Future of Corporate Governance in the Age of the Fourth Industrial Revolution in the Public Sector

Daniel Kambiri

Dominique Emmanuel Uwizeyimana

Tasneem Majam

Abstract: The paper discusses the impact of the Fourth Industrial Revolution (4IR) on corporate governance, particularly in the public sector. It highlights the necessity for modern governance frameworks that can adapt to technological advancements. With the rapid changes brought about by 4IR, existing governance practices and stakeholder dynamics require re-evaluation to maintain or enhance organisational performance. Using a mixed-methods approach, the research gathered data from public sector stakeholders through purposive and convenience sampling. Quantitative data were analysed using SPSS and Microsoft Excel, while qualitative data were thematically analysed. Findings reveal a strong consensus among stakeholders about the transformative potential of 4IR, which is expected to increase transparency in governance processes. Key recommendations from the study include enhancing digital governance frameworks to promote transparency and accountability, upskilling the workforce to adapt to new technologies, and leveraging emerging technologies to improve governance practices and stakeholder engagement. The research emphasises the need for policymakers to develop frameworks that facilitate the adoption of these digital governance practices, encouraging training programs on emerging technologies and fostering a culture of accountability and diverse leadership. Ultimately, the study points to the urgency for public sector governance to evolve in response to rapid technological change, ensuring resilience and effectiveness in the governance landscape shaped by the Fourth Industrial Revolution. This study was conducted by the authors and has not been published elsewhere. This paper seeks to explore the profound impact of 4IR technologies such as Artificial Intelligence, Internet of Things and Blockchain on their role on shaping corporate governance. It also provides valuable insights for the public sector and policymakers on how operations are going to be influenced by 4IR.

INTRODUCTION

The concept of corporate governance has been recognised as a vehicle for driving company performance within the private and public sectors. This paper attempts to discuss some of the experiences companies will encounter within the corporate governance field influenced by the Fourth Industrial Revolution (4IR). The future of corporate governance in the 4IR is shaping up to be transformative, as technological advancements fundamentally change how companies operate and interact with stakeholders Bukari, Agyemang and Bawuah 2024:4. Corporate governance in the 4IR era will be marked by the integration of technology, a commitment to ethical and sustainable practices, and a redefined focus on broader stakeholder interests Ardiansyah and Alnoor 2024. Company boards and management must adapt quickly, develop new skills, and embrace technology-driven oversight to navigate this era effectively Coyle, 2015:21). There are key trends that are going to be determined by this era, which include increased accountability through transparency, evolving regulatory compliance with technology, expanded focus on Environmental, Social, and Governance (ESG), and sustainability. In addition, cybersecurity and digital risk act as a core for board responsibilities, diversity in leadership and digital skills on boards, ethics of artificial intelligence (AI) and automation, agility in decision-making, and stakeholder-centric governance model.

The 4IR represents a fundamental shift in how companies operate, driven by a fusion of technologies that blur the lines between physical, digital, and biological spheres. This new era is characterised by developments in artificial intelligence, robotics, the Internet of Things (IoT), blockchain, and biotechnology (Gwala 2023:107. As businesses navigate this rapidly evolving landscape, corporate governance must adapt and transform to address the challenges and opportunities that arise (Akinsola and Mary, 2025). The future of corporate governance will likely be shaped by increased transparency, accountability, agility, and stakeholder engagement, ensuring companies survive and thrive in this dynamic environment. To evaluate the effects of the Fourth Industrial Revolution (4IR) on corporate governance, the study was guided by the following research questions:

i. What is the role of 4IR in shaping corporate governance within the public sector?

ii. What is the support being provided by companies in the public sector in embracing 4IR?

This article was presented in various sections, which include a theoretical foundation, whereby corporate governance theories were discussed, and later on, agency theory was selected to guide the study. The agency theory was discussed in relation to corporate governance and 4IR. This was followed by a literature review of the study. This section is made up of concepts of corporate governance, 4IR, link between corporate governance and 4IR. The research methodology, findings, and discussions for the study were also presented. The article concluded by providing a summary and some key recommendations to be considered for future programming of the public sector in the era of 4IR.

