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From Traditional to Intelligent Corporate Governance: The Role of Artificial Intelligence in Crisis Management- An Analytical Study of Enron and Yassir -

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Abstract:
This study examines the evolution of corporate governance from traditional frameworks to intelligent governance supported by artificial intelligence (Al), with emphasis on its role in crisis management. It highlights the limitations of conventional governance mechanisms in addressing complex organizational failures, as illustrated by the Enron scandal, which contributed to the emergence of stricter regulatory reforms such as the Sarbanes-Oxley Act (SOX).
A descriptive methodology combined with qualitative content analysis is adopted. The Enron case is used as an empirical reference, relying on financial reports, audit documents, and publicly available records to identify key governance weaknesses, particularly informational opacity, weak oversight, and managerial misconduct.
The study further explores how Al-based tools can enhance governance systems by improving monitoring, supporting decision-making, and enabling early risk detection. Rather than replacing traditional structures, Al is considered a complementary mechanism that strengthens transparency, reduces information asymmetry, and improves internal control effectiveness in the post-SOX environment.
This leads to the concept of intelligent corporate governance, where decision-making processes are increasingly data-driven and proactive. Finally, the framework is applied to Yassir in Algeria to assess its relevance in an emerging market context and to demonstrate how Al integration can improve governance efficiency, regulatory compliance, and crisis preparedness.
Keywords: Corporate Governance, intelligent Governance, Crises, Artificial Intelligence, Enron
Jel Classification Codes : G30 ; G34; O33

ملخص : تهدف هذه الدراسة الى تقديم منظور مختلف تماما لحوكمة المؤسسات من خلال الدمج بين المبادئ التقليدية للحوكمة وتكنولوجيا الذكاء الاصطناعي من اجل ادارة الازمات ومنع حدوثها بشكل مسبق. حيث تطرقت هذه الدراسة الى مختلف مقاربات الحوكمة منذ ظهورها الى غاية فضيحة شركة انرون، مع اظهار قصور هذه المبادئ في عجزها على التصدي لمختلف الازمات التي تؤثر على المؤسسة. هذه الدراسة تعتمد على منهجية وصفية في مناقشة فرضيات الدراسة من خلال التركيز على منهجية تحليل المحتوى لأزمة شركة انرون بطريقة تبين عجز الحوكمة التقليدية داخلها، حيث تنتقل هذه الدراسة لشرح مختلف أدوات الذكاء الاصطناعي الحديثة التي يمكن دمجها داخل نظام الحوكمة لضمان الشفافية والرقابة والمرونة بعيدة عن التحيزات الشخصية، وهذا ما نسميه بالحوكمة الذكية التي يتم من خلالها تحويل مجالس الإدارة التقليدية الى أخرى ذكية، وحماية مختلف أصحاب المصلحة من خلال نظام بيئي رقمي متكامل، والذي بدوره يقود المؤسسة الى تحليل تنبؤي قادر على كشف مختلف المخاطر التي يمكن ان تواجهها، و أخيرا تم دراسة شركة Yassir للمواصلات في الجزائر و اختبار الفرضيات
الكلمات المفتاحية : حوكمة المؤسسات، الحوكمة الذكية، الأزمات، الذكاء الاصطناعي، شركةEnron
تصنيف جال: G30، G34 ، O33

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I- Introduction:

Amid successive crises and the increasing complexity of organizational environments, organizations face growing ethical, legal, and social obligations to adopt effective governance frameworks. These frameworks are intended to ensure transparency, accountability, and responsible conduct toward diverse stakeholders.

Since the emergence of corporate governance as a field of study, scholars have continuously sought to refine its principles in response to crises, evolving risks, and technological developments.

Historically, major crises such as those following the Great Depression **(Robbins, 1934)** have acted as catalysts for governance reforms. Nevertheless, the recurrence of corporate fraud, corruption, and financial scandals suggests persistent limitations in the practical implementation of governance systems, as well as difficulties in fully operationalizing their underlying principles.

In recent years, rapid technological advancement-particularly in artificial intelligence (Al) —has reshaped governance practices. Governance is no longer limited to traditional mechanisms but increasingly integrates Al-based tools across organizational levels, from boards of directors to operational management. This integration enhances transparency, accuracy, and oversight, while improving decision-making processes in complex environments.

Research Problem and Questions

The main research problem addressed in this study lies in the development of a new governance paradigm that combines traditional governance principles with the capabilities of artificial intelligence in crisis management. Accordingly, the study investigates the following central question:

How can corporate governance evolve from being a reactive outcome of crises to a proactive system for crisis prevention through artificial intelligence?

To address this question, the following sub-questions are proposed:

Q1: How do crises reshape corporate governance paradigms?

Q2: How can artificial intelligence contribute to the development of intelligent governance systems?

Q3: What regulatory and ethical challenges may arise in Al-based governance systems?

Hypotheses :

The study is based on the following hypotheses:

H1: Crises drive governance systems to evolve from reactive monitoring mechanisms toward adaptive and predictive frameworks emphasizing resilience and organizational learning.

H2: Artificial intelligence enhances governance effectiveness through data analytics and process automation, while improving transparency and accountability, particularly when combined with technologies such as blockchain.

H3: The effectiveness of Al-driven governance depends on overcoming technological constraints and establishing robust ethical and legal frameworks addressing data privacy, algorithmic bias, and information security.

