ARTIFICIAL INTELLIGENCE TO ENHANCE CORPORATE GOVERNANCE: A CONCEPTUAL FRAMEWORK

Anacleto Correia [*], Pedro B. Água [**]

* CINAV, Escola Naval, Military University Institute, Almada, Portugal
** *Corresponding author*, CINAV, Escola Naval, Military University Institute, Almada, Portugal
Contact details: CINAV, Escola Naval, Military University Institute, Base Naval de Lisboa — Alfeite 2810-001, Almada, Portugal

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Abstract

In this preliminary study, we explore the novel intersection of corporate governance (CG) and artificial intelligence (AI), addressing the crucial question: How can AI be leveraged to enhance ethical and transparent decision-making within the corporate environment? Drawing from current studies on organizational governance, AI ethics, and data science, our research raises the curtain on the potential of AI in augmenting traditional governance mechanisms, while also scrutinizing the ethical quandaries and challenges it may pose. We propose a novel conceptual framework, rooted in the principles of separation of ownership and control, and data ethics, to be underpinned and validated, in the future, through an empirical study. Given the current inception stage of the study, we expect the results will illustrate a significant positive impact of AI on CG effectiveness, particularly in enhancing transparency and fostering ethical decision-making. We also propose future studies to be done as a mix of econometric and machine learning methods to empirically test the framework with datasets gathered over a period of years.

Keywords: Artificial Intelligence, Corporate Governance, Data Science, Ethical Decision-Making, Organizational Ethics, Transparency

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1. INTRODUCTION

Corporate governance (CG) has long been recognized as a vital mechanism for ensuring the efficient functioning and ethical conduct of corporations (Tricker, 2015). CG involves the structures, processes, and rules that control and direct corporations, with the aim of balancing the interests of a company's broad stakeholders set, such as shareholders, management, customers, suppliers, financiers, government, and the community (Freeman, 1984). Despite the acknowledged importance of CG, numerous cases of corporate mismanagement and scandal, such as Enron, WorldCom, and Volkswagen, to name just a few, underscore the persistent challenges and the need for further enhancement of CG mechanisms (Park, 2008; Jensen, 2001).

The ongoing digital transformation presents an opportunity to rethink and reinvent CG. This transformative period is characterized by the emergence of powerful technologies such as artificial intelligence (AI), which have the potential to

disrupt traditional business models and introduce novel approaches to management and decision-making (Brynjolfsson & McAfee, 2014). AI technologies, with their advanced capabilities for pattern recognition, predictive analysis, and decision automation, provide a vast potential for improving CG. Yet, despite the transformative potential of AI, its application in CG remains under-explored, and its implications under-theorized (Mikalef et al., 2019).

The application of AI in CG is challenging for several reasons. First, AI can enhance decision-making by providing valuable insights from large volumes of data, and automate certain governance processes, thereby reducing human error and bias, and improving efficiency (Myatt, 2007). This could lead to better alignment of corporate actions with shareholder interests, and more effective compliance with regulations, thereby enhancing the overall governance of corporations.

Second, AI has the potential to foster greater transparency in CG. Through its predictive and analytical capabilities, AI can help uncover hidden patterns and trends, providing valuable insights which can be used to improve the transparency of decision-making processes. This could enhance the accountability of corporations to their stakeholders, a key aspect of CG.

However, the application of AI in CG is not without challenges. One of the main challenges pertains to the ethical implications of AI. These include issues related to privacy, fairness, and accountability, among others (Russell et al., 2015). For example, AI systems, with their capacity for data analysis and prediction, could potentially infringe on the privacy of individuals. Moreover, the decisions made by AI systems may not always be fair or unbiased, as they could be influenced by the biases in the data used to train these systems. Another challenge is the "black box" problem associated with AI. This refers to the difficulty of understanding how AI systems make decisions, due to the complexity of their algorithms and the large volumes of data they process (Castelvecchi, 2016). This lack of transparency could undermine trust in AI systems and hinder their acceptance by stakeholders.

To address these challenges, there is a need for a comprehensive framework for leveraging AI in CG, which balances the potential benefits and ethical and transparency issues. Such a framework would guide how to integrate AI into CG mechanisms, and how to address the ethical and transparency issues that may arise.

To this end, our research aims to develop a comprehensive AI-based CG framework. We will explore how AI can be leveraged to enhance CG, identify the potential ethical and transparency issues that could arise, and propose strategies for mitigating these issues. Our research is guided by two key research questions:

RQ1: How can AI be leveraged to enhance CG?

RQ2: What are the potential ethical and transparency issues that could arise from the use of AI in CG and how can they be mitigated?

