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Corporate Governance in the Digital Economy (A Theoretical Analysis of the Challenges and Opportunities)

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Abstract:

This research aims to establish a conceptual and theoretical framework for corporate governance within the context of the digital economy. It examines the transformations in governance roles and mechanisms, analyzes the key challenges facing corporate governance in the digital economy (with a focus on technological, organizational, and institutional dimensions), and explores the opportunities the digital economy offers for enhancing corporate governance, particularly in the areas of transparency and disclosure, oversight and accountability, and supporting strategic decision-making. This research employs a theoretical and analytical approach, based on a review and analysis of recent scholarly literature published in peer-reviewed international journals over the past seven years.

The research concludes that corporate governance in the digital economy is no longer merely a formal extension of traditional governance, but rather represents an institutional shift in roles and responsibilities. The board of directors, not the executive management alone, is now the primary actor in guiding digital transformation and managing its risks. A lack of digital expertise within the board leads to superficial oversight, deepening the governance gap. Digital technologies can enhance transparency and accountability if integrated within clear governance frameworks. Reliance on technology without parallel development of regulatory frameworks and corporate culture increases risks rather than reducing them.

Keywords: Corporate Governance, Digital Economy, Theoretical Analysis, Challenges, Opportunities

1. Introduction:

Over the past decade, the world has witnessed an unprecedented acceleration in the shift towards the digital economy as a new paradigm for value creation. This paradigm is based on data, digital platforms, algorithms, artificial intelligence, blockchain, and cloud infrastructure. This transformation has reshaped business models, organizational boundaries, and markets, giving rise to new patterns of risk and opportunity directly linked to how companies are managed, directed, and controlled. In this context, corporate governance emerges not only as a traditional mechanism for regulating the relationship between owners and management, but also as a dynamic institutional framework that must adapt to the demands of the digital economy. This includes its technological complexity, accelerated innovation cycle, broad stakeholder base, and heightened sensitivity to issues related to data, privacy, and cybersecurity (Nahum et al., 2026).

Recent literature has shown that digital transformation is not simply about adopting technology; it necessitates changes in organizational structure, decision-making mechanisms, and strategic oversight. Effective governance in the digital age depends on the board's ability to guide digital transformation and manage its risks within the context of ownership, board structure, and functions (Nahum et al., 2026). It is also influenced by the extent to which the board possesses digital expertise that enables it to understand, evaluate, and align technical decisions with strategic objectives. Recent empirical studies have supported this trend by highlighting the impact of digital expertise within the board in driving digital innovation and improving performance through a "resource allocation" channel, rather than solely through the traditional oversight role (Yu et al., 2025).

Conversely, the digital economy reveals a growing gap between the demands of corporate oversight and the capacity of many boards to address technological risks. Cybersecurity is a prime example; evidence shows that cybersecurity oversight has become a core board responsibility, yet current practices suffer from a lack of specialization, diffused responsibilities, and an over-reliance on a single “expert” member or on technical reports that fail to translate into accountable governance decisions (Gale et al., 2022). Published field findings also indicate that the absence of cybersecurity expertise within the board can lead to “symbolic oversight” rather than substantive oversight, even when formal oversight activities are performed similarly to those carried out by experts (Lowry et al., 2025). Digital transformation is thus redefining the standard of “due

diligence" for boards by shifting from traditional financial/operational oversight to oversight of data, algorithms, and digital infrastructure.

A related challenge is the growing reliance on artificial intelligence (AI) in forecasting, risk management, compliance, and reporting, raising new governance issues related to transparency, algorithmic bias, interpretability, and accountability. Recent contributions have proposed frameworks for integrating AI at the board and committee levels or within managerial work, emphasizing that "augmented intelligence" may be more consistent with accountability requirements than complete system autonomy (Ahdadou et al., 2025). Concurrently, legal regulation globally is moving towards "accountability documentation" models by imposing impact and risk assessment obligations and transparency requirements, thereby expanding the responsibilities of companies and their boards to society and regulators (Oduro et al., 2022). This means that governance in the digital economy is no longer limited to agency balances but also encompasses the governance of the social and legal implications of technologies.

In terms of data, data governance has become a central focus of corporate governance due to the increasing scale of data processing, the interconnectedness of digital supply chains, and the growing risks to compliance and reputation. Recent literature proposes approaches that link data protection compliance with sustainability and ESG frameworks as corporate incentives to promote data ethics and mitigate "legal but harmful" digital practices (Balboni & Francis, 2024). The European environment, for example, is witnessing advanced debate on how digital transformation, artificial intelligence, and the data economy are reshaping corporate law and governance through concepts such as "corporate digital responsibility" and the redefinition of data stakeholders (Möslein, 2025). These transformations underscore that digital governance is not merely a regulatory choice, but a necessary response to the changing nature of resources (data), risks (cyber/algorithmic), and accountability (regulatory/societal).