THEORETICAL FOUNDATIONS

There are theoretical approaches that describe corporate governance, namely agency theory, stakeholder theory, stewardship theory, transaction cost economics, and resource dependency theory. These theories of corporate governance are important because they highlight the relationship between corporate governance variables and the capital structure of companies (Younas 2022:2). Basically, all these theories are key because they describe corporate governance in various dimensions. Some of the key highlights are that corporate governance in the public sector is interpreted as government officials (agents) managing resources on behalf of citizens (principals), public officials act as stewards, motivated to protect and maximise value for stakeholders, and governance must balance the interests of multiple stakeholders, not just shareholders (Amin, Malik, and Scheepers, 2024). In relation to the 4IR, corporate governance theories are important because they provide tools such as AI dashboards, e-governance, and real-time service delivery platforms that allow officials to act as stewards of public trust, since the public sector serves citizens, civil society, businesses, and future generations (Layton-Matthews and Landsberg, 2022). Fourth Industrial Revolution governance requires considering digital inclusion, data privacy, cybersecurity, and equitable access to technology. For instance, theories explain why governments must involve diverse groups in policy-making around AI ethics, automation, and e-governance reforms, because governments depend on technological expertise, infrastructure, and partnerships with the private sector to implement digital transformations. Corporate governance theories advocate for collaborations through public-private partnerships with tech firms and capacity building to govern 4IR innovations.

Agency Theory

A lot of empirical work has been done on corporate governance from theoretical perspectives of agency theory because it has theoretical roots in it (Filatotchev and Wright 2011). Agency theory is regarded as the fundamental base for all other corporate governance theories and focuses on the contractual relationship nature between shareholders and management (Younas 2022:3). The theory was proposed by Alchian and Demsetz in field of economics, directed at the agency relationship, in which on party (principal) delegates work to another (agent), who performs that work (Abid et al 2014:5). This study was grounded on agency theory; it argues that shareholders' interests necessitate security by split-up incumbency of the role of board and CEO. The basis of the theory is on a mechanism where the board of directors and owners act as the monitoring authority, whereas agents are the managers. According to Younas (2022:2), the increase of wealth is the priority of shareholders, and managers are interested in the increase of their compensation, not only in shareholders' wealth. Agency theory has its origins in the economic theory, which was presented by Adam Smith in 1776. There are three agency problems, namely the Principal-Agent Problem, Principal-Principal problem, and Principal-Creditor Problem (Younas 2022:2).

One of the disadvantages of the theory is that the agent may not work for the paramount interest of the principal. Also, an agent can misuse his/her power for monetary and non-monetary benefits. The agent doesn't take precautionary risk measures, or the agent and principals may have different attitudes towards risk. Agency problem arises because contracts are written and enforced by considering costs (Abid et al, 2014:6). The theory asserts that the board of directors plays a critical role in monitoring the performance of managers and protecting the interests of all parties. In line with that, there is an audit committee which acts as a proxy of the board of directors by monitoring and controlling the management activities and matching with the shareholders' needs (Gwala and Mashau 2022:2). Agency theory claims that the appointment of independent directors is essential to the effective and efficient performance of management.

Based on the explanation above, agency theory is associated with corporate governance because it is based on the principal–agent relationship whereby principals, such as shareholders or the public sector, delegate decision-making authority to agents like public officials (Panda and Leepsa, 2017). In the public sector, agents may pursue self-interest through the misuse of resources at the expense of the public. In this case, corporate governance provides the rules, systems, and mechanisms such as boards, audits, performance monitoring, and reporting systems so that the interests of agents are aligned with those of principals (Amin et al. 2024). The theory explains why governance structures such as boards, audit committees, or digital monitoring tools are key to addressing conflicts of interest and ensuring accountability. Agency theory is linked to 4IR because it enhances monitoring and accountability by enabling real-time digital audits, biometric tracking, and AI-based compliance systems, thereby reducing the chances of fraud and mismanagement (Zogning, 2017). The theory suggests a relationship between principals and managers, and 4IR asserts that there is a fusion of digital technologies in the operations of the public sector. Technologies such as AI and big data can be used by shareholders to make and check decisions in real time, thereby minimising gaps. In addition, there is a component of monitoring of agents by principals and IoT, as well as digital reporting can be utilised to produce accurate, real-time data on performance and operations of managers.

