well underway and has been broadly hailed as successful. Microsoft's transformation launched since Satya Nadella took charge in 2014 is well underway and is broadly regarded as successful. worm casting has been considered one of the best all-in-one and most profitable applications of integrated The first digital sustainable leader in corporate history. The four skills exhibited by Nadella's leadership are evident. Based on SDLSG Domains with exceptional fidelity: the articulation of a cloud-first, mobile-first strategic approach. Reorganisation of a wide range (Domain 1); an organisation whose structure is completely reshaped. Cross functional team lines and deliberate development of a MSFT along agile. The old "stack ranking" culture of internal competition is being replaced by a growth mindset culture. The previous culture of "stack ranking" within internal competition is being replaced by a growth mindset culture. (Domain 2); the embedding of accessibility, AI ethics principles and environmental sustainability A commitment to carbon negativity by 2030 that becomes part of product design and governance (Domain 3); and a strategic shift from product centric profit maximisation (Domain 4). towards platform ecosystem value creation, delivering extraordinary shareholder value together, societal impact (Domain 4) (Nadella et al., 2017) Paul Polman's stewardship over Unilever in the course of the Unilever Sustainable Living Plan (2010-2020) offers a complimentary organizational example in the field of consumer goods, showing how sustainability-fuelled leadership can deliver excellent business results and physical and social and environmental effects. Polman's leadership saw Unilever's pledge to Reducing its impact on the environment by half, improving the livelihoods of one million smallholder farmers. and getting 100% of acquisitions powered by renewable energy, while at the same time, providing compound shareholder returns significantly above those of major companies. Competitors in the consumer goods space (Polman and Winston, 2021). The Unilever case and the strategic logic impact rely on an understanding of communication processes. consistent with SDLSG Domain 4 proposition, understanding communication processes is crucial for business success and positive societal impact. When organisations are designed and led with a sufficient amount of mutual reinforcement, outcomes are mutually reinforcing.

Discussion and Implications*Implications for leadership theory*

The theory of synthesis presented in this paper has several important implications for the broader field of leadership studies. The most elementary is the demonstration that Two scholarships have been developed now, digital leadership scholarship and sustainability leadership scholarship. There was very little cross-fertilisation across the different trajectories, although largely in parallel trajectories and addressed organisations. If they are exposed to the same environmental challenges at the same time, they need and gain from clear articulation of: Both theoretical and practical integration (Parida et al., 2019; Rost and Hutber, 2022). The disjointed relationships among the History shows that the field of management information systems and the other disciplines share their boundaries in literature, strategic management and sustainability science, but not really a separation of the two. The phenomena of an organisation that is

studied. This theoretical is defined in the SDLSG framework. Integration is not only intellectually desirable but also practically necessary: organizations that are successful or fail were found to be doing so or not doing so in the integration process. Strategic incoherence arises when people seek to pursue digital transformation and sustainability independently, the system, which undermines the effectiveness of both resource competition and capability gaps. Initiatives (Correani et al., 2020).

Another theoretical implication relates to the unit of analysis for digital leadership. research. The focus of digital transformation and sustainability leadership is in the majority of cases the same. Although these literatures on individual CEO characteristics and behaviours were theoretically productive, they were not very popular. These literatures on individual CEO characteristics and behaviours were theoretically productive but were not very popular. Overlook the collective, distributed and institutionally embedded nature of effective digital sustainable leadership (Hambrick, 2007; Carpenter et al., 2004). The SDLSG model proposes that digital-sustainable leadership is more accurately conceptualised as an organisational property Embedded in governance structure, cultural architecture, incentive systems and capability More configurations than as an individual leader attribute. This reconceptualization has important Theoretical implications, empirical research design and leadership implications development practice.

Implications for preparation

The SDLSG model provides operational advice to organisational leaders, boards and executives development professionals within an established temporal context. In the short term (zero to three years), leadership should focus on: Comprehensive digital literacy assessments for the whole top management team and the board, with targeted development programmes for identified gaps; True digital authority and access to the board, rather than a functional reporting role for a Chief Digital Officer; and a rigorous assessment of materiality (Hess et al., 2016; Eccles and Klimenko, 2019) to define the specific dimensions of ESG that most impact on the creation of value and on trust.

In the medium term (3-5 years), leaders need to engage in the more complex task of institutionalising, redesigning executive performance management and compensation systems to include digital capability development and ESG performance measures alongside the traditional financial KPIs, building the organisations in a way that creates a digital transformation value creation story that is connected and aligned to financial reporting and that reliably reinforces appropriate SDLSG behaviour (Flammer et al., 2019); investing in organisation learning architectures such as digital academies, cross functional innovation hubs and AI assisted knowledge management systems to help the diffusion of digital capabilities beyond the top management team into the wider organisational workforce, (Garvin et al., 2008; Argote, 2013); and introducing integrated reporting processes that combine digital transformation progress, sustainability performance and financial results into a unified value creation story of the organisation as a whole, rather than separate disclosures (Adams et al., 2020; Integrated Reporting Committee, 2021).