Literature Review

This study draws upon a body of prior research, including the following foundational works:

Alessandro Zattoni & **Amedeo Pugliese** (2021)

"Corporate Governance Research in the Wake of a Systemic Crisis: Lessons and Opportunities from the COVID-19 Pandemic" (Journal of Management Studies, July 2021)

This study examines the impact of the COVID-19 pandemic on corporate governance systems, highlighting how systemic crises expose structural weaknesses in traditional governance frameworks.

The authors emphasize issues such as boardroom rigidity, operational inertia, and the concentration

of decision-making power, particularly in family-owned or dominant-shareholder firms. The study further shows that such structures often lead to biased
decisions and reduced organizational adaptability.
Ultimately, it proposes a shift toward a more adaptive and stakeholder-oriented governance model capable of responding to complex and uncertain environments.

Arkunkumar (2024)
"The Role of Corporate Governance in Preventing Financial Crises" (Journal of Visual and Performing Arts, February 2024)
This research explores the role of corporate governance in mitigating financial crises through structural and procedural analysis. It identifies a strong relationship between board diversity (including gender composition and professional expertise) and organizational resilience during crises. The study also explains why firms exposed to similar external conditions may experience different crisis outcomes, highlighting significant heterogeneity in governance systems across organizations.

Research Gap and Original Contribution
Building on these studies, the present research extends the analysis of governance failures through the Enron case, which revealed critical weaknesses such as systemic accounting irregularities, material reporting opacity, and limited stakeholder awareness of governance principles.
Accordingly, this study proposes a paradigm shift that integrates artificial intelligence into governance systems, aiming to transform information management processes and redefine stakeholder participation in corporate governance evolution.

I.1. Emergence of Corporate Governance and Foundational Theoretical Frameworks
The emergence of corporate governance is commonly linked to financial crises affecting corporations and banking systems in Europe and the United States over recent decades. However, its conceptual foundations can be traced back to Adam Smith's The Wealth of Nations (1776) **(Smith, 2005)**, where he highlighted the implications of separating ownership from management. Smith noted the divergence of interests between owners and managers, particularly the risk of managerial negligence in handling shareholder resources, which may lead to inefficiency and value loss. This idea was later developed by **(Berle & Means, 1933)** in The Modern Corporation and Private Property, who systematically analyzed the separation between ownership and control. Their work emphasized the resulting agency conflicts and the need for governance mechanisms to regulate managerial behavior and protect shareholders' interests through monitoring and accountability structures.
A more formal theoretical development emerged with Jensen and Meckling's (1976) agency theory **(Michael C & William H, 1976)**, which conceptualizes the firm as a nexus of contracts. Their framework explains how information asymmetry and conflicting incentives between principals and agents generate agency costs. To mitigate these issues, firms implement governance mechanisms such as board oversight and external auditing.
Overall, corporate governance literature has progressively evolved around addressing the structural tension between ownership and control, with increasing emphasis on accountability, monitoring, and alignment of interests.

I. 2. Governance Approaches and Principles
The recurrence of major financial and economic crises across different regions has significantly increased scholarly and regulatory attention to corporate governance frameworks. The instability generated by the U.S. financial crisis of the 1980s posed serious risks to capital markets,

while the Asian financial crisis of 1997 revealed deep structural vulnerabilities in global financial systems.

More recently, the 2008 subprime mortgage crisis led to widespread corporate and banking failures, reinforcing the need for stronger governance mechanisms capable of addressing complex and evolving risks.

In response to these successive crises, corporate governance frameworks have progressively evolved. The following table summarizes key milestones in the historical development of governance principles.

Table 1. Historical Development of Corporate Governance

Events	Results
Berle & Means Study (1932, USA) **(Berle & Means, 1933)**	Berle and Means provided one of the earliest systematic analyses of corporate governance in The Modern Corporation and Private Property. Their work highlighted the separation between ownership and management and its implications for corporate control. They emphasized the resulting agency problems and the need for structured mechanisms to regulate managerial behavior and ensure accountability, laying the foundation for modern governance theory.
Freeman's Stakeholder Theory (1984**) (Edward Freeman, Harrison, Wicks, & All, 2010)**	Freeman introduced a broader view of corporate governance by arguing that organizations are responsible not only to shareholders but also to a wider group of stakeholders. This approach shifted the focus toward balancing competing interests within and outside the firm, highlighting the importance of stakeholder engagement for long-term organizational sustainability..
The Treadway Commission Report (1987, United Kingdom) **(TREADWAY, 1987)**	The Treadway Commission Report addressed issues of financial reporting fraud and emphasized the importance of internal control systems. It recommended stronger fraud detection mechanisms, improved auditor responsibilities, and greater transparency in financial disclosure, reinforcing the role of ethical standards in governance systems.
The Cadbury Report (1992, United Kingdom) **(Cadbury.A, 1992)**	The Cadbury Report marked a key development in modern governance by introducing principles related to board independence, separation of executive and supervisory roles, and enhanced audit functions. It also reinforced the importance of accountability and transparency as core pillars of effective governance.
OECD Principles of Corporate Governance (1999). **(OECD, 1999)**	First issued in 1999 and subsequently revised, the OECD Principles provide an international governance framework focused on protecting shareholder and stakeholder rights. Recent updates increasingly emphasize transparency, digital transformation, and the role of technology in improving governance efficiency.