LITERATURE REVIEW

The following section reviews literature around the subject of corporate governance and 4IR within the public sector. The review is meant to draw parallels with the existing studies, whilst at the same time showing the necessity of the current study by amplifying the problem stated. **Corporate Governance**

Corporate governance is an emerging subject, and its development is based on various complex disciplines such as legal, cultural, ownership, and other structural differences (Mallin 2013). Corporate governance refers to the system of rules, policies, procedures, and processes by which a company is directed and controlled (Jhunjhunwala 2023). According to Alodat, Salleh, Hashim, and Sulong (2022), it involves balancing the interests of a company's stakeholders, such as shareholders, management, customers, and the community. Corporate governance is considered a package of systems, processes, and principles whereby a company is governed in the best interest of all stakeholders (Chauhan and Chauhan 2014). In other words, it facilitates the promotion of corporate fairness, transparency, and accountability with its principal stakeholders, which include financers, customers, management, employees, government, and the community (Chauhan and Chauhan 2014). Corporate governance offers a structure to monitor the company's performance (Abid, Khan, Rafiq, and Ahmed 2014). It is important because it determines the level of confidence associated with a company known to have good corporate governance. Corporate governance is one of the indicators used by foreign investors when looking for local companies to invest in (Kaplan 2012).

Within the concept of corporate governance, there is a governance structure that identifies the distribution of rights and responsibilities among various stakeholders in companies or corporations, such as the board, managers, auditors, creditors, and stakeholders. Also, the structure specifies the rules and procedures to be adhered to when making decisions in corporate affairs (Chauhan and Chauhan 2014). In this case, governance helps corporations to set and pursue corporate objectives in different operating environments, such as social, market, and regulatory. Chauhan and Chauhan (2014) assert that there is the monitoring of actions, policies, and decisions of the corporations linked to the stakeholders' interests. Corporate governance is associated with the development, growth, and advancement of the economy as well as the enhancement of the corporate structure and complexities accompanying it (Abid et al. 2014). Furthermore, Kim (2023) argues that the focus of corporate governance is to ensure accountability, fairness, and transparency in a company's relationship with all its stakeholders, primarily by aligning the interests of management with those of the shareholders. This can be achieved through a governance framework that typically involves the board of directors overseeing management's activities, establishing corporate policies, ensuring compliance with laws and regulations, and monitoring the company's performance (Kim 2023). Good corporate governance promotes ethical decision-making, reduces the risk of fraud and conflicts of interest, and fosters trust in the company, ultimately leading to sustained company success and long-term value creation (Karsono 2023).

There are key elements of the conceptual framework of corporate governance, which include pillars, principles, and theories. Some of the pillars of corporate governance are accountability, fairness, transparency, and responsibility (Karsono 2023:1). There are common theories underpinning corporate governance such as agency theory, stewardship theory, stakeholder theory, transition cost economic and resource dependence theory (Abid et al. 2014:1). In addition, there are key actors in corporate governance such as board of directors, management, shareholders and auditors and regulators. Some of the roles of these key actors include overseeing management, protecting shareholders' interests, and making strategic decisions, running day-to-day operations and execution of the company's strategic plan, reporting to the board, electing the board and influencing major decisions and providing external oversight, ensuring financial accuracy and regulatory compliance (Harvard Law School Forum on Corporate Governance 2016:2). Therefore, the pillars, theories and key actors of corporate governance are critical towards the financial and operational performance of the parastatals under study because they determine efficiency and effectiveness of these parastatals.

There are internal and external mechanisms of corporate governance. The internal mechanism consists of board committees, performance monitoring, and internal controls. Internal control mechanisms are used to explain the processes, laws, and companies that are used to control the operations (Alabdullah and Maryanti 2021:8). They aim to achieve the targets of the company and master the link between the shareholders and other stakeholders. These internal mechanisms cover audit, risk, and remuneration to ensure specialised oversight, regular evaluation of management's performance through metrics like financial results, key performance indicators, and risk management and systems to manage risk, prevent fraud, and ensure legal compliance. On the other hand, the external mechanism is made up of market forces, regulation and laws, and investor activism (Almutairi and Quttainah 2019:2). It addresses the stock prices, competition, and takeovers serve as checks on management's performance, statutory and regulatory frameworks as well as shareholders, especially institutional investors, exert pressure on companies to improve governance and performance.

There are outcomes of good corporate governance including enhanced accountability which explains proper oversight mechanisms ensure that managers act in the best interest of shareholders and other stakeholders (Jaggi 2022:3). Also, Kim (2023:2) asserts that transparency and integrity are another outcome of good corporate governance which entails open communication and financial disclosure build trust with investors, the public, and regulators and sustainability which promotes long-term sustainability on corporate governance by focusing on ethical behaviour and balancing stakeholders' interests.

