Analysing the Effect of Artificial Intelligence and Management Control on Digital Governance

Ghrairi Monem*

Accounting, Ihec carthage TUNISA, Tunisia

Abstract

Artificial Intelligence and Management Control Systems are two aspects known to play a significant role in digital governance. They optimize the organizational systems and foster transparency and accountability in daily proceedings. This research study investigated the effect of artificial intelligence and management control on digital governance in Tunisian corporate sector organizations. After carrying out a focused literature review that revealed that artificial intelligence and management control systems are associated with improving corporate governance, the focus is to assess the effect of artificial intelligence and management on digital governance. The researchers used a sample of 400 respondents currently working in different corporate sector organizations in Tunisia. Data gathered under the theoretical underpinnings of agency theory revealed that Artificial Intelligence significantly affects digital governance in Tunisia. The respondents widely agreed that Artificial Intelligence is helping in operational efficiency, mitigating risks, accelerating growth, and others. Further, the effect of Management Control Systems on digital governance also remained significant. It was found that Management Control Systems ensure accountability and digital presence and aligns functions with organizational goals and objectives. Thus, it is concluded that digital governance is affected by Artificial Intelligence and Management Control Systems in optimizing the functions of organizations. Effective implementation of management control in digital governance helps companies ensure transparency in their accountability and other aspects of operations.

Keywords: Artificial Intelligence, Management Control Systems, Digital Governance, Tunisia

JEL Classification: M410

* Corresponding author
E-mail: monem.ghrairi@gmail.com
Address: IHEC Carthage – University of Carthage -Tunisia A

1. Introduction

The advent of globalization with the emergence of liberal world order shifted the international paradigm from state-based economic development to private sector-based. In this lieu, the role of corporate management, strategy, and policy acquired prominence through the industrial sector of developed and developing countries (Dignam & Galanis, 2016). The corporate governance domain encompasses the management mode, addresses strategy development, and focuses on formulating efficacious policies (D'Cruz & Noronha, 2016). The fundamental purpose of corporate governance is to develop the resources and infrastructure of a business organization in such a manner that it continuously improves product quality and service delivery to customers, meanwhile also increasing financial profits for company stakeholders (Ahunwan, 2021). According to the description of Chartered Governance Institute UK & Ireland (2020), corporate governance is described as a system of rules, practices, and processes through which an organization is directed and controlled. In its conventional form, corporate governance addresses identifying governance structure, leadership determination, accountability, and decision-making practices (Agbata et al., 2023). However, the transformation of the digital era has expedited the first two decades of the 21st century. Supported by ubiquitous internet technology and smart devices, the concept and application of artificial intelligence (AI) have gained one of the top positions in the agendas of corporate leaders (Ekundayo & Sodipo, 2022). Although the concept is old, belonging to the 1950s, for which Peter Drucker's coined the phrase "The manager and the moron," implying the computer is a moron that only executes commands. However, computer technology has evolved exponentially since then, to the point that it is considered an integral part of our day-to-day lives (Hilb, 2020). Thus, with the internet's development, AI has also been recognized as a general-purpose technology. Its permeation into different public and private domains will likely provide solutions to multi-dimensional problems. Nevertheless, the implications and dynamics of AI in corporate governance is a developing field in which its relationship with different aspects of governance and policymaking is yet to be deciphered. Therefore, the current article aims to investigate artificial intelligence's effect on corporate sector digital governance. In conjunction with AI, management control is also identified as a crucial link between the applications of principles of corporate management and its impact on corporate governance (Berente et al., 2021). Management control is elaborated as a function that is focused on achieving established objectives within the decided time frame. Conventionally, the management control process is based on three distinct components, i.e., employing remedial action to a problem, determining actual performance, and establishing standards within the organization (Li et al., 2017). In this regard, any management control system objectively compares planned and actual performance by realizing causes and differences. By determining causes for differences between planned and actual outcomes, the management control system guides managers (and other leaders) to take corrective actions to minimize said differences (Rogov et al., 2020).

Regarding application, management control systems are classified into two categories: regulative controls and normative controls. Regulative controls focus on policy development which

regulates employees' workings and productivity, encompassing financial controls, quality controls, profitability, etc. (Long et al., 2020). Whereas normative controls focus on behaviourism, regulating secondary characteristics of the workforce such as team performance, team cohesion, communication networks, cultural norms, etc. In terms of management and digital technology, corporate governance can be described as a composite system comprising boards, ownerships, incentives, communication networks, online activities, and digital mechanisms to promote productivity (Hilb, 2020). Concerning artificial intelligence, the dynamic pertains to the usage of computer intelligence to decipher inconsistencies within this above-mentioned factor which lead to a reduction in productivity and an increment in employee discontent (Raisch & Krakowski, 2021). Thus, Artificial intelligence pertains to the implementation of intelligent systems and designs thinking to construct laws and policies as well as corporate infrastructure that maximizes productivity while working in a foreseeable environment (Buchak et al., 2018). Hence, this research is the focused influence of artificial intelligence in regulating corporate governance functions, in parallel with the influence of management control systems. Given the multifaceted nature of corporate governance, the article attempts to present a comprehensive description of the effectiveness of artificial intelligence on corporate governance holistically. The article expounds on corporate governance, the role of artificial intelligence on corporate governance, and the impact of management control on corporate governance. Moreover, the article also extracts theoretical background to establish a theoretical framework for the study. In furtherance, hypothesis development is done considering contemporary literature on this subject concerning relevant corporate governance and digital management theories. Although several studies have addressed corporate governance through different perspectives, such as investor activism, the impact of corporate governance, institutional investment in corporate governance, and others (D'Cruz & Noronha, 2016), however yet no study has investigated the effect of Artificial Intelligence as a major technological phenomenon (Akgiray, 2019; Fenwick & Vermeulen, 2019; Lafarre & Van der Elst, 2018). Besides, several studies were conducted in Tunisia, yet Artificial Intelligence and Management Control Systems on corporate governance remained an underrepresented phenomenon (Moussa, 2019; Salem et al., 2019). Based on the relevant empirical gap, this research investigated the effect of artificial intelligence and management control on the dynamics of corporate governance. The core objectives of the study are to examine **(i)** the effect of artificial intelligence on corporate governance, **(ii)** the role of the management control system on the governance of modern business corporations, and **(iii)** the influence of AI and the management control decision-making process of corporations.