Source: Prepared by the researchers based on the review referenced in the table.

The milestones presented in Table 1 illustrate the gradual evolution of corporate governance from a narrow focus on shareholder control toward more comprehensive frameworks emphasizing accountability, transparency, and stakeholder inclusion. Early contributions, such as Berle and Means' analysis of the separation between ownership and management, laid the foundation for agency-based governance mechanisms. This perspective was later expanded by stakeholder-oriented approaches and reinforced through major regulatory reports such as the Treadway and Cadbury reports, which formalized principles of transparency, audit independence, and board accountability. More recently, the OECD Principles have further broadened governance standards by incorporating digital transformation and emphasizing the role of information systems in enhancing governance effectiveness.

I. 3. Analysis of the 1929 Global Economic Crisis

The theoretical interpretation of economic crises has long been debated among classical and Marxist scholars. In Marx and Engels' analysis, crises are described as periods of severe economic

disruption characterized by halted trade, overproduction of goods, liquidity shortages, rising unemployment, and the eventual contraction of productive capacity **(MARX & ENGELS, 1978)** From this perspective, financial speculation is seen as a key factor that intensifies economic instability and reinforces the dominance of capitalist classes.

This interpretation contrasts with Jean-Baptiste Say's market theory (1803), which argues that supply naturally creates its own demand, suggesting that market economies tend toward equilibrium and are therefore unlikely to experience prolonged crises **(SAY, 2011)** This optimistic view contributed to policies that encouraged large-scale production and market expansion.

However, in practice, the U.S. economy in the 1920s experienced significant financial excess. Rapid expansion in stock market investment, combined with easy credit conditions offered by banks-where margin lending reached up to 90% of share value created an artificially inflated market. This speculative environment attracted a broad range of investors, including low-income individuals seeking financial gains.

Several structural factors contributed to the formation of this bubble, including post-World War I political stability in the United States, expansionary lending policies both domestically and internationally, and strong financial linkages between European economies and American capital markets.

As production increasingly exceeded demand, share prices began to decline in late 1929, triggering widespread panic selling. On October 23, 1929, approximately six million shares were traded on Wall Street, causing a sharp decline in major indices. The situation reached its peak on October 29, known as "Black Tuesday," when 16.5 million shares were exchanged context of rapidly falling prices **(Klein, 2001)**

The crash led to the collapse of financial institutions, widespread bank failures due to unpaid loans, corporate bankruptcies across multiple sectors, mass unemployment, and a significant loss of investor confidence. The crisis quickly extended beyond the United States, as the withdrawal of American capital and the suspension of international financial support contributed to a global economic downturn. **(Lopus, 2005)**

I. 4. The Relationship Between the 1929 Crisis and Corporate Governance

The 1929 economic crisis, commonly referred to as the Great Depression **(Robbins, 1934)**, significantly reshaped global economic thinking by exposing the limitations of classical economic assumptions. It demonstrated that market self-regulation was insufficient to ensure stability, and challenged the belief that increases in production naturally generate corresponding demand. Instead, the crisis was characterized by a sharp contraction in demand, accumulation of unsold goods, falling prices, and declining profitability.

At the corporate level, excessive reliance on leverage-particularly through stock purchases financed by bank credit-contributed to systemic financial fragility. This expansion of credit, driven by short term speculative incentives, ultimately led to widespread failures among both investors and financial institutions, highlighting the risks of uncontrolled lending practices and weak regulatory oversight.

In this context, Berle and Means **(Berle & Means, 1933)** conducted a landmark study of major U.S. corporations in The Modern Corporation and Private Property (1933), Their analysis identified a structural imbalance within modern corporations, notably the growing separation between ownership and control. As shareholding became increasingly dispersed, managerial autonomy expanded, often leading to a misalignment between managerial decisions and shareholder interests.

The authors further highlighted the emergence of agency problems, where managers could prioritize personal or organizational interests over those of shareholders, particularly in the absence of effective monitoring systems. They also pointed to deficiencies in transparency and

accountability as key weaknesses in corporate structures of the period.
These findings contributed to the development of early corporate governance mechanisms aimed at correcting these imbalances. Such mechanisms included the establishment of board oversight structures, the formalization of internal and external auditing processes, and the introduction of accountability systems linking managerial performance to shareholder value. Over time, governance frameworks also began to incorporate broader expectations related to corporate responsibility toward employees, communities, and the wider economic environment.
Ultimately, corporate governance emerged as a structural response to the failures revealed by the 1929 crisis, serving both as a mechanism to reduce managerial opportunism and as a foundation for restoring investor confidence and ensuring financial system stability.

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I. 5. Optimal Framework for Implementing Intelligent Governance in Crisis Management

Economic institutions and banking systems constitute the foundational pillars of national economic stability and sustainable growth. Consequently, operational disruptions or systemic crises originating within these entities generate cascading macroeconomic repercussions. Preventing such destabilizing events necessitates the imperative deployment of AI-enhanced governance frameworks within economic organizations transforming governance from reactive compliance to predictive resilience architecture.