However, the digital economy should not be viewed solely as a source of challenges, but also as an incubator of significant governance opportunities. Digital technologies can enhance transparency, accuracy of disclosure, speed of oversight, and the ability of the governing body to anticipate future needs through advanced analytics. They may also enable new governance models within platform and blockchain environments, where decision-making authority is distributed among multiple stakeholders within governance systems ranging from centralized to open-source, depending on the platform's ecosystem characteristics and the incentives of its participants

(Santalo & Filatotchev, 2025). Therefore, the digital economy opens up avenues for developing governance models that are more adaptable to networks and platforms, more capable of integrating stakeholders, and more reliant on proactive risk management.

1.1. Research problem:

Based on the foregoing, the research problem lies in the need for a comprehensive theoretical analysis that explains the relationship between corporate governance and the digital economy, and identifies ways to develop governance frameworks that align with the requirements of the contemporary digital environment. The research problem is defined by the following main question:

How can corporate governance be developed within the digital economy in a way that balances the digital challenges and the opportunities offered by modern technologies?

This main question gives rise to a set of sub-questions consistent with the research topics, as follows:

- What is the conceptual and theoretical framework that governs the relationship between corporate governance and the digital economy?

- What are the most prominent technological, organizational, and institutional challenges facing corporate governance in the digital economy?

- How can the digital economy contribute to enhancing transparency, improving oversight and accountability, and supporting strategic decision-making within the framework of corporate governance?

1.2. Research Objectives:

This research aims to achieve a set of scientific objectives consistent with its analytical structure, namely:

- Establishing the conceptual and theoretical framework of corporate governance within the context of the digital economy, and demonstrating the transformations in governance roles and mechanisms.

- Analyzing the main challenges facing corporate governance in the digital economy, with a focus on technological, organizational, and institutional dimensions.

- Exploring the opportunities offered by the digital economy to enhance corporate governance, particularly in the areas of transparency and disclosure, oversight and accountability, and strategic decision support.

2. Research Methodology:

This research adopted a theoretical analytical approach, based on a review and analysis of recent scientific literature published in peer-reviewed international journals over the past seven years. The aim was to construct a conceptual and explanatory framework that clarifies the dimensions of corporate governance within the context of the digital economy. This approach was implemented by analyzing relevant concepts and theories, extrapolating digital challenges and opportunities, and linking them to current trends in corporate governance, without resorting to field data collection or statistical testing.

3. Theoretical Framework:

This section presents the theoretical framework for corporate governance in the digital economy through four main topics that address conceptual foundations, challenges, potential, and contemporary trends.

3.1. Conceptual and Theoretical Foundations of Corporate Governance in the Context of the Digital Economy

3.1.1. The Concept and Evolution of Corporate Governance

Corporate governance is a central concept in contemporary economic and administrative thought. It refers to the set of rules, mechanisms, and relationships through which companies are directed and controlled to ensure a balance between the interests of shareholders, management, and other stakeholders. Historically, the concept has been linked to the agency problem arising from the separation of ownership and management. Governance has sought to limit opportunistic management behavior and promote accountability and transparency (Nahum et al., 2026).

However, recent literature confirms that corporate governance is no longer confined to its narrow financial or legal dimensions. It has evolved to encompass strategic, institutional, and ethical dimensions. Contemporary corporate governance aims to ensure long-term sustainability, manage risks, guide innovation, and enhance market confidence, particularly in environments characterized by uncertainty and rapid technological change (Santalo & Filatotchev, 2025).

This development highlights the shift in governance from a supervisory tool to a strategic guidance mechanism.

In this context, the board of directors is seen as the central pillar of corporate governance, undertaking multiple functions including oversight of executive management, setting strategic directions, managing risks, and protecting stakeholder interests. With the accelerating pace of digital transformation, these functions have expanded to encompass overseeing complex technical decisions, such as investing in digital infrastructure, utilizing artificial intelligence, data governance, and cybersecurity (Gale et al., 2022). Consequently, the criterion for "governance effectiveness" is no longer solely based on independence or the number of committees, but rather on the board's ability to understand and interact with the digital environment.

3.1.2. The concept of the digital economy and its basic characteristics

The concept of the digital economy refers to an economic model that relies fundamentally on digital technologies for the production and exchange of goods and services, value creation, and market regulation. The core characteristic of the digital economy is the centrality of data as a strategic resource, in addition to reliance on digital platforms, cloud computing, artificial intelligence, blockchain, and the Internet of Things (Möslein, 2025).

The digital environment is characterized by several features that make it radically different from the traditional economy. First, it is highly immaterial, where value is generated more from information and algorithms than from physical assets. Second, it is characterized by rapid innovation and short technological lifecycles, forcing companies to make investment and strategic decisions under high levels of uncertainty. Third, it is characterized by interconnected markets across platforms, where companies operate within ecosystems comprising multiple actors, including developers, users, and regulators (Santalo & Filatotchev, 2025).