2. Literature Review and Hypotheses Development

2.1 Corporate Governance

Although the notion of corporate governance changes concerning the nature of the organization and its geographical and cultural aspects, corporate governors' primary roles and responsibilities remain the same (Ali et al., 2020). The responsibilities assigned to managers and board members throughout the decision hierarchy are also based on fundamental principles of growing organizational

profitability, increasing productivity, and minimizing financial risks. Moreover, it is propounded by (Yoshikawa et al., 2016) that national laws significantly differ for the roles of higher managers and boards of directors. However, (Solomon, 2020) identified three roles of the board of directors across all types of organizations and jurisdictions. These roles are supervisors, co-creator, and supporters. This notion of three roles extends the conventional dualistic notion of direction and control, which is often mistakenly expected from the board of directors. Whereby is highlighted by the research of (Colares Oliveira et al., 2016) that external environments in which public companies operate have drastically changed over the last few years, especially since the global financial crisis in 2008. Since then, corporate governance has evolved into an avenue marred with various complexities upstream and downstream of the supply chain. Consequently, a complication of the situation has also complicated the role of shareholders. On the one hand, increased regulatory burdens on corporate sectors in many countries have added to the costs of employing novel technology and complexified supervision roles (Horan & Mulreany, 2020). On the other hand, the ubiquity of technology has substantially reduced technological adoption costs, thus enabling companies to adopt various modes of a particular technology as per their needs and valuation (Ekundayo & Sodipo, 2022).

Organizations are implementing digital systems to influence their decision-making process to minimize uncertainties and the effects of changes in governmental regulations. At the initial level, these digital systems are adopted to gain tremendously more data and social information in order to gain more insight into the market phenomenon, thus enabling decision-makers to precisely identify issues (Cihon et al., 2021). Secondly, digital systems help distribute workload within the organization's workforce by shifting considerable amounts of repetitive work to computer systems, meanwhile letting human beings manage more thought-oriented tasks. In this way, digital systems also improve the productivity of teams, which creates a positive loop in which increased productivity generates more wealth, which improves the company's ability to invest in themselves, thus further improving the quality of work (Arslan & Alqatan, 2020).

2.2 Artificial Intelligence and Governance in Digital Era

The current examination considers one of the promising headings of advancement of present-day enterprises. The inclusion of man-made brainpower (AI) in corporate administration. Various encounters with AI in settling on administrative choices have shown positive outcomes, encouraging numerous scientists to create idealistic conjectures about the rise of AI later that can understand the elements of administering assortments of a legitimate element (Dempsey et al., 2022). AI, in this regard, has emerged as an accelerating and cohesive factor, promising to improve the integration of various domains of business digitally to enhance decision-making prospects (Butcher, 2019). Moreover, AI provides different "shades" of adaptability through flexibility in development and implementation. Apart from a strict management perspective, AI can be applied in optimizing and predicting energy utilization by developing power generation and balanced energy usage intelligent machines (Hickman & Petrin, 2021).

Nevertheless, adopting AI technology is a concern in corporate domains, mainly because companies cannot precisely identify their development needs to train computer systems. On the other hand, at the highest stage, AI can be distinguished between rule-based systems and machine learning. The former depends on the human compression of a given context to define rules on which computer systems should operate. Meanwhile, the prospect of machine learning is gaining momentum in financial fields, in which machines are enabled to learn and formulate conclusions on the basis of given data and learning algorithms (Hilb, 2020). Nonetheless, technology's adoption depends upon its ease of implementation and usage, whereby it is consensus (Hu & Chang 2017) that AI helps in digital governance by increasing operational efficiency, mitigating risks, and accelerating growth and innovation.

H1: Artificial Intelligence has a positive impact on digital governance.

2.3 Management Control and Corporate Governance

Management control is pertinent to implementing tools and management techniques to support governance infrastructure. Management control and corporate governance philosophies are interrelated through power-sharing dynamics within the organization (Milosevic, 2015). While corporate governance involves overseeing the audit process and activities of board committees and ensuring financial integrity, management control pertains to actions and views of management regarding controls to regulate operations and management within the company. The debate about academic theorization of corporate governance and practical nuances has become complex with the unearthing of a new phenomenon that influences corporate governance through the actions of managers (Xue & Hong, 2016). (Mallin, 2016) asserted that the recent global crisis has also impacted how management relates to corporate governance subjectively. In this regard, the investigation notes that the worldwide monetary emergency brought about by the COVID-19 pandemic can become another driver for a particularly advanced change. The possibilities for bringing AI into corporate administration are assessed in the investigation utilizing different methodologies, which the researcher separates into three categories: AI authenticity, in which AI is viewed as an associate that can improve on crafted by individuals from administering bodies. Management controls are not merely systems impacting governance, but they are also impacted by institutional environments and the nature of dominant coalitions (Prowle & Tsiligkiris, 2020). It is also suggested by (Matei & Drumasu, 2015) that by changing the technical environment, the entire mechanism of management control systems can be gradually changed.

H2: Management control systems have a positive impact digital governance mechanism.