The benefits of AI in CG extend beyond the boardroom. By improving decision-making and efficiency, AI can enhance the competitiveness of corporations, contributing to economic growth and job creation. By fostering greater transparency, AI can enhance the accountability of corporations to their stakeholders, contributing to societal trust in corporations. And by addressing the ethical implications of AI, the research can contribute to the responsible use of AI, ensuring that the benefits of AI are realized in a way that is ethical and sustainable.

The rest of this paper is structured as follows. Section 2 provides a background on CG and the potential role of AI in enhancing it. Section 3 presents the proposed AI-based CG framework and discusses how it can help address the challenges and issues in CG. Finally, Section 4 concludes the paper with a summary of the findings and implications for future research.

2. THEORETICAL BACKGROUND

Agency theory, originally proposed by Jensen and Meckling (1976), has been the dominant theoretical framework in CG research for decades. It postulates that in modern corporations, there exists a separation of ownership and control, where the owners (principals) delegate the management of the corporation to the managers (agents). This separation gives rise to agency problems due to the divergence of interests between the principals and agents.

Principals, typically shareholders, are interested in maximizing the value of their investments, while agents, the managers, may have different objectives, such as personal wealth maximization, career security, or other non-economic interests (Eisenhardt, 1989). This divergence of interests often leads to issues such as moral hazard, where agents take on excessive risk for personal gain at the expense of the principals, and adverse selection, where agents possess information that principals do not, enabling the agents to act in ways that may not be in the best interests of the principals (Fama, 1980; Eisenhardt, 1989).

To mitigate these agency problems, various CG mechanisms have been put in place, including board supervision, performance-based compensation, shareholder voting rights, and external audits (Fama, 1980; Jensen & Meckling, 1976). However, these traditional governance mechanisms have their limitations. One of the main limitations is that they rely heavily on human judgment and decision-making, which are prone to bias, subjectivity, and error (Tversky & Kahneman, 1974). For instance, board members may have cognitive biases that affect their ability to effectively supervise management, and auditors may have confirmation biases that affect their ability to accurately assess financial reports (Healy & Palepu, 2001; Bazerman et al., 2002; Água & Correia, 2021, 2022). Another limitation is the lack of transparency and accountability, which can facilitate unethical behaviour and misconduct by managers (Jensen, 2001).

The effectiveness of CG mechanisms has been questioned due to the abovementioned high-profile corporate scandals and failures (Agle et al., 2008). These cases demonstrate the limitations of traditional CG mechanisms, which are often characterized by human bias, subjectivity, lack of transparency, and inadequate oversight (Jensen, 2001). Therefore, there is a pressing need for innovative approaches to enhance CG.

AI techniques have the potential to help overcome these limitations. AI refers to the simulation of human intelligence processes by machines, especially computer systems (Russell & Norvig, 2016). AI has gained significant attention in business research and practice due to its potential to transform various aspects of business operations, such as decision-making, process automation, customer service, and strategy formulation (Brynjolfsson & McAfee, 2014). AI's potential is particularly relevant to CG.

AI can enhance decision-making by providing valuable insights from large volumes of data, reducing human error and bias (Davenport & Ronanki, 2018). The ability to analyse and learn from data allows AI to generate valuable insights that can inform decision-making, automate complex processes, and forecast future trends with a high degree of accuracy (Goodfellow et al., 2016). AI can enhance strategic decision-making by providing predictive analytics based on comprehensive data analysis, enabling corporations to anticipate market trends, customer behaviour, and competitive moves (Siegel, 2016). Moreover, AI can learn from the data and improve its decision-making capabilities over time through machine learning algorithms (Goodfellow et al., 2016).

Furthermore, AI can automate routine tasks, freeing up human resources for more strategic and creative tasks, thus increasing operational efficiency (Chui et al., 2018). AI can also automate certain governance processes, such as financial auditing and compliance monitoring, improving efficiency and accuracy (Yoo et al., 2018). Transparency and accountability can be enhanced by AI if an audit trail of decision-making processes and outcomes is provided, in an attempt to address the "black box" problem through explainable AI techniques (Russell et al., 2015; Castelvecchi, 2016). AI can also help detect and prevent unethical behaviour and misconduct by analysing patterns and anomalies in corporate data (Dhar, 2016).

Despite the potential of AI to enhance CG, there is a paucity of research that systematically investigates this potential. A few studies have started to explore this area, but their focus has been on specific aspects of CG. For instance, Mikalef et al. (2019) examined how AI can be used to enhance board-level decision-making, while Yoo et al. (2018) studied how AI could be used to automate certain CG processes. However, these studies do not provide a comprehensive framework for leveraging AI to enhance CG, nor do they thoroughly address the ethical and transparency issues that could arise from such usage.