These characteristics lead to a redefinition of corporate risk, as digital risks—such as cyber breaches, privacy violations, and algorithmic bias become an integral part of strategic risk. Studies have shown that these risks cannot be effectively managed by technology units alone, but require high-level governance oversight due to their financial, legal, and reputational implications (Lowry et al., 2025). Therefore, the digital economy imposes a new governance logic that moves beyond traditional post-implementation frameworks to proactive and preventative models.

3.1.3. The Relationship Between Corporate Governance and the Digital Economy

The relationship between corporate governance and the digital economy is evident in the fact that digital transformation is not merely a technological change, but an institutional transformation that touches the very core of the company's guidance and control mechanisms. The literature has shown that the success of digital transformation depends largely on how it is implemented from a governance perspective, that is, on clear roles and responsibilities, the integration of the digital dimension into the strategy, and the provision of effective oversight by the board of directors (Nahum et al., 2026).

From a theoretical perspective, this relationship can be explained by combining several approaches. On the one hand, agency theory suggests that digitalization may widen the information gap between management and the board due to the complexity of technical decisions, necessitating the development of new oversight mechanisms. On the other hand, resource dependency theory asserts that the board's digital expertise is a strategic resource that grants the company access to technological knowledge and opportunities, enhancing its capacity for innovation (Yu et al., 2025). The corporate perspective highlights the role of regulatory and normative pressures—particularly those related to artificial intelligence and data protection—in reshaping governance practices (Oduro et al., 2022).

Empirical evidence supports this theoretical overlap, with recent studies demonstrating that having digitally experienced board members is positively associated with higher levels of digital innovation and performance, not only through improved oversight but also by supporting strategic decisions related to digital transformation (Yu et al., 2025).

Conversely, other findings suggest that the absence of such expertise can lead to superficial oversight of digital risks, particularly in cybersecurity, even when oversight activities are merely nominal (Lowry et al., 2025).

Furthermore, the digital economy is expanding the scope of governance to include social and regulatory accountability for technology use. Modern trends in AI regulation and data governance require companies to assess the ethical and legal implications of technologies, document their decisions, and bear responsibility for potential harms (Ahdadou et al., 2025; Balboni & Francis, 2024). This is driving the adoption of the concept of "digital governance" as a qualitative extension of traditional corporate governance.

3.2. Challenges Facing Corporate Governance in the Digital Economy

The digital economy represents a highly complex corporate environment characterized by the interplay of technical, organizational, and strategic dimensions. This imposes a growing set of unprecedented challenges on corporate governance. These challenges are not limited to technological aspects but extend to the legal framework, board structure, and accountability and oversight mechanisms. For analytical purposes, these challenges can be categorized into three main axes: technological, organizational and legal, and institutional and administrative.

3.2.1. Technological Challenges:

Digital technology constitutes the core of contemporary economic transformation, but it simultaneously generates a set of risks that complicate governance practices.

1- Cybersecurity Challenges

Cyber risks are among the most prominent challenges facing boards of directors in the digital economy, given their significant financial, legal, and reputational implications.

Key dimensions of the challenge:

- The increasing frequency and sophistication of cyberattacks
- The expanding scope of sensitive digital assets (customer data, intellectual property, algorithms)
- The difficulty of translating technical risks into strategic decisions at the board level
- Over-reliance on technical reports without a deep understanding of governance.

Evidence suggests that many boards of directors' exercise only nominal oversight of cybersecurity due to a lack of digital expertise, even when formal committees or policies exist (Gale et al., 2022; Lowry et al., 2025).