3. Theoretical Framework

For the current exposition, corporate governance and management theories are relented (Ashok et al., 2022). The agency theory was selected a providing theoretical grounds to current research as the current research was based on the relationship between principal actors (shareholders in this case)

and agents (such as senior members of the institution). In this, the principles place agents within the company so that agents can decide in the principal's best interest (Sama et al., 2022). However, agents' best decisions are not guaranteed, as they may succumb to systematic failure, behavioural limitations, or self-interest. Their theory works well in separating the domains of control and ownership (Manita et al., 2020). Talking specifically about the current study, Agency theory highlighted information asymmetry existing between principals and agents. Today data collection, processing, and reporting have become more efficient with the implementation of artificial intelligence and Management control systems, leading to improved efficiency that could reduce information gaps as artificial intelligence algorithms provide real-time insights and data analytics. Such advancements allow better-informed decision-making and monitoring of agents' actions within digital governance contexts. Besides, effective management control systems are required to align agents' actions with principals' objectives. Here, artificial intelligence and Management control systems can greatly enhance performance measurement and monitoring (Dawson et al., 2016). As noted by (Daly et al., 2019), artificial intelligence technologies facilitate comprehensive and real-time performance tracking, enabling more accurate evaluation of agent behaviour and outcomes. By integrating AI and MCS, digital governance systems can establish robust controls, inducements, and accountability mechanisms, optimizing organizational performance and results. Figure 1 shows the conceptual framework of current study:

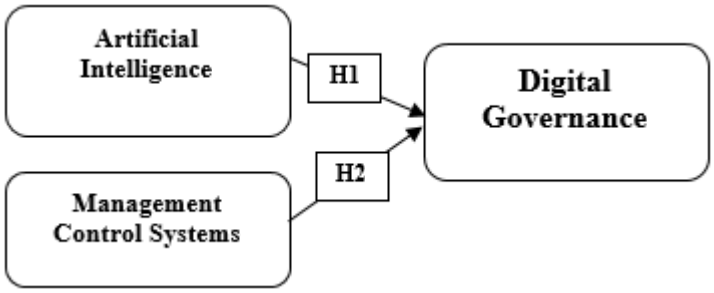

Figure 1. Conceptual Framework (Source: This study)

4. Methodology

4.1 Research Approach and Design

A deductive approach was applied to answer the research questions in the current study. The rationale behind adopting this approach was that it was suitable to analyse the study purpose (DeGracia et al., 2014). Accordingly, the research has formulated the hypothesis and, later, attempted to test them by collecting quantitative data collected through instruments and various experiments. Furthermore, the quantitative design was adopted in accordance with the character of the research targets. The rationale behind adopting the quantitative method was that this design helps examine the cause-and-effect relationship between the variables (Bayley, 2013). The researcher used structured questionnaires designed with a five-point Likert scale. The questionnaire used measurement items and scales from different resources (See Table 1). The quantitative data were gathered, further

evaluated, coded, and finally used for data analysis. Notably, the data analysis was based on both descriptive and inferential analyses. SPSS and Partial Least Square- Structural Equation Modelling (SEM) were applied for the data analysis.

Table 1. Sources of Measurement Items and Scales

S/R.	Constructs	Sources	Items
1.	Artificial Intelligence	(Susar & Aquaro, 2019)	AI helps in digital governance by increasing operational efficiency. AI helps in digital governance by mitigating risks. AI helps in digital governance by accelerating growth. AI helps in digital governance through innovation. AI can be applied in optimizing and predicting energy utilization. AI can optimize and predict energy utilization by developing power generation. AI can be applied in optimizing and predicting energy utilization by balanced energy usage intelligent machines.
2.	Management Control Systems	(Davila, 2005)	Management control helps organizations align their digital governance with their functions. Management control helps organizations align their digital governance with their goals. Management control ensures that digital governance creates accountability for the organization's digital presence. Management control ensures that roles are created for the organization's digital presence through digital governance. Management control ensures that decision-making authority is done through digital governance for the organization's digital presence.
3.	Digital Governance	(Knowles et al., 2015)	Digital governance uses artificial intelligence to allow people to have access to governance services 24*7 Digital governance uses artificial intelligence to help people avail the governance services 24*7 at their doorstep. Digital governance uses management control to minimize the number of tactical debates related to the nature of an organization's digital presence. Digital governance uses management control to minimize the number of tactical debates related to managing an organization's digital presence.

4.2 Sample procedures

The population of current research involved employees currently working in different corporate organizations in Tunisia. Currently, several corporate sector organizations are working in Tunisia, and gathering data from all the entities was difficult. Thus, the researcher used (the Observatory of Public Sector Innovation, 2022) as an official platform by the Tunisian government, providing information and statistics on public and private sector organizations and their employees. Initially, a

sample of 400 was selected as the study involved Structural Equation Modelling, obligating an ideal sample size should be more than 200 individuals (Taherdoost, 2016). Further, the sample size chosen was also affirmed using the G* Power analysis, indicating an ideal sample size of n= 74 with two predictors and effect size f2= 0.15. The figure shows the central and non-central sample distributions according to G* Power analysis.

Further, as per the study requirements, the convenience sampling technique. The researcher deliberately chose only those respondents as conveniently available samples for providing information on the topic of the study. The survey questionnaires were emailed after acquiring formal permission from all the respondents. The data were gathered from January 2023 to May 2023. Once the data gathering was completed, the responses were compiled on a Microsoft Excel sheet, indicating a response rate of 79.25% (317) finalized for the current research, which was higher than the minimum rate of 60%.