The application of AI in decision-making and process automation also raises significant ethical and transparency issues. For instance, the decisions made by AI systems may be biased due to biased training data or algorithms, leading to unfair outcomes (Crawford, 2016). Moreover, the decision-making process of AI systems can be opaque, making it difficult for humans to understand and explain the decisions, which can undermine accountability and trust in AI systems (Castelvecchi, 2016).

The ethical and transparency issues associated with AI have been increasingly recognized as critical challenges that need to be addressed (Russell et al., 2015). These issues include privacy, fairness, transparency, and accountability, among others. Privacy issues arise from the extensive data collection and processing involved in AI systems, which can potentially infringe on individuals' privacy rights (Zuboff, 2019). Fairness issues arise from the potential biases in AI systems, which can lead to unfair outcomes for certain groups of individuals (Crawford, 2016). Transparency issues arise from the opaque decision-making process of AI systems, which can undermine accountability and trust in AI systems (Castelvecchi, 2016). Accountability issues arise from the difficulty of attributing responsibility for the decisions made by AI systems, especially when these decisions have significant societal implications (Floridi & Taddeo, 2016). Addressing these ethical and transparency issues is crucial to ensure the responsible use of AI in business and society.

In summary, agency theory provides a valuable theoretical foundation for understanding the role of AI in CG. By addressing the limitations of traditional governance mechanisms and mitigating agency problems, AI can significantly enhance CG. However, the successful integration of AI into CG requires a thoughtful and balanced approach that takes into account both the potential benefits and the ethical and transparency considerations. While AI holds significant promise for enhancing CG and mitigating agency problems, it also needs a comprehensive framework that balances the potential benefits and challenges and ensures ethical and transparent AI use.

3. STUDY FRAMEWORK

The background section reveals a gap in the existing research on the intersection of AI and CG. While some studies have explored specific aspects of this intersection, there is a lack of a comprehensive framework that integrates AI into CG and addresses the associated ethical and transparency issues.

Developing such a framework is important for several reasons. First, it can provide a systematic approach to leveraging AI in enhancing CG, which can lead to more efficient and effective governance processes, better decision-making, and improved corporate performance. Second, it can guide how to address the ethical and transparency issues associated with the use of AI in CG, ensuring that the benefits of AI are realized in a responsible and sustainable manner.

Moreover, the integration of AI into CG could potentially extend the agency theory by introducing AI as a new mechanism to mitigate agency problems. AI could enhance the monitoring and control mechanisms, reduce human bias and error, and provide more accurate and timely information for decision-making, thus mitigating the divergence of interests between principals and agents (Brynjolfsson & McAfee, 2014; Davenport & Ronanki, 2018).

To develop the proposed AI-based CG framework, it is necessary to conduct empirical research that explores how AI can be leveraged to enhance CG, and how the ethical and transparency issues can be mitigated. Such research would involve qualitative interviews to gain insights from corporate board members, senior management, and AI experts; a quantitative survey to gather data from a large and

more diverse sample; and secondary data analysis to examine the impact of AI on CG performance.

To ensure the comprehensiveness of the proposed framework, it should address several key aspects of CG, such as board structure and processes, executive compensation, shareholder rights, and corporate accountability and transparency. The framework should also guide how to integrate AI into these aspects in a way that enhances CG and addresses ethical and transparency issues. Hence, the proposed framework should take into account the specific characteristics and capabilities of AI, such as machine learning, predictive analytics, and decision automation. It should guide how to leverage these capabilities to enhance CG, and how to address the associated challenges, such as the "black box" problem and potential biases in AI systems.

Furthermore, the framework should guide how to ensure the ethical use of AI in CG. This involves addressing the privacy, fairness, transparency, and accountability issues associated with AI. The framework should provide specific guidelines and mechanisms for addressing these issues, such as data privacy policies, fairness audits, explainability tools, and accountability structures. Finally, the framework should be flexible and adaptable to different types of corporations and different contexts. This requires considering the variations in CG practices across different industries, countries, and cultures, and the dynamic nature of AI technologies.

The AI-based CG framework proposed in this work (Figure 1) aims to integrate AI into the key aspects of CG in a way that enhances CG and addresses ethical and transparency issues. The framework comprises the following five key aspects:

1) *Board structure and processes:* The framework proposes the use of AI in enhancing board decision-making and oversight. AI could be used to analyse large volumes of data relevant to the board's decision-making, thereby providing valuable insights for the board (Brynjolfsson & McAfee, 2014). AI could also be used to automate certain board processes, such as compliance monitoring, thereby improving efficiency and accuracy (Yoo et al., 2018).