2- Challenges of Artificial Intelligence and Algorithms

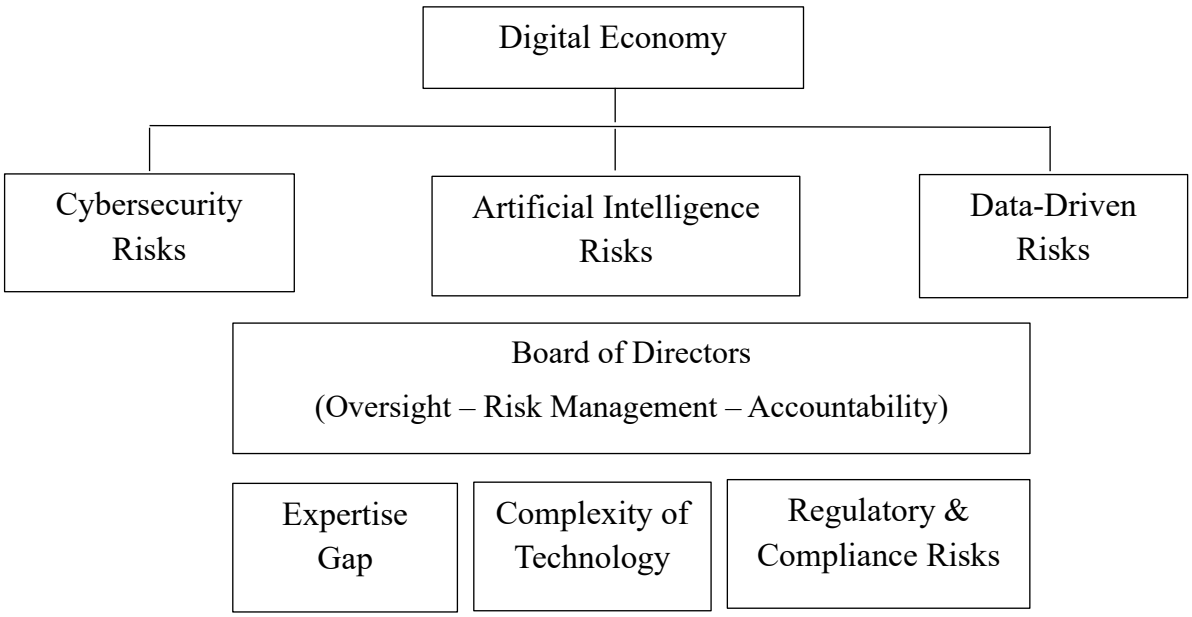
The increasing use of artificial intelligence in decision-making has complicated the concept of accountability within companies. The most prominent challenges include:

- The ambiguity of algorithmic logic (Black Box Problem)
- The risks of algorithmic bias and unintentional discrimination
- The difficulty in determining legal liability in case of error

– The limited ability of boards of directors to evaluate AI models.

Recent literature has confirmed that integrating AI without clear governance frameworks may lead to an unconscious delegation of decision-making power rather than "augmented intelligence" supporting human decision-makers (Ahdadou et al., 2025).

Figure (1): Technological Challenges for Corporate Governance in the Digital Economy



Source: Prepared by the researcher based on: Gale et al. (2022); Ahdadou et al. (2025)

This conceptual figure illustrates how key technological challenges cybersecurity risks, artificial intelligence risks, and data-driven risks emerge from the digital economy and directly affect the core governance functions of the board of directors, particularly oversight, risk management, and accountability. The figure further highlights structural governance vulnerabilities, including the digital expertise gap, technological complexity, and regulatory and compliance risks.

3.2.2. Legal and regulatory challenges:

The digital economy imposes a rapidly evolving and changing regulatory reality, creating a gap between operational innovation and traditional legal frameworks.

1- Inadequacy of traditional regulatory frameworks

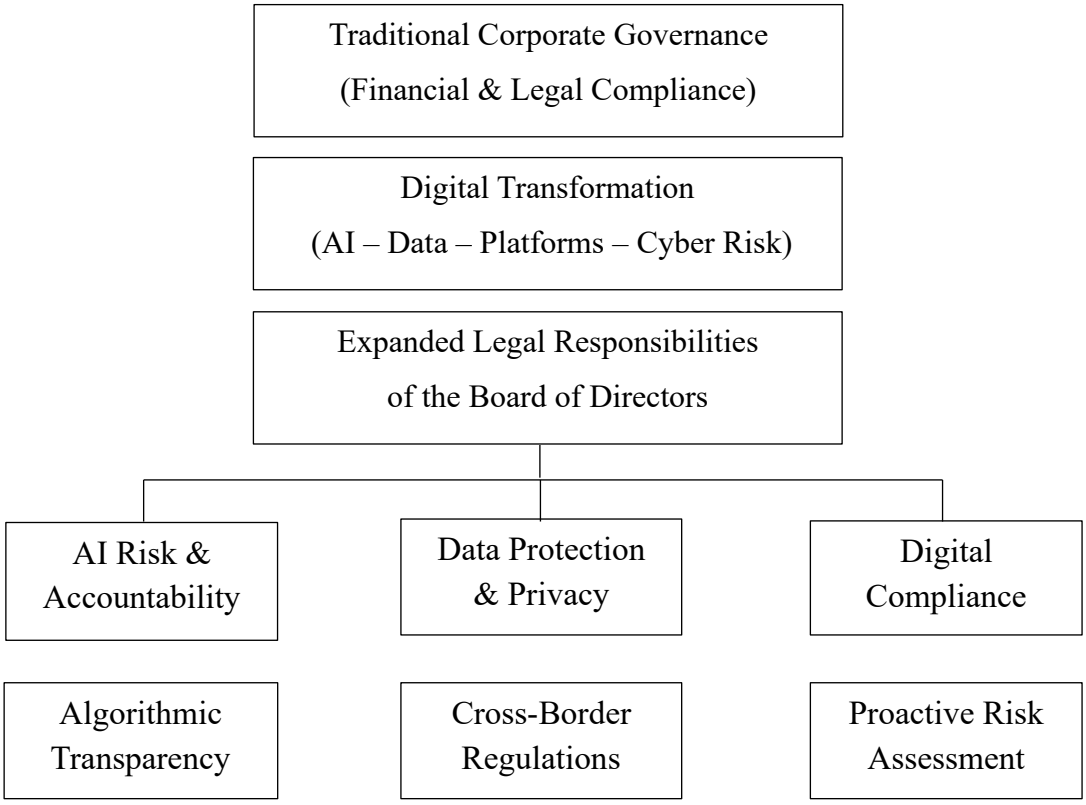
Companies face governance challenges stemming from the slow pace of legislation compared to the rapid pace of digital development, the lack of precise legal definitions of responsibility for algorithmic decisions, and the ambiguity surrounding the scope of digital disclosure obligations.