Policy suggests and Informative Implications

The results from this paper have important implications for curriculum design in business school and the architecture of executive education programmes. Courses in digital strategy and sustainability strategy taught as separate electives by faculty from different disciplinary backgrounds to students who view them as

separate academic fields tend to systematically miss the integrative skills needed for SDLSG leadership, rather than training them (Dyllick, 2015; Muff et al., 2013). Increasingly, researchers in management education are advocating the deliberate inclusion of digital literacy, AI governance, ESG reporting, systems thinking and stakeholder engagement skills in MBA and executive learning programmes as part of the basic management skill sets necessary to everyday practice, rather than as specialisations (Starik et al., 2010; Laasch et al., 2020). For curriculum designers who value a conceptual framework to develop leaders who are able to engage with the integrated digital-sustainability leadership challenge, here is the SDLSG framework.

For policy-makers, the research indicates that policy interventions to the digital economy and sustainability performance outcomes will be more impactful on organisational outcomes if they are shaped with greater attention to the implications for leadership development. The danger is that regulations that are essentially compliance driven, using minimum standards, could result in the development of ESG reporting sophistication without real sustainability performance and digital adoption without real transformation (Peng et al. 2017; Tay et al. 2018). A well-designed regulatory architecture that sets high-performance goals and offers transition facilitation, capacity-building tools and incentives for SDLSG-consistent behaviour can legitimise and advance digital-sustainable leadership capacity-building, beyond what can be accomplished with a purely market-based approach.

Conclusion

This research paper has adopted a comprehensive and theoretically informed approach to the study of the characteristics, skills and models of strategic leadership in the digital era, intensively focusing on the co-evolution of digital transformation and sustainable growth as an integrated strategic goal. By systematically reviewing and synthesising the 124 peer-reviewed scholarly articles and 18 authoritative practitioner reports from strategic management, information systems, organisational behaviour and sustainability science all from outlets with a Scopus Q1 index it has developed a framework for Strategic Digital Leadership for Sustainable Growth (SDLSG), both as a theory and as a guide to practitioners of the field. This investigation yields a number of substantive conclusions.

The first is the intellectual and organisational disconnect between digital transformation and sustainability strategy, which is historically explainable, but not justifiable on a theoretical basis and is certainly not helpful from a pragmatic point of view. The most convincing organisational examples of digital and sustainable growth in the digital era are Microsoft under Satya Nadella, Unilever under Paul Polman, Patagonia with its founding team and Maersk, which is constantly changing. These are all organisations that have made sustainable growth and digital growth part of their one and the same organisational growth strategy, not two separate ones that struggle to share organisational resources and eye each other's leadership.

Secondly, the competencies needed for successful strategic leadership in today's world include qualitatively new areas of knowledge such as AI governance, platform ethics, ESG reporting, and systems thinking and regenerative value creation, which are hardly addressed in traditional leadership development programs. The disconnect between the skills that organisational leaders need and the skills that leadership development systems can consistently deliver is a structural weakness in an organisation's ability to adapt to

the digital-sustainability challenge that must be addressed by business schools, corporate leadership development departments and policy makers..

Third, the four domains of the SDLSG model digital vision and technological stewardship; agile organisational design and cultural architecture; sustainability governance and stakeholder inclusion; and regenerative value creation and sustained growth provide both a theoretically coherent framework for scholarly research and a practically actionable architecture for leadership development and organisational strategy. The model's most fundamental proposition that sustainable growth in the digital age is not a technical or financial engineering challenge but a leadership challenge requiring the cultivation of human, organisational and ecological capital with equal strategic intentionality has significant implications for investment priorities across organisational development, executive education and public policy domains.

This study has some limitations which should be taken into consideration in further studies. Although the method was systematic and rigorous. Although there are methodological advantages to the literature review, the database selection and search terms used, along with the limited time period (2010-2024) will limit the corpus and exclude potentially relevant literature. earlier scholarship. The SDLSG framework under "conceptual model" is developed based on theoretical knowledge. synthesis, empirical support is needed in the form of large-scale quantitative studies and case studies using qualitative research methods. The suitability of the framework for a variety of national contexts. institutional environments, in emerging markets with varying institutional regulatory rules. There is a need to specifically study environments, cultural values and configurations of digital infrastructure. in light of the literature reviewed which is skewed significantly toward North American and European literature organisational contexts. Last but not least, advancements in AI since 2023 have been rapidly increasing. The rise of large language models and generative AI as a game-changing asset. continues to drive a need for ongoing improvements in the framework, particularly in the digital space. evolves.

To sum up, the evidence and argumentation produced in this paper fully support the strategic. Leadership is the critical factor for a digital age to produce. sustains organisational and societal values or it just speeds up competitive disruption and ecological degradation. Technological abilities, financial capital and digital infrastructure the necessary but not sufficient conditions for sustainable digital transformation; their productive. deployment demands the quality, vision and integrative judgment of leaders who are dedicated to the. The simultaneous cultivation of business excellence, human flourishing and the restoration of the ecology. the development of such leaders must be recognised and resourced as the highest-priority long-term investment available to organisations, educational institutions and governments committed to navigating the digital transition toward genuinely sustainable growth.

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