I. 5.1. Artificial Intelligence Enhanced Board Governance

Economic institutions and banking systems represent the backbone of national economic stability and sustainable development. As a result, any operational disruption or systemic crisis within these entities can generate severe macroeconomic consequences. This makes the integration of artificial intelligence (Al) into governance systems increasingly necessary, shifting corporate governance from a reactive compliance function toward a predictive and resilience-oriented framework. **(Deloitte, 2021)**

A. Artificial Intelligence as a Strategic Tool in Board Decision-Making

Modern boards of directors are progressively required to incorporate artificial intelligence into strategic decision-making processes while managing the associated risks. The rapid evolution of Al technologies, particularly following the emergence of generative models such as ChatGPT, has significantly accelerated corporate investment in digital transformation. This shift has positioned Al as a strategic governance tool rather than a purely operational technology.
In this regard, effective Al-enabled governance requires boards to strengthen their capabilities in three key areas **(Xinyan, 2022)** **First**, Al should be integrated into strategic planning from the earliest stages, enabling more informed decision-making, improved scenario analysis, and enhanced risk forecasting. **Second**, organizations must leverage Al to identify opportunities and assess risks through data-driven insights, supporting both innovation and resilience.
Third, boards need to develop a clear understanding of the risks associated with Al adoption, particularly in relation to cybersecurity, data governance, and algorithmic accountability.
Accordingly, intelligent governance depends not only on technological adoption but also on the development of institutional competence. Boards must ensure that appropriate expertise is available, whether through internal capacity building or external advisory support, in order to effectively oversee Al-driven systems.

B. Governance Structure and Oversight Mechanisms

The effectiveness of intelligent governance is also closely linked to board structure. Adaptive governance systems increasingly rely on specialized committees, such as technology oversight and risk management committees, to monitor Al applications and ensure alignment with organizational objectives. These structures enhance the board's ability to respond to technological and regulatory changes in a timely manner.

In parallel, real-time monitoring systems and data analytics tools contribute to improved transparency and decision-making efficiency. However, such technological integration must be accompanied by strong ethical oversight to ensure accountability, integrity, and responsible data use. **(IoD, 2024)**

C. Al as a Governance Practice

Rather than replacing traditional governance mechanisms, artificial intelligence should be understood as a complementary tool that enhances board effectiveness. Its role lies in improving predictive capabilities, supporting decision-making processes, and strengthening organizational resilience. Nevertheless, maintaining human oversight remains essential to ensure that strategic decisions remain ethically grounded and aligned with stakeholder interests. **(IoD, 2024)**

I. 5.2. Intelligent Governance and Stakeholder Protection

The integration of artificial intelligence (Al) and Internet of Things (loT) technologies within corporate systems is reshaping the way organizations manage stakeholder relationships.

Through real-time connectivity across supply chains and operational processes, firms are now able to monitor product lifecycles more effectively and respond more quickly to changes in market demand. This shift contributes to the emergence of digitally enabled business models and reinforces the transition toward more interconnected forms of value creation.

Within this framework, organizations increasingly operate within digital ecosystems, where firms, consumers, and partners interact through shared technological platforms. These ecosystems facilitate coordination across different actors and support more efficient information exchange, enabling organizations to adapt more rapidly to environmental changes. **(Tamim, Jon , & All, 2013)**

Al and lot technologies also enhance organizational sensing capabilities by improving the detection of shifts in customer behavior and market conditions.

This enables firms to rely on data-driven insights for marketing, pricing, and operational decisions, thereby strengthening their ability to maintain continuity during periods of disruption. As a result, organizations become more responsive to emerging risks and changing stakeholder expectations **(Ali Mohammed, 2015)**

From an organizational perspective, these developments are closely linked to the adoption of more integrated operational models such as DevOps, which emphasize closer coordination between development and operational functions.

Rather than representing a purely technical framework, this approach reflects a broader managerial shift toward continuous delivery of value through improved collaboration, faster feedback cycles, and more efficient problem resolution processes.

Overall, the combination of Al, loT, and integrated operational practices contributes to greater organizational agility. This agility enables firms to respond more effectively to disruptions across supply chains and internal processes, while continuously adjusting their strategies in line with evolving market conditions. In this way, intelligent governance enhances both operational resilience and stakeholder protection in increasingly complex environments. **(Ibrahimi & Benchekroun, 2023)**

II– Methods and Materials:

This study adopts a dual methodological approach that **combines descriptive analysis and content analysis** in order to provide a comprehensive and evidence-based examination of corporate governance dynamics in crisis contexts.

The descriptive method is used to outline and interpret the operational context of the Enron case. This includes an analysis of its strategic practices, governance failures, and its relationship with its

external auditor, Arthur Andersen. It also examines the broader consequences of the crisis, particularly its impact on investors, regulatory institutions, and overall market confidence.
In parallel, the same approach is applied to Yassir as a contemporary technology-driven firm operating in a rapidly evolving digital environment. The focus is placed on its organizational structure, strategic adaptability, and the role of digital technologies, particularly artificial intelligence, in strengthening governance practices and improving crisis responsiveness.
Content analysis is then employed to examine primary and secondary sources related to both cases. For Enron, this includes regulatory reports, legal documents, and internal records, allowing for a systematic assessment of governance failures and the validation of the study's hypotheses through triangulated evidence.
For Yassir, the analysis is based on corporate communications, publicly available reports, digital platform information, and documented responses during periods of disruption such as the COVID-19 pandemic. This enables an evaluation of how data-driven decision-making and algorithmic tools contribute to organizational resilience and risk management.