Recent studies have shown that new AI-related legislation imposes obligations to assess risks on companies, thus expanding the scope of board responsibility (Oduro et al., 2022).

2- Data governance and privacy

Data is a strategic asset, but it is also a source of increasing regulatory risks. Key challenges include compliance with multiple and cross-border legislation, reconciling data exploitation with ethical obligations, and integrating data governance within the ESG framework, as the literature suggests that weak data governance may lead to "formal legal compliance" without achieving effective protection for data subjects (Balboni & Francis, 2024).

Figure (2): The evolution of the legal responsibilities of the board of directors in the digital economy



Source: Prepared by the researcher based on: Oduro et al. (2022); Möslein (2025)

The figure above illustrates the transition of board responsibilities from traditional legal compliance to expanded digital accountability, which includes AI risk assessment, data protection, and digital sustainability.

3.2.3. Institutional and Administrative Challenges

In addition to technical and organizational challenges, the implementation of digital governance faces internal obstacles related to the institutional structure itself.

1- The Digital Expertise Gap on Boards of Directors

Studies indicate that many boards of directors lack members with specialized digital expertise, relying on external consultants instead of building internal capabilities. They also struggle to integrate the digital dimension into their overall strategy. Evidence has shown that the absence of digital expertise weakens the board's strategic role and limits its ability to effectively guide digital transformation (Yu et al., 2025).

2- Resistance to Change and Cultural Transformation

Institutional challenges include middle management resistance to digital transformation, the dominance of traditional governance logic, and weak digital culture and technical accountability. This leads to a gap between operational and governance digital transformation, where companies adopt technology without developing the accompanying institutional frameworks (Nahum et al., 2026).

Table (1): Governance challenges in the digital economy and proposed mechanisms for addressing them

Challenge category	The governance challenge	Impact on corporate governance	Proposed governance mechanisms
Technological	Escalating cyber risks	The council's limited capacity for effective oversight, and the increased risk of losses and reputational damage.	• Establish a dedicated cybersecurity committee at the board level • Integrate cybersecurity into strategic risk management • Appoint board members with technical expertise
Technological	The complexity of artificial intelligence	Difficulty in establishing accountability and assigning	• Adopting the principle of "augmented intelligence" instead of full delegation

	systems (Black Box)	responsibility when wrongdoing occurs.	• Requiring management to submit interpretability reports • Board oversight of AI use policies
Technological	Increasing reliance on big data	Risks of privacy breaches and data misuse.	• Developing an integrated data governance framework • Linking data management to ESG responsibilities • Adopting data ethics policies
Legal/ Regulatory	Inadequacies of traditional legislation	A gap between innovation and legal compliance.	• Adopting a proactive compliance approach • Board oversight of the regulatory impact assessment of technologies
Legal/ Regulatory	Multiple cross-border systems	Increased compliance costs and legal uncertainty.	• Establishing a corporate-wide organizational governance function • Harmonizing digital compliance policies globally
Institutional/ Administrative	Digital expertise gap within boards of directors	Formal oversight and a weak strategic role for the council.	• Diversifying the skills of board members • Ongoing digital training for board members
Institutional/ Administrative	Resistance to organizational change	Adoption of operational digitization without governance transformation.	• Aligning digital transformation with the company's strategy • Fostering a digital culture and accountability
Comprehensive Governance	Conflicts of interest in the digital environment	Weakening trust and transparency.	• Updating disclosure and conflict of interest policies • Enhancing digital transparency and smart disclosure

Table (1) shows that the challenges facing corporate governance in the digital economy are multidimensional. Technological risks (such as cybersecurity and artificial intelligence) intersect with the complexities of compliance and cross-border regulation, as well as internal challenges related to board capabilities and organizational culture. From the author's perspective, the most important finding of the table is that the problem is not the mere presence of technology, but rather the shift in the governance center of gravity from traditional reactive oversight to proactive governance that integrates digital risks into strategy and enterprise risk management (ERM) and translates them into accountable responsibilities at the board level. Evidence supports this trend; research on cybersecurity at the board level indicates that a lack of specialized expertise can lead to nominal oversight, even when oversight activities appear to be in place, thus deepening the governance gap in the digital environment (Gale et al., 2022; Lowry et al., 2025). The table also reflects that the knowledge gap within the board is not a mere organizational detail, but a critical variable affecting the company's ability to guide digital transformation and innovation. Digital expertise within the board is linked to better outcomes in terms of digital innovation—not only through an oversight role, but also through a "resource-saving" role and by linking technical decisions to strategic decisions (Yu et al., 2025).