2) *Executive compensation:* AI could play a role in designing and implementing performance-based compensation schemes. Machine learning algorithms could be used to predict the impact of different compensation structures on executive behaviour and corporate performance, thereby enabling more informed and effective compensation decisions (Goodfellow et al., 2016).

3) *Shareholder rights:* AI could enhance shareholder engagement and voting. AI could be used to analyse shareholder feedback and voting patterns, thereby providing insights into shareholder sentiment and preferences (Bollen et al., 2011). AI could also be used to facilitate electronic voting, thereby making it easier and more convenient for shareholders to exercise their voting rights (Lu et al., 2020).

4) *Corporate accountability and Transparency:* AI could enhance corporate accountability by providing an audit trail of decision-making processes and outcomes.

5) *Corporate transparency:* AI could enhance corporate transparency by detecting and preventing unethical behaviour and misconduct. AI could also be used to generate real-time, interactive, and user-friendly corporate reports, thereby enhancing corporate disclosure (Dhar, 2016).

The proposed AI-based CG framework is flexible and adaptable. It can be tailored to the specific characteristics and needs of different types of corporations and different contexts. The framework also recognizes the dynamic nature of AI technologies and the need for continuous learning and adaptation. It encourages corporations to regularly update their AI strategies and practices in response to technological advancements and changes in the business and regulatory environments.

Figure 1. AI-based CG framework

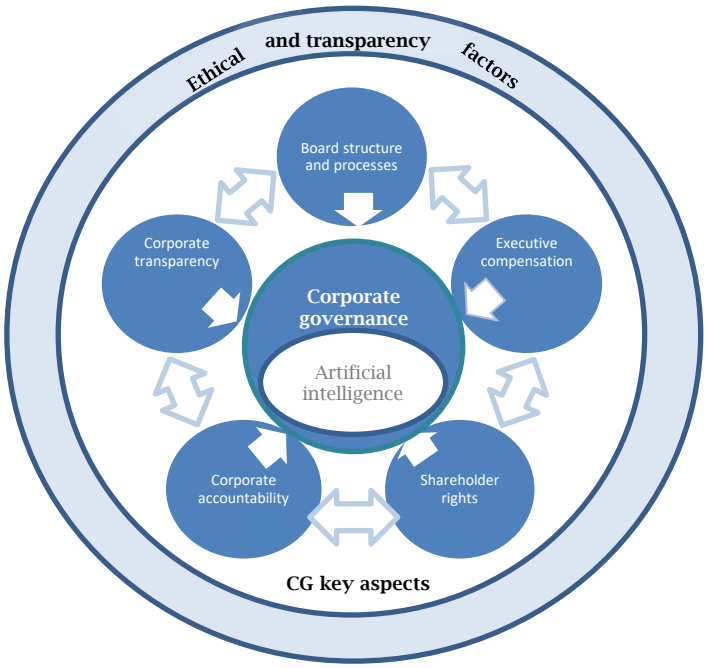

Figure 1 depicts the overall representation of the AI-based CG framework and its components:

- *AI in CG:* The central focus of the framework is given by the intersection of AI and CG (central circle).
- *Key aspects of CG:* Around the central circle are surrounding circles, each representing a key aspect of CG that can be enhanced by AI. The key aspects of CG, previously described, are board structure and processes, executive compensation, shareholder rights, corporate accountability, and corporate transparency.
- *Integration of AI:* Each one of the key aspects of CG can be enhanced via AI integration (represented by arrows connecting surrounding circles to the central circle).
- *Dynamic nature of the framework:* This behaviour is suggested by the impact originated by each key aspect of CG on the others key aspects, due to the AI effect (arrows between the key aspects of CG).
- *Ethical and transparency factors:* It guides how to ensure the ethical use of AI in CG. It involves implementing data privacy policies, conducting fairness audits, using explainability tools, and establishing accountability structures (Russell et al., 2015) (outer layer surrounding the entire figure).