II.1. Case Study of Enron Corporation

A- Enron Corporation(Historical Profile)

Enron Corporation was created in 1985 following the merger between Internorth (Omaha) and Houston Natural Gas, initially operating in the natural gas pipeline and electricity sectors. The company later expanded internationally and became listed among Fortune 500 firms for six consecutive years between 1996 and 2001, a period that reflected its peak market valuation **(Fortune, 2025)** Under the leadership of Chairman Kenneth Lay and Chief Executive Officer Jeffrey Skilling, Enron pursued an aggressive diversification strategy into energy trading, broadband services, and insurance markets. This expansion was accompanied by a rapid increase in reported revenues, rising from approximately $31 billion to $100 billion between 1996 and 2000, with net income reaching $979 million in 2000 **(Rashid, 2020)** During this period, Enron was widely perceived as one of the most innovative firms in the U.S. energy sector prior to its collapse.

B- The External Auditor: Arthur Andersen

The reliability of corporate financial reporting depends largely on the independence of external auditors. In the case of Enron, this responsibility was assigned to Arthur Andersen, one of the most established global audit firms.
Founded in 1913, Arthur Andersen had built a strong international reputation for audit quality and financial transparency, becoming a preferred auditor for major corporations. However, over time, the firm developed a parallel consulting division that became a major source of its revenue, creating a structural conflict between audit independence and
commercial interests.
In the Enron case, this conflict significantly undermined professional objectivity. Arthur Andersen approved financial statements that contained material misstatements, despite indications of accounting irregularities. This situation reflected a deterioration in audit
independence, driven largely by the firm's financial dependence on consulting contracts with audit clients, which contradicted regulatory expectations set by the U.S. Securities and Exchange Commission (SEC).
Following the disclosure of Enron's accounting fraud, Arthur Andersen's role further deteriorated when it became involved in the destruction of audit related documents, obstructing regulatory investigations. The consequences were severe: the firm faced criminal charges, lost a large portion of its clients, and ultimately collapsed, marking one of the most significant failures in the history of the auditing profession .**(Donald L. Buresh, 2023)**

II.2. Case Study of Yassir Transportation Company

A- The Reality of AI-Based Governance in Algeria

In recent years, Algeria has increasingly engaged in digital transformation efforts through the development of digital infrastructure and the integration of information and communication technologies (ICTs) within both public administration and economic institutions. This orientation forms part of broader national strategies aimed at promoting a knowledge-based economy and encouraging technological innovation.

Despite these efforts, several studies indicate that while ICT development has been identified as a strategic priority, the level of digitalization in Algeria remains below that of many developed countries **(2022 ،حسيني)** This gap highlights a persistent digital divide that continues to affect the pace of technological adoption across institutions.

At the policy level, official reports emphasize that digital transformation is not limited to its technological dimension, but is also viewed as a tool for improving administrative efficiency and enhancing the quality of public services delivered to citizens **(2025 ،وكالة الانباء الجزائرية)**

Accordingly, artificial intelligence is gradually being introduced as a supporting mechanism for improving governance performance and public sector efficiency.

Available data suggest that Algeria has launched several initiatives aimed at digital modernization, including more than 500 projects focused on administrative reform, with a significant proportion dedicated to the digitization of public services.

These initiatives aim to simplify administrative procedures and improve accessibility, reflecting a gradual shift toward a more technology-enabled public administration model.

From an international perspective, Algeria ranks 112th out of 193 countries in the United Nations E-Government Development Index, and ninth at the African level. Although this reflects some progress, it also confirms the continued existence of structural limitations in digital infrastructure and human capital development.

In parallel, the emergence of a small but growing start-up ecosystem-estimated at around 50 to 60 active firms in sectors such as fintech, smart agriculture, and digital services-illustrates an evolving innovation landscape. Public funding initiatives, including allocations of approximately 1.5 billion Algerian dinars, further demonstrate a strategic effort to support entrepreneurship and technological innovation. **(ALGERIATECH Editorial, 2025)**

infrastructure development projects such as the High-Performance Computing Center in Oran represent a significant step toward strengthening national capacities in artificial intelligence and big data. These initiatives are expected to support research and applications in strategic sectors such as energy, agriculture, and climate forecasting, thereby contributing to the gradual consolidation of Algeria's digital transformation trajectory **(ALGERIATECH Editorial, 2025)**

B- Governance Analysis of Yassir: A Leading Algerian Model in Artificial Intelligence and Good Governance

Yassir represents one of the emerging technology firms in Algeria and the broader North African region. The company was founded in 2017 by Algerian engineers Nouredine Tayebi and Mehdi Yeto, both graduates of the National Polytechnic School of Algiers. The founders combined international experience with knowledge of the local market, which contributed to the development of the company's initial business model.

The platform was first introduced as a ride-hailing service in Algiers before gradually expanding to other major cities, including Oran, Constantine, and Annaba. Over time, Yassir diversified its services to include delivery and digital payment solutions, reflecting its adaptation to changing market needs.

Despite its modest initial funding, the company experienced significant growth, both in terms of

workforce and user base. It now employs a large number of engineers and collaborates with a wide network of drivers, delivery agents, and merchants, illustrating the expansion of its digital ecosystem.