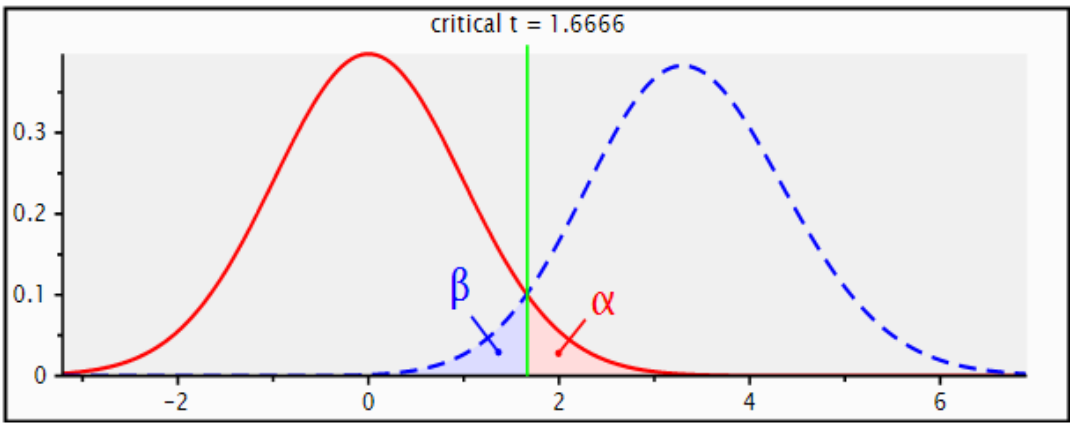

Figure 2. Central and Non-Central Sample Distribution

5. Results

This section of the study focuses on determining the effect of artificial intelligence and management control on digital governance. As noted earlier, structured survey questionnaires were distributed among the higher executives of companies implementing digital governance. The results were calculated by employing a two-step structural equation modelling approach, including validity and reliability analysis and a test of the structural model.

5.1 Demographics

Demographics is the study of a specifically chosen population based on their composition in terms of gender, age, employment status, and working experience. The demographic analysis provides insight into the general dynamics occurring in a chosen participant population. Demographics were recorded among the participants that were higher executives in companies that had implemented digital governance, Calculations revealed that most respondents were females (60.8) and 39.2% were females. 59.3% of respondents were 30-39 years old, 35.6% were 40 or above, and

5.0% were 18-29. Regarding the employment statistic, 85.4% were full-time workers while 0.3% were part-time employed. Finally, 66.2% of respondents had work experience ranging from 10 years or above, 24.6% had 5-10 years of work experience, and 9.1% had work experience ranging from 0 to 9 years. Table 1 summarizes the results of the descriptive analysis regarding demographics.

Table 1. Demographics Analysis

Constructs	**Categories**	**N**	**%**
Gender	Male	124	39.2%
	Female	193	60.8%
Age	18-29 years	16	5.0%
	30-39 years	188	59.3%
	40 years and above	113	35.6%
Employment Status	Full time	271	85.4%
	Part-time	76	0.3%
Working Experience	0-5 years	29	9.1%
	5 to 9 years	78	24.6%
	10 years or above	210	66.2%

The analysis of multicollinearity is an important step in regression-based studies. According to (Liao & Valliant, 2012), multicollinearity between the predictors is considered an unfavourable phenomenon and must be assessed to nullify its probable effects. Thus, multicollinearity was analyzed by calculating each construct's Variance Inflation Factor values. Results revealed that (See Table 2) all the VIF values attributed to both predictor values remained smaller than the minimum cut-off value of 3.0, nullifying any potential multicollinearity between the study variables.

Table 2. Variance Inflation Factor Analysis

Items	**VIF**	**Decision**
AI2	1.184	<. 3.0
AI6	1.24	<. 3.0
AI7	1.08	<. 3.0
DG1	1.817	<. 3.0
DG2	2.617	<. 3.0
DG3	1.881	<. 3.0
DG4	1.032	<. 3.0
MCS1	1.95	<. 3.0
MCS2	1.601	<. 3.0
MCS3	2.101	<. 3.0
MCS4	1.41	<. 3.0
MCS5	1.292	<. 3.0

In order to conduct the Structural Equation Modelling, first, the reliability and validity of the measurement model were tested (Westland, 2015). Notably, the reliability and validity of testing was based on assessing the convergent validity further witnessing the measurement model analysis (Farhi et al., 2023). With the Cronbach Alpha value of Artificial Intelligence at 0.729, Management Control Systems at 0.783, and Digital Governance at 0.707, all the relevant values surpassed the minimum threshold value of 0.7. Besides, regarding the Compositor Reliability, Artificial Intelligence was at 0.714, Management Control Systems was 0.853, and Digital Governance was at 0.828 (< 0.7). The results affirmed that the reliability of the measurement model is established. Further, the majority of the Factor Loads of most of the items surpassed the minimum threshold value of 0.5 (ranging from .628 to 784), the Average Variance Extracted value of Artificial Intelligence was 0.673, Management Control Systems 0.741, and Digital Governance 0.563, showing greater than the minimum threshold value of 0.7, affirming the reliability of the measurement model. Overall, these calculations affirmed that the constructs are internally consistent having convergent validity.

Similarly, discriminant validity was analyzed to examine the extent to which research constructs are distinct from each other (Thakkar, 2020). First, the Fornel-larker criterion was examined (See Table 3), indicating all the correlation values as distinct. Besides, all the squares of Average Variance Extracted values remained higher than the mentioned correlation values. Further, the Hetreotrait-Monotrait ratio was calculated (See Table 4). The HTMT value of Artificial Intelligence was 0.802, Management Control Systems 0.837, and Digital Governance 0.612, which is relatively lower than the minimum threshold value of 0.85 (Bagozzi & Yi, 2012). Overall, it was found that the research constructs are distinct, affirming the discriminant validity is established.