To support the proposed AI-based CG framework, correlation studies are planned as this research develops. These studies will measure how AI technologies can improve CG by examining the relationship between variables. We will search for associations between the application of AI and the enhancement of CG. With the study, it is expected to gather evidence regarding the following claims:

- AI's advanced capabilities in pattern recognition, predictive analysis, and decision automation have potential implications for the structures, processes, and rules that control and direct corporations (Brynjolfsson & McAfee, 2014).
- By leveraging AI's capability to process and analyze large volumes of data, corporations can gain valuable insights that enhance decision-making processes, automate certain governance processes, and reduce human error and bias, thereby improving efficiency (Davenport & Ronanki, 2018). Consequently, this could lead to a better alignment of corporate actions with shareholder interests and more effective compliance with regulations, thereby enhancing the overall governance of corporations (Hilb, 2020).
- The integration of AI into CG, if done in an ethical and transparent manner, can significantly improve an organization's efficacy and performance. By uncovering hidden patterns and trends, AI could provide valuable insights that can be used to improve the transparency of decision-making processes (Chui et al., 2016). This increased transparency could enhance the accountability of corporations to their stakeholders (Siau & Yang, 2017), a crucial aspect of effective CG (Tricker, 2015).
- The decisions made by AI systems may not always be fair or unbiased, as they could be influenced by the biases in the data used to train these systems (Barocas & Selbst, 2016).
- Due to its capacity for extensive data analysis and prediction, AI could potentially infringe on the privacy of individuals (Russell et al., 2015).
- The complexity of AI algorithms (the so-called "black box" problem) and the large volumes of data they process can make it difficult to understand how AI systems make decisions (Castelvecchi, 2016). This lack of transparency could undermine trust in AI systems and hinder their acceptance by stakeholders (Burrell, 2016).

To test hypotheses about these claimed relationships, the proposed correlational studies to be conducted should use a sample of several corporations from various industries. The goal is to gather vital information regarding the level of AI integration within a company's governance procedures. By leveraging well-established metrics like board effectiveness, regulatory compliance, stakeholder satisfaction, and shareholder value, we aim to appraise their CG proficiency and performance. We will also account for potential confounding factors such as industry, company size, and geographical location. Not only will this study's findings add to the theoretical understanding of how AI affects CG, but they will also provide valuable practical insights for companies looking to capitalize on AI to bolster their governance efforts.

A step further in the study to explain how or why certain relationships exist is the use of the mediation analysis (Baron & Kenny, 1986), is a statistical technique used to investigate the process by which a variable (the mediator) influences the relationship between two other variables (the independent and dependent variables). The mediation analysis involves testing whether the indirect effect of the independent variable on the dependent variable through the mediator is significant (Hayes, 2013). In the context of our proposed AI and CG framework, AI's integration into CG can be conceptualized as the independent variable; corporate performance as the dependent variable; and various aspects of the framework (such as board structure and process, executive compensation, shareholder rights, corporate accountability, and corporate transparency) as potential mediators. A first model to illustrate the mediation analysis could include (Preacher & Hayes, 2004):

- Independent variable (*X*): AI's integration into CG.
- Mediators (*M*): Board structure and process, executive compensation, shareholder rights, corporate accountability, and corporate transparency.
- Dependent variable (*Y*): Corporate performance.

The mediation analysis would involve the following steps:

- Regressing the mediators (*M*) on the independent variable (*X*). This establishes whether AI's integration into CG significantly influences the various aspects of the framework.
- Regressing the dependent variable (*Y*) on the independent variable (*X*). This tests the total effect of AI's integration into CG on corporate performance.
- Regressing the dependent variable (*Y*) on both the independent variable (*X*) and the mediators (*M*). This tests whether the mediators significantly influence corporate performance when controlling for AI's integration into CG.

The indirect effect of AI's integration into CG on corporate performance through the mediators would be considered significant if the confidence

intervals do not contain zero. This would suggest that AI's impact on corporate performance is mediated by its influence on the various aspects of the framework. The actual mediation analysis may involve more complex statistical techniques depending on the nature of the data and the research questions. Moreover, it will be important to interpret the results of mediation analysis in light of the theoretical underpinnings of the proposed framework and the literature on AI and CG.

4. CONCLUSION

The aim of this research was the recognition of the transformative potential of AI in CG and the concomitant need for an ethical and transparent approach. Our study provides a nuanced understanding of how AI can enhance CG, as well as the ethical and transparency issues that need to be addressed.

Drawing on the findings, we proposed an AI-based CG framework. This framework provides a balanced approach to leveraging AI in CG, integrating AI into decision-making and governance processes, while also addressing the ethical and transparency issues. This framework extends the agency theory, suggesting a new approach to mitigating agency problems in the era of AI.

Future research should delve deeper into the ethical and transparency issues. This would involve testing the proposed framework, conducting larger and diverse interviews, using detailed and comprehensive data, and developing specific ethical and transparency guidelines and mechanisms.

In the age of AI, CG mechanisms need to evolve to leverage the benefits of AI, while also addressing the ethical and transparency challenges. Our research provides a foundation for this evolution, contributing to the enhancement of CG in the era of AI.

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