The mechanisms proposed in Table 1 demonstrate a "governance package" approach rather than piecemeal solutions; that is, combining (1) building the board's capacity and assigning clear committees/responsibilities, (2) developing auditable policies, procedures, and reporting flows, and (3) aligning compliance with international frameworks that emphasize proactive risk assessment, documentation, and transparency.

In the area of cybersecurity, proposals such as establishing a cyber committee or integrating cybersecurity into the ERM align with international principles guiding boards that emphasize "governance from the top down," defining responsibilities, and strategically integrating cybersecurity rather than confining it to operational levels (World Economic Forum [WEF], 2021). In the realm of artificial intelligence (AI), the "proactive compliance" option, along with interpretability reports and impact assessments, aligns with the global regulatory trend toward requiring organizations to conduct systematic risk assessments and management processes both before deployment and throughout the product lifecycle (Oduro et al., 2022). This is further supported by applied standard frameworks such as NIST AI RMF 1.0, which frames AI risk management across operational functions (governance, measurement, and management) and

underscores the socio-technical nature of risk (National Institute of Standards and Technology [NIST], 2023).

In information security governance, the proposed approaches support a governance-led leadership logic based on “assess, direct, monitor, and communicate” as functions linked to top-level governance (International Organization for Standardization [ISO], 2020). Regarding the broader governance framework, the G20/OECD Principles (2023 edition) emphasize the board's role in strategic guidance, disclosure, and risk management, aligning with the repositioning of digital risks at the heart of governance, rather than on its periphery (OECD, 2023). From the author's perspective, the table's most significant value lies in highlighting that effective digital governance is not achieved simply by adding a policy or committee, but by redesigning the relationship between technology, strategy, and accountability and by building "institutional capacity" that prevents artificial intelligence, cybersecurity, and data governance from becoming silent risks beyond the scope of accountability.

From the above, we can see that the challenges facing corporate governance in the digital economy are multidimensional and interconnected, and cannot be addressed through isolated technological or organizational solutions. Cybersecurity, artificial intelligence, data governance, emerging legislation, and the expertise gap within boards are all contributing to a redefinition of the very concept of governance. These challenges underscore the need to develop integrated digital governance models capable of absorbing new risks without hindering innovation.

3.3. Opportunities Offered by the Digital Economy to Enhance Corporate Governance

The digital economy, along with its inherent risks, represents a practical lever for developing corporate governance by improving transparency and disclosure, enhancing oversight and accountability, and strengthening the quality of strategic decision-making. These opportunities stem from the shift towards standardized digital disclosure, the development of analytics and big data tools, the proliferation of regulatory automation technologies (RegTech/SupTech), and the application of artificial intelligence to support oversight and forecasting.

3.3.1. Enhancing Transparency and Disclosure

1) Digital Disclosure

Digital disclosure contributes to reducing information asymmetry and improving stakeholders' ability to evaluate and monitor, especially when presented in standardized, machine-readable

formats. Improving comparability and transparency through the adoption of standards such as XBRL is linked to increased transparency in financial disclosure environments, thereby enhancing the relevance and reliability of information (Al-Okaily et al., 2024). Standardizing Digital Transformation Disclosure Practices: Recent developments in "voluntary digital transformation disclosure" have shown that leading companies disclose digitally to varying degrees, highlighting a clear need for standardized guidelines to ensure consistency and comparability (Borrero-Domínguez et al., 2024).

2) Intelligent electronic and financial reporting:

This goes beyond simply "transferring the report to an electronic medium." It entails a shift to automated reporting, faster updates, and greater integration of information systems. Integrating electronic reporting with accounting information systems and analytics enhances auditability and traceability, and promotes transparency (Borrero-Domínguez et al., 2024).

Recent literature confirms that the characteristics of distributed data (such as decentralization and tamper resistance) pave the way for more reliable reporting, reduced trust gaps in information, and greater automation potential (Han et al., 2023).

3) Using Big Data in Oversight:

Big data provides governance with new oversight tools by shifting oversight from limited sample examination to continuous analysis of risk patterns and deviations. Improving the quality of monitoring and early detection through the adoption of big data analytics is linked to better decision-making, forecasting, and performance processes, thus supporting audit and risk committees with more accurate oversight signals (Chatterjee et al., 2023).

Recent reviews indicate that data visualization tools have become an important resource for auditing and oversight by improving the understanding of patterns and deviations and communicating findings to management and the board (Mauludina et al., 2024).