There are pillars of corporate governance, the main ones include accountability, transparency, fairness, and disclosure. Coyle (2015:16) highlights fairness, accountability, responsibility, and transparency as key; therefore, disclosure and responsibility become unique. Within the operations of companies, they are encouraged to promote ethics, fairness, transparency, and accountability (Jamali, Safieddine, and Rabbath 2008:3). Transparency means openness. In the context of corporate governance, a company is willing to avail clear information to shareholders and other stakeholders about what the company has done and hopes to achieve, without giving away commercially sensitive information (Coyle 2015:18). On the other side, it is useful to think of openness in terms of its opposite, that is closed book and refuse to divulge any information whatsoever information (Coyle 2015:18). Information must be communicated understandably, but transparency is concerned more with the content of the information that is communicated. In this case, stakeholders should be informed about what a company is doing and plans to do in the future, and about the risks involved in its business strategies. It helps companies to foster long-term investment, financial stability, and business integrity, thereby supporting stronger growth and more inclusive societies (Zhelev 2020:55).

Fairness is a concept that is linked to ethical behaviour and integrity (Coyle 2015:16). There should also be fairness in the treatment of minority shareholders when there is a majority shareholder or dominant shareholder. Sometimes, the minority shareholder rights are often disregarded by the larger shareholders and the board of directors. All stakeholders are supposed to be treated fairly and ethically. Mohamad and Sori (2011:5) indicate that good ethical conduct underpins good corporate governance. Companies must be open about what they are doing in matters that are of interest or concern to shareholders and other stakeholders. Reporting is an important element of governance. Shareholders and other stakeholders have a right to be told (Coyle 2015:16).

Zhelev (2020:7) adds that disclosure should be done covering aspects such as financial and operating results of the company, company objectives and financial information, and major share ownership, including beneficial owners and voting rights. In addition, remuneration of members of the board and key executives, related party transactions, foreseeable risk factors, issues regarding employees and other stakeholders, and governance structures and policies, including the content of any corporate governance code or policy and the process by which it is implemented, must be disclosed to the shareholders and stakeholders.

Kim (2023:1) presented disclosure and transparency as one and treated the pillars as a core principle of corporate governance. They provide clear, accurate, and timely information to stakeholders regarding the company's performance, financials, risks, and decision-making processes (Handayati, Wulandari, Soetjipto, Wibowo, and Narmaditya 2020). Transparent practices enable shareholders and investors to make informed decisions, while fostering trust and credibility. Regular and comprehensive disclosure builds transparency, instilling confidence in the company. Access to information is a prerequisite precondition for checks and balances to be effective, and it enhances best practices in social accountability within the pillar of disclosure (Chifaka et al. 2022:7).

Fourth Industrial Revolution

The 4IR can be defined as the era of rapid technological advancements that are reshaping industries and societies through Internet of Things, big data, digitalisation, automation, 3D printing, artificial intelligence, robotics, cybersecurity, and cloud computing (Asghar, Rextina, Ahmed, and Tamimy 2020). The relationship between corporate governance and the 4IR is significant and complex. As companies navigate the challenges and opportunities presented by this era of rapid technological change, the role of corporate governance becomes increasingly important in ensuring that companies can adapt and thrive in this new environment. It starts from Industry 1.0, which is characterised by steam engineering; it shows how technology evolved. Industry 2.0 shows the introduction of the assembly line revolutionised manufacturing processes, increasing efficiency and production capacity. Industry 3.0 brought significant advancements in computing, the internet, and nuclear energy, enabling automation, digital communication, and advanced computation. The shift to Industry 4.0, titled digitisation, involves the deep integration of digital technologies into industrial processes. The key elements of Industry 4.0 include cloud computing, Internet of Things platforms, location detection technology, augmented reality, advanced human-machine interfaces, mobile devices, 3D printing, and authentication and fraud detection. Supporting technologies such as big data analytics, smart sensors, multilevel customer interaction, and profiling further drive this digital transformation.