Table 3. Fornel-Larcker Criterion

	Artificial Intelligence	**Digital Governance**	**Management Control Systems**
Artificial Intelligence	0.452		
Digital Governance	0.407	0.549	
Management Control Systems	0.398	0.023	0.316

Table 4. Hetreotrait-Monotrait Ratio

Constructs	**HTMT Value**
Artificial Intelligence	.802
Digital Governance	.837
Management Control Systems	.612

The model fit analyses were also conducted to examine the extent to which observed data fits well to the expected data (Van Vuuren, 2010). Findings showed the chi-square value with the degree of freedom value df= 9and probability level at 0.003. Further, the Standardized Root Mean Square (RMSEA) was 0.133, Tucker and Lewis Indices was 1.40 (0.90>), and Non-Fit Indices value was at

0.945(< 0.90). Overall, the results indicated a good fit for the measurement model in the current study (Tenenhaus et al., 2009) (See Table 5 for details).

Table 5. Goodness of Fit

	CMIN	**TLI**	**RMSEA**	**NFI**
Obtained	0.199	1.40	0.013	0.945
Ideal Value	<3.0	0.90>	< 0.90	< 0.90

The R2 analysis also known as Coefficients if Determination R2 was analysed to examine the extent to which predictor variables (Artificial Intelligence and Management Control Systems) are causing variance in the dependent variables (Digital Governance) (Mishra et al., 2019). Results revealed R2 value of 0.543, indicating 54.3% variance in the dependent variable by the predictors in the current study. Consequently, it is assumed that Digital Governance is somewhat correlated to Artificial Intelligence and Management Control Systems. After examining the R2, the path analysis was conducted containing regression weights, t-statistics, beta coefficients, and p-values of the proposed structural relationships between the study variables. As noted by (Erkut, 2020), Digital governance in organizations is a critical and transformative phenomenon that has become increasingly influential in today's interconnected world. It encompasses the strategies, policies, and practices that govern an organization's practical and responsible use of digital technologies. Based on these premises, the first hypothesis proposed a significant effect of Artificial Intelligence on Digital Governance. With the beta coefficients value β= 4.194, t= 9.463, and p> 0.000, the proposed relationship remained significant. These results are consistent with the propositions by (Sharma et al., 2020). As argued that with the rapid advancement of technology and the pervasive nature of digital platforms, organizations are embracing digital governance to ensure translucency, security, and adherence. Organizations can effectively oversee risks, guard sensitive information, and stimulate innovation, improving operational efficiency and competitive advantage in the digital age by implementing robust digital governance frameworks.

Similarly, the second hypothesis assumed a significant effect of Management Control Systems on Digital Governance. The second hypothesis also remained validated as the beta coefficients value was β= 3.298, t= 6.894, and significance value was p> 0.000. These results are also consistent with the argumentation by (Nørreklit et al., 2019). As stated, management control systems (MCS) play a crucial role in digital governance by providing a framework for organization planning, monitoring, and controlling digital activities. In digital governance, Management control systems (MCS) help ensure digital initiatives align with strategic objectives, regulatory requirements, and ethical standards. These systems provide mechanisms for defining and communicating digital policies, guidelines, and performance targets. MCS also enables organizations to monitor and measure key performance indicators (KPIs) related to digital activities, allowing them to assess the effectiveness and efficiency of their digital governance practices. Overall, the path analysis remained supportive towards the hypothetical postulations, while the path between Management control systems (MCS)

and Digital Governance remained stronger the path between Artificial Intelligence and Digital Governance. Figure 3 shows the results of structural model analysis.