3.3.2. Improving oversight and accountability mechanisms

1) Near-real-time monitoring

Near real-time/continuous monitoring enables the board to transition from periodic to continuous monitoring of risk and compliance indicators by integrating IT governance into corporate governance. Recent studies demonstrate that the increasing reliance on technology

necessitates that IT governance become an integral part of corporate governance (rather than being entirely delegated to executive management), thereby enhancing the board's oversight of digital risks and opportunities (Caluwe et al., 2024). Furthermore, blockchain and auditing literature indicates that "agreed-upon" and "tamper-proof" data can enhance traceability and support more continuous forms of assurance/audit (Han et al., 2023).

2) Intelligent compliance systems:

The digital economy is driving automation and analytics-driven compliance over manual compliance through RegTech/SupTech solutions. Improving compliance efficiency and reducing the risk of violations: Recent reviews and evidence show that adopting RegTech can enhance assessment and monitoring capabilities and reduce the risks associated with financial misconduct, while also highlighting the need to manage the accompanying privacy risks (Jeyasingh, 2023).

Similarly, digital regulatory governance at the system level: The SupTech/RegTech literature discusses how digital tools enable more effective regulation and oversight through automation and data-driven coordination (Bagherifam, 2025).

These systems do not absolve the board of responsibility; rather, they shift the board's role to adopting a smart compliance framework and defining risk thresholds, controls, and data quality standards.

3) The role of technology in reducing administrative corruption:

Technology can reduce corruption by minimizing manual transactions, enhancing traceability, and increasing the transparency of procedures (especially in supply chains, spending, procurement, and sensitive operations). Furthermore, it can enhance transparency and traceability through blockchain, as recent studies provide evidence of blockchain's potential to support transparency and accountability in anti-corruption contexts through traceability and tamper resistance (Ayeboafo, 2025).

3.3.3. Supporting Strategic Decision-Making

1) Predictive Analysis: Predictive analysis supports the board's ability to anticipate and identify trends and risks before they materialize. This is achieved through models based on internal and external data, improving forecasting, decision-making, and performance. Field evidence indicates that big data analytics enhances forecast quality and supports "smart decision-making," which is reflected in improved performance (Chatterjee et al., 2023).

Furthermore, translating analytics into governance is crucial. Governance value is realized when predictive outputs are translated into risk appetite policies and early warning indicators that are presented to board committees in a clear and accountable manner.

2) Decision Support Systems:

Decision support systems enhance the board and management's ability to evaluate scenarios, allocate resources, and justify decisions, especially when integrated with databases and digital reports. Integrating technology into the governance structure is also essential. Integrating IT governance into corporate governance (rather than isolating it) improves the quality of decisions related to digital investment, internal control, and risk management (Caluwe et al., 2024). Furthermore, improved auditability and reasoning are achieved, as standardized digital reporting (such as XBRL) supports a "reviewable decision" pathway through verifiable and re-analyzable data (Al-Okaily et al., 2024).

3) Sustainable Corporate Innovation

The digital economy provides tools to enhance sustainable innovation by improving efficiency, supporting green innovation, reducing emissions, and increasing resource productivity. European evidence shows that digital integration is associated with improvements in emissions reduction, green innovation, and resource efficiency (Quttainah & Ayadi, 2024).

Recent studies also provide evidence of the relationship between digital transformation and green innovation in the manufacturing sector within transition mechanisms (Mu et al., 2025). A research trend also highlights the link between digital transformation and improved sustainable innovation performance through organizational/digital capabilities (Awan et al., 2023).

The following table illustrates how the opportunities offered by the digital economy to enhance corporate governance can be translated into a practical governance measurement framework that supports the board's role in guidance, oversight, and accountability. The table demonstrates that the true value of digital transformation lies not in the mere adoption of technologies, but in their alignment with clear measurement mechanisms that enable monitoring of transparency, oversight effectiveness, and the quality of strategic decision-making. From an analytical perspective, the table reflects the shift in governance from a traditional model based on periodic, post-assessment evaluation to a dynamic digital governance model that relies on continuous monitoring, tracking, and proactive risk assessment, thereby enhancing the council's ability to respond quickly and intervene promptly.