Linkage Between Corporate Governance and The Fourth Industrial Revolution

Kulal, Rahiman, Suvarna, Abhishek, and Dinesh (2024) argue that corporate governance ensures that decision-makers are accountable to stakeholders through reporting, auditing, and disclosure. Periodic reports and manual assessments characterise traditional corporate governance. 4IR technologies such as AI enable real-time data collection and analysis, allowing the public sector to make faster, evidence-based decisions and respond more effectively to emerging issues. In this case, 4IR technologies such as blockchain, AI-powered analytics, and e-governance platforms are used to improve transparency and decision-making by reducing opportunities for corruption, fraud, mismanagement, or data manipulation. Also, technologies like blockchain improve record-keeping, thereby creating immutable, publicly verifiable records of transactions and decisions, enhancing trust between citizens and institutions. This means the public sector can build public trust, market and stakeholder confidence. Another key aspect of corporate governance is risk management, which allows boards to identify, assess, and mitigate organisational risks, and 4IR introduces cybersecurity, data privacy, and AI ethics risks (Sylvester, 2024). Digital platforms such as social media and e-participation tools enable inclusive decision-making and citizen involvement in governance. Furthermore, there is increased efficiency in service delivery in terms of resource allocation, and 4IR plays an important role through automation, big data, and smart systems to improve efficiency in public service delivery, procurement, and performance monitoring (Kulal et al. 2024). Through the use of digital platforms, AI, big data, and cybersecurity, there is improved procurement and budgeting, monitoring, evaluation, service delivery, and empowered citizens (Gil, Cortés-Cediel and Cantador, 2018). AI and robotics streamline administrative processes such as data management, and public service delivery (Boikanyo, 2024). This reduces bureaucracy, minimises human error, and speeds up service provision. Through the advent of 4IR, the public sector uses a diverse range of resources and technologies to streamline and enhance the execution of value chain tasks, leading to heightened efficiency and effectiveness (Olaitan and Mapanga, 2024). According to Boikanyo (2024), Internet of Things and digital integration foster collaboration between different government departments, agencies, and stakeholders, breaking down silos and enabling more coordinated policy implementation. The public sector management has come under scrutiny in its modes of operation, recognising that there needs to be an evolution beyond traditional administration towards more innovative ways of managing the public sector service delivery (Layton-Matthews and Landsberg, 2022). The 4IR technologies assist the public sector to communicate more effectively using these digital platforms, hence, improved access to information and better communication would assist the board in the decision-making process (Alsulaimani1 and Islam, 2022). The recognition of integrating 4IR into public service strategy and goals within the public sector, such as e-Government strategies are considered to be essential platforms to support public sector service delivery. This is because e-Government is a set of multifaceted public sector technological platforms used to create and support government structures and enable service delivery to be delivered in efficient, effective, and accessible ways (Layton-Matthews and Landsberg, 2022).

RESEARCH AND METHODOLOGY

This study adopted the interpretivism approach as its philosophy. This is because it encompasses an in-depth study of individuals or a small group of people through critical observations and detailed discussions, focusing on gaining subjective knowledge. It uses a broader framework of ‘qualitative analysis’ in which deeper sets of data are sought from smaller numbers of respondents. Using this philosophy, the study sought to understand how respondents interpret the role of the Fourth Industrial Revolution in shaping the future of corporate governance within the public sector, as well as the challenges that need to be addressed. Both quantitative and qualitative approaches were used to investigate the research problem. Qualitative methods allow an in-depth exploration of corporate governance issues necessary to understand the meaning behind complex social processes and provide context through collecting rich, descriptive data (Greenfield and Greener 2016:234). The flexibility of qualitative designs enabled investigating varied perspectives to capture key details that quantitatively testing hypotheses may overlook. The qualitative approach was relevant for this study, considering that it sought to construct and interpret the social reality of the impact of the Fourth Industrial Revolution on corporate governance in the public sector. An instrumental case study research design was used to conduct an in-depth analysis of the state of the 4IR revolution and corporate governance. For this study, the public sector was used as a case study. Table 1 shows that the study used non-probability sampling, namely purposive and convenience sampling. A purposive sampling technique was applied to select respondents with expertise or in-depth knowledge of corporate governance and 4IR, such as boards and management. Convenience sampling was applied to ordinary employees who were available and willing to participate in the study. After selecting the research respondents, data were gathered using a questionnaire and in-depth interviews. In addition, convenience sampling was also considered for ease of access. The study promoted, respected, and protected some research ethics. The researchers clarified to the respondents the purpose of the research and how respondents were expected to participate. In this case, respondents signed consent forms before participating in the study. All respondents' information was protected by not publishing their personal data, and the study used pseudonyms. More so, the study ensured privacy, anonymity, confidentiality, and prevention of harm to respondents. The study acknowledges the sampling techniques used may not cover all aspect, therefore future researchers can use other sampling techniques.