The name "Yassir," derived from Arabic, reflects the idea of facilitating daily activities and mobility, which aligns with the company's core objective of providing accessible and efficient digital services. **(Yassir, 2026)**

III- Results and discussion :

III.1- Hypothesis Testing in the Enron Case Study

III.1.1-Testing the First Hypothesis:

This study assumes that corporate crises act as a catalyst for the transformation of governance systems, shifting them from reactive, ex-post control mechanisms toward more adaptive and forward-looking frameworks based on learning and risk anticipation.

To examine this assumption, the Enron case is used as a key empirical reference. Its collapse illustrates how governance systems based primarily on ex-post control can fail to detect and prevent major risks, thereby highlighting the need for more proactive and adaptive approaches.

First: Board Oversight and Governance Failure

Evidence from U.S. Senate hearings (2002) indicates significant weaknesses in Enron's governance structure, particularly in terms of board oversight. Despite the presence of an experienced board, several high-risk financial decisions were approved without sufficient scrutiny.

Notably, the board authorized complex financial arrangements and granted the Chief Financial Officer, Andrew Fastow, exceptional waivers that allowed him to manage external entities while maintaining personal financial interests. This situation reflects a clear breakdown in oversight and an inability to effectively control conflicts of interest **(COMMITTEE ON GOVERNMENTAL AFFAIRS UNITED STATES SE, 2002)**

Second: Financial Practices and Lack of Transparency

A central feature of the Enron crisis was the extensive use of Special Purpose Entities (SPEs) and Special Purpose Vehicles (SPVs) to conceal liabilities outside the balance sheet. These structures enabled the company to mask its actual financial position and present inflated performance figures.

Such practices reduced transparency and limited stakeholders' ability to assess the company's real level of risk. As a result, governance mechanisms based on financial reporting failed to provide accurate and reliable information **(Investigations., United States Senate Permanent Su, 2003)**

Third: Internal Communication and Organizational Learning

Internal communications revealed during the investigations show that certain executives were aware of the risks associated with these financial practices. Concerns were raised regarding the complexity and opacity of the company's financial structures and their potential impact on investor confidence.

However, these warnings were not followed by corrective action. This suggests not only a failure of oversight, but also a limitation in organizational learning, as the company was unable to integrate internal risk signals into its decision-making processes **(COMMITTEE ON GOVERNMENTAL AFFAIRS UNITED STATES SE, 2002)**

Fourth: External Control Mechanisms

The Enron case also highlights weaknesses in external governance mechanisms. Arthur Andersen, the company's external auditor, failed to adequately assess and disclose the risks associated with Enron's financial reporting practices.

In addition, major financial institutions participated in structuring complex transactions that contributed to the concealment of financial information. These interactions demonstrate how

deficiencies in both internal and external governance can reinforce each other and increase systemic risk **(United States General Accounting, March 2003)**

Finally: Consequences of Governance Breakdown

The disclosure of these practices in 2001 led to the rapid collapse of Enron. The company's stock price fell sharply, resulting in substantial financial losses for investors, estimated at approximately $60 billion. Thousands of employees and retirees were also affected, losing significant portions of their **(Portraits in Oversight, 2022)**

Discussion

The findings from the Enron case confirm that governance systems based primarily on ex-post control are insufficient to prevent complex corporate crises. The failure observed was not limited to internal management, but reflected a broader systemic weakness affecting both corporate governance practices and external regulatory mechanisms.

This case illustrates the need for a transition toward more proactive governance models that emphasize transparency, continuous monitoring, and early risk detection. In response to these failures, regulatory reforms such as the Sarbanes-Oxley Act (2002) were introduced to strengthen accountability, improve audit oversight, and enhance financial disclosure.

Governance Principles Under the Sarbanes-Oxley Act

The corporate scandals involving Enron and Arthur Andersen resulted in a significant loss of investor confidence and led directly to the adoption of the Sarbanes-Oxley Act (SOX) in 2002. This regulatory framework introduced substantial changes to
corporate governance practices, particularly by strengthening audit oversight through the establishment of the Public Company Accounting Oversight Board (PCAOB), reinforcing auditor independence, and increasing executive responsibility for financial reporting.

In addition, the Act introduced mechanisms aimed at improving transparency and accountability, including stricter disclosure requirements, whistleblower protections, and enhanced penalties for fraudulent practices. These measures contributed to restoring confidence in financial markets and improving the reliability of corporate reporting. **(Congress, 2002)**.

However, despite these regulatory improvements, traditional governance frameworks continue to face limitations in dealing with the growing complexity of modern business environments. This suggests that regulatory reforms alone may not be sufficient to address emerging risks.

In this regard, the integration of advanced technologies, such as artificial intelligence and blockchain, is increasingly considered as a complementary approach to strengthen governance systems. These technologies can support more timely decision-making, improve risk monitoring, and enable a more proactive approach to governance. This evolution reflects a gradual shift toward more adaptive forms of governance, often referred to as "smart governance"

III.2.2- Testing the Second Hypothesis:

This study assumes that artificial intelligence technologies can enhance corporate governance systems by improving data analysis, automating processes, and reinforcing transparency and accountability.