Table (2): Digital Economy Opportunities Matrix and Governance Measurement Indicators (KPIs/KRIs)

The opportunity	KPI (Performance Indicator)	How is KPI measured
Enhancing Transparency and Disclosure	Digital Disclosure Timeliness	Average number of days between event and digital disclosure
	Disclosure Completeness Index	Percentage of completed disclosure items to total (checklist-based)
	Stakeholder Access Rate	Number of reports accessed/downloaded per period
Smart electronic and financial reporting	Automation Coverage (Reporting)	Percentage of automated reporting processes out of total processes
	Close Cycle Time	Financial closure period (days) before/after the transition
	Audit Trail Completeness	Percentage of transactions with a complete tracking history
Using Big Data for Oversight	Anomaly Detection Coverage	Percentage of transactions/operations included in anomaly analysis
	Control Testing Frequency	Number of controls tested/month (ongoing)
	Risk Signal Lead Time	Mean time between risk alert and occurrence
Improving oversight and accountability	Monitoring Latency	Average time for risk board updates (minutes/hours)
	Incident Response Time (MTTR)	Average incident response/repair time
	Board Reporting Frequency (Digital Risk)	Number of digital risk reports submitted by the council per quarter
Intelligent Compliance (RegTech) Systems	Compliance Automation Rate	Percentage of automated compliance checks out of the total
	KYC/AML Processing Time	Average KYC/AML check completion time
	Policy Update Lead Time	Time from new regulation issuance to internal policy update

Reducing administrative corruption	Process Traceability Score	Percentage of transactions with full traceability (from application to approval)
	Procurement Transparency Index	Percentage of published contracts/tenders + availability of competition data
	Whistleblowing Resolution Time	Average reporting processing and closure time
Strategic Decision Support	Forecast Accuracy (MAPE)	Average Forecast Error (MAPE) for Sales/Flows
	Scenario Coverage	Number of Scenarios/Stress Tests Performed Annually
	Early Warning Hit Rate	Valid Alarms/Total Alarms After Verification
Decision Support Systems (DSS)	Decision Cycle Time	Decision-making time from referral to approval
	Decision Justification Coverage	Percentage of board decisions documented with justifications and supporting data
	User Adoption Rate (DSS)	Active users/Total target audience
Sustainable Corporate Innovation	Green Innovation Output	Number of green innovation patents/projects/year
	Digital Efficiency Gain	Reduced cost/process time due to digitalization
	ESG Data Reliability Score	Percentage of verified/reliable ESG data out of total

Source: Prepared by the researcher based on previous literature

The table above confirms that the diversity of digital opportunities, from smart disclosure to predictive analytics and sustainable innovation, calls for an integrated governance framework that balances maximizing performance and reducing risks, and prevents digitalization from becoming a source of new governance gaps instead of a tool to enhance trust, transparency and institutional sustainability.

4. Conclusion:

The research concluded that the digital economy is no longer merely a new operational context for companies, but has become a fundamental reshaping factor in corporate governance, particularly in terms of roles, responsibilities, and oversight and accountability mechanisms. The theoretical

analysis demonstrated that the acceleration of digitalization creates a governance gap if it is not accompanied by a parallel development of institutional structures and board capabilities, especially in the areas of cybersecurity, data governance, and artificial intelligence. The research also showed that the digital economy offers real opportunities to enhance transparency and disclosure, improve continuous oversight, and support data-driven strategic decision-making, provided that these tools are integrated within a comprehensive governance framework that goes beyond mere formal compliance. Thus, the effectiveness of digital governance is determined by companies' ability to transition from traditional control models to dynamic and proactive governance that is compatible with the complexity of the digital environment.

4.1. Summary of results:

- Corporate governance in the digital economy is no longer a formal extension of traditional governance, but rather represents an institutional transformation in roles and responsibilities.

- The board of directors is the primary actor in guiding digital transformation and managing its risks, not just the executive management. - The lack of digital expertise within the board leads to superficial oversight and deepens the governance gap.

- Digital technologies can enhance transparency and accountability if integrated within clear governance frameworks.

- Relying on technology without a parallel development of regulatory frameworks and corporate culture increases risks rather than reducing them.

4.2. Recommendations:

- Integrate digital governance into the overall corporate strategy rather than treating it as a supporting technical function.

- Enhance digital and knowledge diversity on boards of directors through appointment and ongoing training.

- Develop integrated frameworks for data governance, artificial intelligence, and cybersecurity under the direct supervision of the board.

- Adopt digital measurement mechanisms that support transparency, continuous monitoring, and data-driven decision-making.

- Adopt a proactive and flexible compliance approach that aligns with the evolution of global digital regulations.

4.3. Limitations of the Study

This study is subject to several methodological and epistemological limitations that should be considered when interpreting its findings. First, the study adopted a theoretical analytical approach based on a review of the scientific literature, without conducting empirical testing or analyzing field data. This limits the generalizability of the results to all sectors and institutional contexts. Second, the study focused on the general conceptual frameworks of corporate governance in the digital economy and did not address in detail the sectoral differences or institutional variations between small and medium-sized enterprises (SMEs) and large or multinational corporations. Third, the references used were limited to recent literature published in English and in peer-reviewed international journals, which may exclude some relevant local or contextual perspectives. Fourth, given the rapid nature of technological and organizational development, some of the trends and challenges discussed in the study may change over time, making the findings relevant to the timeframe in which the study was conducted. Finally, the study did not delve deeply into the cultural and social dimensions that may influence the implementation of digital governance, which opens the door for more specialized and comprehensive future studies.

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