During the research quantitative and qualitative findings were integrated through a triangulation approach. The findings from approaches were compared and connected to provide a more comprehensive understanding. In the research, quantitative results offered measurable trends and patterns through charts, while qualitative insights explained the reasons behind those patterns. The integration was observed by comparing themes from interviews with statistical results, allowing areas of convergence, divergence, or complementarity to be identified (Noble and Heale, 2019). The process ensured that numerical data were enriched with contextual meaning, and qualitative interpretations were supported by empirical evidence.

Table 1: Categories of respondents, sampling techniques used, and number of respondents

	Sampling Technique		**Number of Respondents**
Category of Respondents	**Purposive Sampling**	**Convenience Sampling**	
Board			10
Operation managers			15
Finance managers			9
Marketing managers			11
Human Resource managers			13
Sales representatives			7
Operations officers			11
Human Resource Assistants			8
Total			84

Source: Researchers' own compilation

FINDINGS AND DISCUSSIONS

This section of results and discussion presents the key findings of the study and interprets their significance. The results are typically organised using descriptive summaries, highlighting trends. This section also explores the broader implications of the results, suggesting how they contribute to existing knowledge and practical applications. It provides a basis for conclusions and future research recommendations.

Gender of Respondents

The gender of respondents captured the diverse perspectives and experiences between females and males. It ensured that findings are inclusive, equitable, and more representative of the respondents. There was no huge gap between females and males; however, the study indicated that females are dominant in the areas of marketing and human resources, and operations.

Education Levels of Respondents

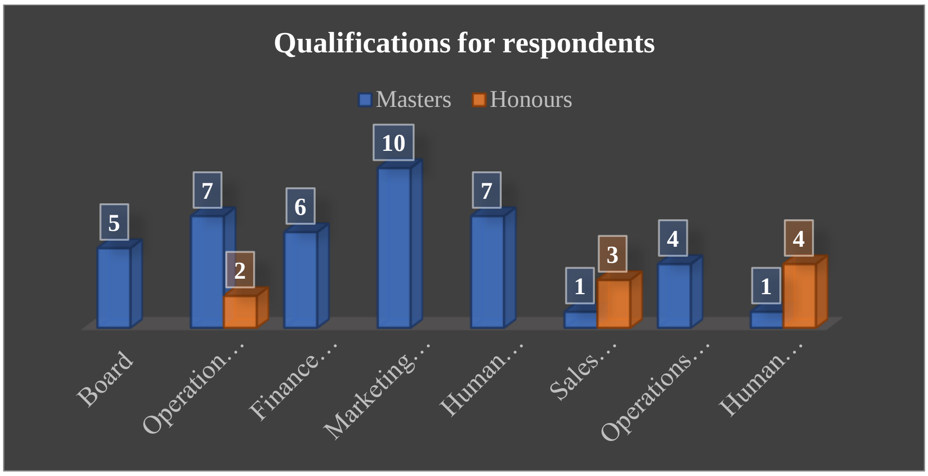

Figure 1: Academic Qualifications of respondents

Figure 1, shows academic qualifications for respondents during the study. It was important because they shaped the knowledge base and critical thinking skills of participants on corporate governance and 4IR. It helped to understand questions, process information, and contribute meaningfully to discussions.