First: Predictive Analysis and Early Fraud Detection

The Enron collapse revealed clear limitations in traditional governance systems, particularly their inability to process complex financial structures and detect hidden risks in a timely manner. Although the Sarbanes-Oxley Act (SOX) strengthened internal controls and transparency, its effectiveness remains largely dependent on periodic and human-driven procedures, which may be insufficient in increasingly data-intensive environments **(U.S.Congress, 2002)**

In contrast, artificial intelligence enables a more proactive approach to governance by supporting real-time data analysis and early risk detection. For example, the COIN platform developed by

JPMorgan Chase uses Al to analyze large volumes of legal documents in a significantly reduced time frame, while improving accuracy and reducing operational errors **(JPmorgan chase, 2025)**. Such applications illustrate how Al can enhance the capacity of organizations to identify potential risks before they materialize.

Second: Auditing Automation and Enhanced Independence

The Enron case also highlighted major weaknesses in traditional auditing practices, particularly the reliance on manual and sample-based procedures, which proved inadequate for detecting complex financial manipulations. Although SOX, especially Section 404, reinforced internal control systems, its implementation still relies on conventional audit tools that are not fully adapted to digital environments **(U.S.Congress, 2002)**

Recent developments in the auditing field show a gradual shift toward data-driven approaches supported by artificial intelligence. Major audit firms have integrated advanced analytics into their practices in order to analyze entire data sets rather than limited samples, detect anomalies, and provide more timely insights. **(Deloitte, 2026)**

Platforms such as KPMG Clara and EY Helix illustrate this evolution by enabling continuous monitoring of financial data and improving the detection of irregular patterns within accounting processes. These developments contribute to strengthening audit quality and reducing dependence on subjective judgment, thereby enhancing the overall effectiveness and independence of the auditing function **(pwc, 2024)**

Discussion

The findings from the Enron case study and the analysis of recent technological developments confirm the validity of the second hypothesis, as artificial intelligence effectively contributes to enhancing corporate governance systems by improving data analysis, supporting real-time decision-making, and strengthening control and transparency mechanisms.

The Enron case highlighted the limitations of traditional governance models, particularly their reliance on periodic oversight, which proved insufficient to detect complex financial risks. In contrast, artificial intelligence offers stronger preventive capabilities through early detection of irregularities and comprehensive data analysis.

However, the effectiveness of these technologies remains dependent on the existence of clear regulatory frameworks and the ability of organizations to address challenges such as data quality issues and cybersecurity risks.

Overall, artificial intelligence does not replace traditional governance mechanisms but rather complements them, leading to a more advanced and proactive governance model.

III.3.3- Testing the Third Hypothesis:

The third hypothesis assumes that, although smart governance systems based on artificial intelligence can improve transparency, risk prediction, and crisis management, their implementation is likely to face significant technical, organizational, and ethical constraints.

Analysis

A first set of challenges relates to data protection and privacy. Al-based governance systems depend heavily on large volumes of data, which increases exposure to misuse and weak data governance. The Cambridge Analytica-Facebook case illustrates how insufficient control over personal data can lead to serious ethical and regulatory concerns, where millions of users' data were exploited without consent **(Quan-Haase, Sloan, Jacobson, & Gorea, 2016)**

In addition, cybersecurity risks represent a growing constraint on Al adoption in governance systems.

Recent studies show that organizations are increasingly exposed to cyberattacks targeting sensitive information, with financial and reputational losses becoming more significant. Supply chain interconnections further amplify these vulnerabilities, as attacks can propagate across multiple

systems **(Age, 2025)**. In this context, cybersecurity risk has become a core governance issue, particularly in financial and digitally dependent sectors, where incidents directly affect compliance and corporate stability **(Geoff , 2025).**

Emerging threats such as API exploitation and blockchain-related vulnerabilities also demonstrate the limitations of traditional, experience-based risk models **(AlBasher, 2025)**

Beyond technical risks, structural and human limitations also constrain the effectiveness of smart governance systems. Many organizations still face gaps in digital infrastructure and unequal access to technology, reflecting a persistent global digital divide **(VASCONCELOSCEM & DENER , 2026)**

Moreover, limited expertise in artificial intelligence at the board level reduces the ability of decision-makers to properly evaluate Al-related risks and outcomes **(Shekshnia & Yakubovich , 2025)** Overall, while artificial intelligence enhances analytical capacity and operational efficiency, its effectiveness in governance remains dependent on human oversight. The findings suggest that smart governance should not replace human judgment, but rather operate through a balanced integration between technological systems and managerial expertise.

III.2- Hypothesis Testing in the Yassir Case Study

III.2.1- Testing the First Hypothesis: Crises as a Mechanism for Reshaping Governance Systems.

Analysis:

The COVID-19 pandemic led to a significant shift in Yassir's governance model, moving from traditional ex-post monitoring toward a more predictive and learning-oriented approach. By analyzing user behavior during lockdown periods, the company adapted its services by introducing new offerings such as Yassir Market, which reflects organizational learning and improved resilience. This adaptation was supported by the use of cloud infrastructure (Google Cloud) and Al-based demand forecasting, allowing the company to rely on data-driven insights rather than managerial intuition. This contributed to greater flexibility in resource allocation and faster responses to environmental disruptions.

Overall, the case of Yassir shows that crises can act as a turning point in reshaping governance systems. They push organizations toward continuous learning and adaptation, making governance a more dynamic and responsive process**(Yassir, 2026)**

III.2.2- Testing the Second Hypothesis: Artificial Intelligence as a Lever for Building Smart Governance.