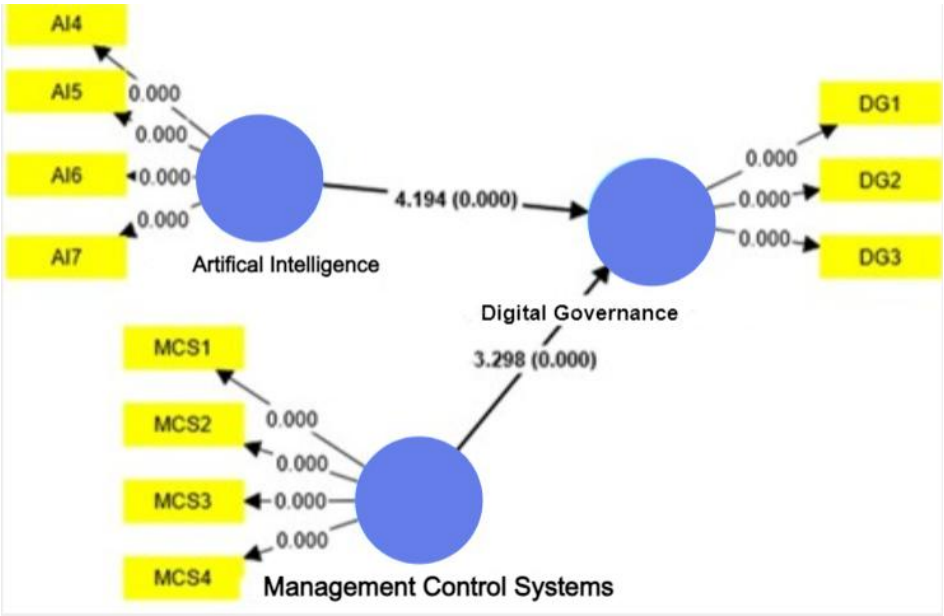

Figure 3. Final Path Model

6. Discussion on Results

According to (Dempsey et al., 2022), digital governance is critical in today's increasingly digitalized world, making it essential for organizations. It ensures adequate and responsible management of digital technologies, data, and processes, promoting trust, transparency, and accountability. Digital governance protects privacy, security, and intellectual property rights by establishing frameworks, policies, and regulations. By acknowledging and understanding the importance of digital governance, current research also focused on factors that affect the relevant phenomenon in Tunisian corporate sector organizations. The results indicated their support and consistency with the existing literature also affirming Artificial Intelligence and Management Control Systems as important factors affecting Digital Governance in many ways. The study respondents indicated their agreement towards the effect of Artificial Intelligence in affecting Digital Governance within their respective organizations as important phenomenon (See Table 6 and 7 for descriptive). According to (Dignam, 2020), ubiquitous technology and smart devices, concept and application of Artificial Intelligence has rapidly gained top positions for corporate leaders There have been diverse encounters with Artificial Intelligence in settling the administrative choices that have revealed positive outcomes, encouraging numerous scientists to focus on creating idealistic conjectures regarding the enhancement of AI in comprehending the elements of administering assortments of a legitimate element (Prowle & Tsiligkiris, 2020). The adoption of such a technology is dependent on the ease of implementation and usage, which integrated Artificial Intelligence with digital governance through increasing operational efficiency, mitigating risks and accelerating growth and innovation.

Table 6. Descriptives of Survey Responses (Range, Mean, Standard Deviation, and Variance)

Items	R	M	SD	VAR.
AI helps in digital governance by increasing operational efficiency.	4.00	4.097	.961	.924
AI helps in digital governance by mitigating risks.	4.00	3.795	.856	.733
AI helps in digital governance by accelerating growth.	3.00	4.078	.836	.699
AI helps in digital governance through innovation.	4.00	4.299	.808	.654
AI can be applied in optimizing and predicting energy utilization.	3.00	4.123	.775	.602
AI can optimize and predict energy utilization by developing power generation.	4.00	3.561	1.22	1.51
AI can be applied in optimizing and predicting energy utilization by balanced energy usage intelligent machines.	4.00	3.712	1.01	1.02
MCS helps organizations align their digital governance with their functions.	4.00	4.063	.935	.876
MCS helps organizations align their digital governance with their goals.	4.00	3.902	.917	.842

Similarly, Management control is a vital tool that supports governance infrastructure. (Saleem, 2021) highlighted that management control and corporate governance philosophies are mainly interrelated through the dynamic of power that occurs in an organisation. Considering the findings of the study, the correlation between management control and digital governance is shown to have a high association. It is imperative to note that this finding reveals that management control plays a major role in ensuring that digital governance is carried out effectively, with appropriate decision-making and accountability, in place. Results revealed that management control has a significant impact on digital governance. Supporting the findings, (Maas et al., 2016) asserted that management control deals with actions and views of the management, in light of regulating operations and management within the company. The management control would ensure that through digital governance, companies are able to carry out effective decision-making and are also able to focus on carrying out transparent accountability in companies. Therefore, organizations identify and mitigate risks associated with digital technologies, i.e., cybersecurity threats and data breaches, by implementing robust Artificial Intelligence and Management Control Systems. Notably, Artificial Intelligence and Management Control Systems also facilitate decision-making by providing timely and accurate information about the organization's digital performance, enabling management to make informed decisions and take corrective actions when necessary. As a result, Artificial Intelligence and Management Control Systems are crucial in digital governance. They provide the structure and mechanisms to ensure digital initiatives are aligned with organizational objectives, risks are handled effectively, and performance is monitored and maintained in the digital landscape.

Items	R	M	SD	VAR.
MCS ensure that digital governance creates accountability for the organization's digital presence.	4.00	3.67	1.02	1.050
MCS ensure that roles are created for the organization's digital presence through digital governance.	4.00	3.73	1.12	1.2
MCS ensure that decision-making authority is done through digital governance for the organization's digital presence.	4.00	4.39	.859	.73
Digital governance uses AI to allow people to have access to governance services 24*7	4.00	3.58	1.12	1.25
Digital governance uses AI to help people avail the governance services 24*7 at their doorstep.	4.00	3.92	.976	.953
Digital governance uses management control to minimize the number of tactical debates related to the nature of an organization's digital presence.	4.00	3.70	1.06	1.12
Digital governance uses management control to minimize the number of tactical debates related to managing an organization's digital presence.	4.00	4.12	.908	.826

6.1 Theoretical Implications

The agency theory of management provided valuable support to current research examining the impact of Artificial Intelligence and Management Control Systems (MCS) on digital governance. This theory focuses on the relationship between principals, government entities or regulatory bodies, and agents within Tunisian organizations, including managers or administrators. By emphasizing potential conflicts of interest and information asymmetry, agency theory discerns how Artificial Intelligence and Management Control Systems (MCS) influence decision-making processes, accountability, and control mechanisms. Based on the applicability of agency theory in the current study, it provides with two primary implications. Firstly, it provided a theoretical lens to understand the dynamics of principal-agent relationships in digital governance. By applying agency theory, the study uncovered how Artificial Intelligence and Management Control Systems influence decision-making processes, accountability mechanisms, and control structures between principals (e.g., government entities) and agents (e.g., managers and administrators). This understanding is significant for developing effective governance frameworks that align the interests of principals and agents, ensuring responsible and efficient digital governance practices. Further, this research study can majorly contribute to optimizing Management Control Systems within digital governance. This study has identified how these technologies improve traditional management control practices by examining the impact of Artificial Intelligence and Management Control Systems on control mechanisms. This knowledge will assist organizations and policymakers in acclimating their control systems to leverage the benefits of Artificial Intelligence and Management Control Systems, overseeing and managing agents' performance while handling potential risks and challenges. Hence, the study provided valuable insights into designing and enhancing control systems to facilitate accountable and transparent digital governance processes by incorporating agency theory.

6.2 Conclusion

The first objective of the research was to examine the effect of artificial intelligence on corporate governance. The second objective was to determine the role of the management control system on the governance of modern business corporations. The last objective of the research is to evaluate the influence of AI and the management control the decision-making process of corporations. It has been observed from the literature review that artificial intelligence and management control help the digital governance help companies to improve the efficiency of operations and implementing transparency in accountability and speeding up effective decision-making. Thus, it is concluded that effective implementation of management control in the area of digital governance would help companies in ensuring that they are able to ensure transparency in their accountability and other aspects of operations.

6.3 Limitations

Although this study highlighted an important technology and organizational governance phenomenon, it has some primary limitations. First, this study is based on a certain geographical region, Tunisia. The generalizability of results can be questioned when applied to any other country. Future researchers can investigate the relevant phenomenon in other countries to overcome these limitations. Besides, this study involved a convenience sampling method. Although research in management sciences applies a convenient sampling method, it is considered relatively weak due to researchers' bias based on certain selection criteria. Another limitation involves focusing only on private sector organizations in Tunisia. The applicability of these findings to the public sector can be questioned. However, future researchers can delimit this phenomenon by investigating the Artificial Intelligence and Management Control Systems in the digital governance of public sector Tunisian organizations. Finally, the selection criteria, focusing on only senior-level individuals, also narrowed down the scope of current research. Future researchers should include different-level employees to provide further insights regarding factors affecting digital governance.

References

Agbata, A., E. Uche, A. Offia, and N. Okoye, (2023), "Corporate governance and firm sustainability in the emerging economy: A literature review," *Corporate Governance and Sustainability Review*, 6, 33-43.

Ahunwan, B., (2021), *Globalization and Corporate Governance in Developing Countries: Micro Analysis of Global Corporate Interconnection between Developing African Countries and Developed Countries*, BRILL.

Akgiray,V., (2019), "The Potential for Blockchain Technology in Corporate Governance," OECD.

Ali, R. F. Dominic, P. D. D.,and K. Ali, (2020), "Organizational Governance, Social Bonds and Information Security Policy Compliance: A Perspective towards Oil and Gas Employees," *Sustainability*, 12(20), Article 20.

Ashok, M., R. Madan, A, Joha, and U. Sivarajah, (2022), "Ethical framework for Artificial Intelligence and Digital technologies," *International Journal of Information Management*, 62, 102433.

Bagozzi, R. P. and Y. Yi, (2012), "Specification, evaluation, and interpretation of structural equation models." *Journal of the Academy of Marketing Science*, 40(1), 8-34.

Bayley, R., (2013), The Quantitative Paradigm."*The Handbook of Language Variation and Change*"(pp. 83-107). John Wiley & Sons, Ltd.

Berente, N., B. Gu, J. Recker, and R. Santhanam, (2021), "MANAGING ARTIFICIAL INTELLIGENCE." 45, 3.

Buchak, G., G. Matvos, T. Piskorski, and A. Seru, (2018). "Fintech, regulatory arbitrage, and the rise of shadow banks. *Journal of Financial Economics*," 130(3), 453-483.

Butcher, J., (2019), "What is the State of Artificial Intelligence Governance Globally?": *The RUSI Journal*, 164, No 5-6.

Cihon, P., J. Schuett, and S. D. Baum, (2021), "Corporate Governance of Artificial Intelligence in the Public Interest." *Information*, 12(7), Article 7.

Colares Oliveira, M., D. Ceglia, and F. Antonio Filho, (2016), "Analysis of corporate governance disclosure: A study through BRICS countries," *Corporate Governance: The International Journal of Business in Society*, 16(5), 923-940.

Daly, A., T. Hagendorff, L. Hui, M. Mann, V. Marda, B. Wagner, W. Wang and S. Witteborn, (2019), "Artificial Intelligence Governance and Ethics: Global Perspectives" (arXiv:1907.03848).

Davila, T., (2005), "An exploratory study on the emergence of management control systems: Formalizing human resources in small growing firms." *Accounting, Organizations and Society*, 30(3), 223-248.

Dawson, G., S., J. Denford, S., C. Williams, K., D. Preston, and K. C. Desouza, (2016), "An Examination of Effective IT Governance in the Public Sector Using the Legal View of Agency Theory," *Journal of Management Information Systems*, 33(4), 1180-1208.

Dempsey, M., K. McBride, M. Haataja, and J. J. Bryson, (2022), "Transnational Digital Governance and Its Impact on Artificial Intelligence. In J. B. Bullock, Y.-C. Chen, J. Himmelreich, V. M. Hudson, A. Korinek, M. M. Young, & B. Zhang (Eds.), The Oxford Handbook of AI Governance," Oxford University Press.

Dignam, A., (2020), "Artificial intelligence, tech corporate governance and the public interest regulatory response," *Cambridge Journal of Regions, Economy and Society*, 13(1), 37-54.

Dignam, A. and M. Galanis, (2016), "*The Globalization of Corporate Governance*. Routledge."

Ekundayo, V. N., and B. Sodipo, (2022) "Approaches to the Application of Corporate Governance Regulations," *Society & Sustainability*, 4(1), Article 1.

Erkut, B., (2020), "Sustainability Free Full-Text From Digital Government to Digital Governance: Are We There Yet?"

Farhi, F., R. Jeljeli, R., Slamene, M. Mohammed, and K. Zamoum, (2023), "Towards Communication in Achieving Sustainable Economic Development Goals: The Role of Communication in UAE Media Institutions," 15, 7933.

Fenwick, M., and E. P. M. Vermeulen, (2019), "Technology and Corporate Governance: Blockchain, Crypto, and Artificial Intelligence," *Texas Journal of Business Law*, 48, 1.

Hickman, E., and M. Petrin, (2021), "Trustworthy AI and Corporate Governance: The EU's Ethics Guidelines for Trustworthy Artificial Intelligence from a Company Law Perspective," *European Business Organization Law Review*, 22(4), 593-625.