Analysis:

The case of Yassir demonstrates that artificial intelligence plays a central role in enabling smart governance through data-driven decision-making, process optimization, and enhanced organizational transparency.

First, the company relies on an integrated data ecosystem, including tools such as Vertex Al, BigQuery, and Looker, to convert large volumes of raw data into actionable insights. This capability supports anticipatory governance by allowing early identification of operational risks and demand fluctuations. In addition, interactive dashboards contribute to improving transparency and reducing information asymmetry, while automation enhances monitoring processes and limits human error, thereby strengthening algorithmic governance.

Second, although Yassir has not formally implemented blockchain technology, its operational logic reflects key principles associated with this system, particularly in terms of traceability and

reliability of transactions. The platform structure ensures a high level of data consistency and operational transparency, which indirectly supports institutional trust.

Finally, process automation within Yassir goes beyond operational efficiency. Algorithms used in driver-passenger matching and recommendation systems reduce the need for human intervention in routine tasks, allowing management to focus on strategic decision-making. This shift illustrates a movement toward governance by design, where digital systems are embedded into organizational processes. Empirically, improvements in service performance-such as reduced waiting times and increased platform efficiency-further reinforce the governance value generated through digital transformation. **(Yassir, 2026)**

III.2.3- Testing the Third Hypothesis: Organizational and Ethical Challenges of Smart Governance

Analysis:

The case of Yassir shows that the adoption of smart governance relies on an advanced technological ecosystem, including tools such as the Security Command Center and other Google Cloud services, which reflects a cloud-based governance model.

However, despite its advantages, this model presents several structural and organizational challenges. One of the main constraints relates to infrastructure disparities, as weak digital networks in several African contexts reduce the effectiveness of intelligent systems. This situation contributes to what can be described as digital governance Inequality **(يونس، 2025)**

In addition, the increasing dependence on data-intensive systems leads to higher operational costs, particularly in terms of data storage and processing. This raises concerns regarding the balance between technological innovation and economic sustainability.

Another important limitation concerns dependence on external service providers. The reliance on platforms such as Google Cloud introduces issues related to data sovereignty, since organizational data may become partially subject to external regulations and governance frameworks.

Overall, the analysis suggests that Al-based governance should not be viewed as a purely technical transformation. Rather, it represents a multidimensional shift that involves technological, ethical, and sovereignty-related challenges.

Therefore, the effectiveness of smart governance models depends on achieving a balance between technological efficiency and organizational autonomy.

This study concluded with the following results:

This study highlights several key findings regarding the evolution of corporate governance toward intelligent, Al-driven models.

First, the Enron case demonstrates how governance failure can result from deliberate manipulation of financial reporting and exploitation of external audit credibility, leading to distorted financial disclosures and loss of stakeholder trust.

Second, the historical evolution of governance shows that traditional frameworks have largely been reactive, emerging mainly in response to crises rather than preventing them, which reveals a structural limitation in anticipating institutional failures.

Third, modern corporations face broad fiduciary responsibilities toward multiple stakeholders; however, traditional compliance-based governance models remain insufficient to address these multidimensional obligations due to their static and retrospective nature.

Fourth, the integration of artificial intelligence emerges as a key driver in transforming governance systems into more dynamic and predictive structures, enabling process automation, real-time monitoring, and proactive risk management.

Fifth, this transformation extends to the restructuring of boards of directors into more intelligent and specialized governance bodies capable of supporting strategic decision-making and digital

transformation.

Sixth, smart governance contributes to enhanced stakeholder protection by improving transparency for investors, promoting fairness in human resource management, strengthening customer-oriented services, and supporting environmental sustainability through ESG-aligned practices.

Finally, the case of Yassir illustrates the practical application of intelligent governance, showing how Al, cloud infrastructure, and data-driven decision-making can enhance resilience, transparency, and adaptability, particularly in crisis contexts such as the COVID-19 pandemic.

Overall, the study confirms that intelligent governance represents a practical evolution of traditional models toward more adaptive, predictive, and stakeholder-oriented systems.

IV- Conclusion:

This study confirms that corporate governance remains a key mechanism for reducing systemic risks; however, traditional governance frameworks have shown clear limitations due to their reactive nature and limited adaptability, as evidenced by repeated global crises ranging from the Great Depression to the COVID-19 pandemic, as well as major corporate failures such as Enron.

In contrast, the integration of artificial intelligence marks a significant shift toward more intelligent governance systems. By incorporating data-driven tools and algorithmic processes within organizational structures, governance becomes more dynamic, predictive, and capable of supporting timely and informed decision-making.

The case of Yassir further illustrates this transformation in practice. Its use of artificial intelligence, cloud-based infrastructure, and data-driven decision-making has contributed to improved operational efficiency, greater transparency, and enhanced resilience, particularly during periods of disruption. This demonstrates that intelligent governance is not only theoretical but also practically applicable and scalable.

Overall, the study highlights the growing necessity for organizations to adopt advanced Al technologies, integrate them across all managerial levels, and invest in continuous human capacity development. It also emphasizes that Al-supported information systems are becoming a fundamental pillar of modern governance. Finally, future research should further examine the limitations of Al in complex geopolitical and technological environments.

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