Hilb, M., (2020), "*Toward artificial governance? The role of artificial intelligence in shaping the future of corporate governance*." 24.

Horan, A., and M. Mulreany, (2020), "Corporate governance in the public sector: Reflections on experience in Ireland," *Administration*, 68(4), 121-144.

Hu, C. P., Y. Y. Chang, (2017), and W. John Creswell, Research Design: "Qualitative, Quantitative, and Mixed Methods Approaches," *Journal of Social and Administrative Sciences*, 4(2), 205-207.

Knowles, W., D. Prince, D. Hutchison, J. Disso, F. P., and K. Jones, (2015), "A survey of cyber security management in industrial control systems," *International Journal of Critical Infrastructure Protection*, 9, 52-80.

Lafarre, A., and C. Van der Elst, (2018), "Blockchain Technology for Corporate Governance and Shareholder Activism" (SSRN Scholarly Paper 3135209).

Li, B., B. Hou, W. Yu, X. Lu, and C. Yang, (2017), "Applications of artificial intelligence in intelligent manufacturing: A review," *Frontiers of Information Technology & Electronic Engineering*, 18(1), 86-96.

Long, G. J., B. H. Lin, H. X. Cai, and G. Z. Nong, (2020), "Developing an Artificial Intelligence (AI) Management System to Improve Product Quality and Production Efficiency in Furniture Manufacture," *Procedia Computer Science*, 166, 486-490.

Maas, K., S. Schaltegger, and N. Crutzen, (2016), "Integrating corporate sustainability assessment, management accounting, control, and reporting," *Journal of Cleaner Production*, 136, 237-248.

Mallin, C. A., (2016), "Corporate Governance," Oxford University Press.

Manita, R., N. Elommal, P. Baudier, and L. Hikkerova, (2020), "The digital transformation of external audit and its impact on corporate governance," *Technological Forecasting and Social Change*, 150, 119751.

Matei, A. and C. Drumasu, (2015), "Corporate Governance and Public Sector Entities." *Procedia Economics and Finance*, 26, 495-504.

Milosevic, D., (2015), "A SURVEY OF CORPORATE GOVERNANCE," 52, 2.

Mishra, P., C. M. Pandey, U. Singh, A. Gupta, C. Sahu, and A. Keshri, (2019), "Descriptive Statistics and Normality Tests for Statistical Data," *Annals of Cardiac Anaesthesia*, 22(1), 67-72.

Moussa, F. B., (2019), "The Influence of Internal Corporate Governance on Bank Credit Risk: An Empirical Analysis for Tunisia. Global Business Review," 20(3), 640-667.

Nørreklit, L., L. Jack, and H. Nørreklit, (2019), "Moving towards digital governance of university scholars: Instigating a post-truth university culture," *Journal of Management and Governance*, 23(4), 869-899.

Observatory of Public Sector Innovation, (2022), "National Open Data Portal of Tunisia," *Observatory of Public Sector Innovation*.

Prowle, M., and V. Tsiligkiris, (2020), "The impact of AI on the practice of management accounting in relation to performance management," Performance Management & The Impact of AI Analytics, British Academy of Management.

Raisch, S., and S. Krakowski, (2021), "Artificial Intelligence and Management: The Automation–Augmentation Paradox," *Academy of Management Review*, 46(1), 192-210.

Rogov, A. A., A. A. Statsenko, I. V. Obukhov, and A. A. Smirnova, (2020), "Development of Artificial Intelligence Systems for Megacities Transport Infrastructure Management," *2020 IEEE Conference of Russian Young Researchers in Electrical and Electronic Engineering (EIConRus)*, 1663-1666.

Saleem, I., (2021), "Corporate board for innovative managerial control: Implications of corporate governance deviance perspective," 21(3).

Salem, I. H., S. D. Ayadi, and K. Hussainey, (2019), "Corporate governance and risk disclosure quality: Tunisian evidence. *Journal of Accounting in Emerging Economies*," 9(4), 567-602.

Sama, L. M., A. Stefanidis, and R. M. Casselman, (2022), "Rethinking corporate governance in the digital economy: The role of stewardship," *Business Horizons*, 65(5), 535-546.

Sharma, G. D., A. Yadav, and R. Chopra, (2020), "Artificial intelligence and effective governance: A review, critique and research agenda," *Sustainable Futures*, 2, 100004.

Solomon, J., (2020), "Corporate Governance and Accountability," John Wiley & Sons.

Susar, D., and V. Aquaro, (2019), "Artificial Intelligence: Opportunities and Challenges for the Public Sector," *Proceedings of the 12th International Conference on Theory and Practice of Electronic Governance*, 418-426.

Taherdoost, H., (2016), "Sampling Methods in Research Methodology; How to Choose a Sampling Technique for Research" (SSRN Scholarly Paper 3205035).

Thakkar, J. J., (2020), "*Structural Equation Modelling: Application for Research and Practice*" (with AMOS and R) (Vol. 285). Springer.

Van Vuuren, L. J., (2010), "Industrial Psychology: Goodness of fit? Fit for goodness?" *SA Journal of Industrial Psychology*, 36(2), 16 pages.

Westland, J. C., (2015), "An Introduction to Structural Equation Models. In J. C. Westland (Ed.), Structural Equation Models*: From Paths to Networks*" (pp. 1-8), Springer International Publishing.

Xue, S., and Y. Hong, (2016), "Earnings management, corporate governance and expense stickiness," *China Journal of Accounting Research*, 9(1), 41-58.

Yoshikawa, T., H. Zhu, and P. Wang, (2016), "National Governance System, Corporate Ownership, and Roles of Outside Directors: A Corporate Governance Bundle Perspective: Roles Of Outside Directors," *Corporate Governance: An International Review*, 22(3), 252-265.