Experience of Participants in The Public Sector

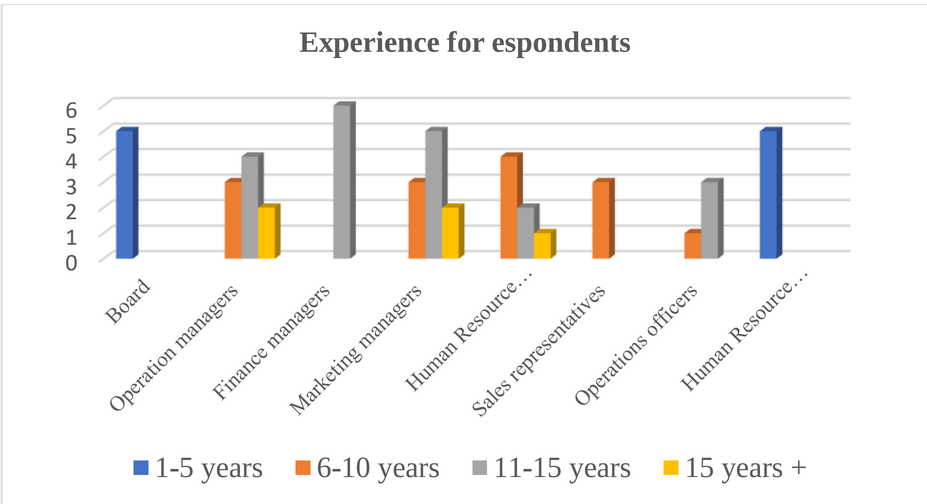

Figure 2: Year of experience

The experience of respondents was presented in Figure 2. It was critical because it provided practical insights and contextual understanding of the future of corporate governance and 4IR. Participants with relevant experience were able to contribute valuable knowledge during the study. Respondents' experience in a study enriches the data and increases the reliability of the research findings.

Increased Transparency Through Technology

One of the most significant changes in corporate governance is the rise of transparency policies, fuelled by the technologies of the 4IR. Blockchain technology, for instance, provides an immutable ledger of transactions and decisions, enabling stakeholders to verify information effortlessly (Varma, Dixit, and Kaur 2024). This fosters a culture of openness and trust between corporations and their stakeholders, including shareholders, customers, and employees (Chifaka et al. 2022). The study depicted that companies through 4IR will be required to disclose financial performance as well as non-financial metrics related to sustainability, social responsibility, and ethical practices. Figure 3, shows that, companies that adopt transparent governance structures and practices will likely gain a competitive edge in attracting investment and talent. The future of corporate governance will require boards to control, oversee, and ensure the integrity of information communicated to stakeholders, as well as to value ethical decision-making. In an interview, one of the Operations Managers mentioned that:

"An increased focus on digital responsibility requires boards to set policies that prevent misuse of data and protect against cyber threats in line with data ethics, privacy, and cybersecurity".

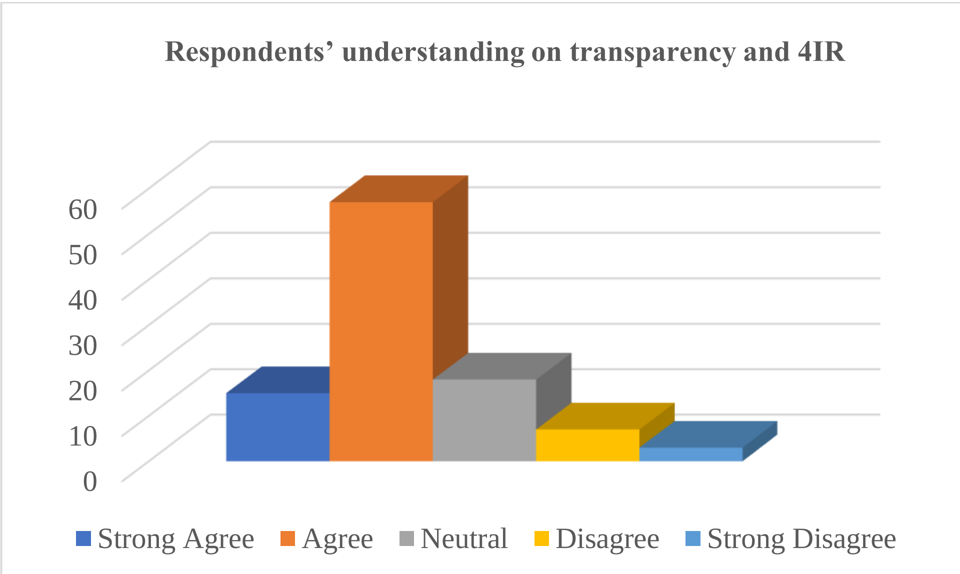

Figure 3: Respondents' understanding of transparency and 4IR

Enhanced Accountability and Risk Management

The complexities introduced by the 4IR demand a re-evaluation of accountability structures within companies. With rapid technological advancements, risks associated with cybersecurity, data privacy, and ethical artificial intelligence have become paramount (Quach, Thaichon, Martin, Weaven, and Palmatier 2022). The study argues that corporate boards must adapt to this shifting landscape by incorporating diverse skill sets, including the Internet of Things and compliance experts, into their composition. The blending of board members with different expertise will enable boards to effectively assess and mitigate risks that could jeopardise the company's reputation and financial stability. Companies are required to establish clear accountability mechanisms that define the roles and responsibilities of their stakeholders in the face of technological disruptions. This includes creating frameworks for ethical decision-making, particularly concerning AI and data usage and storage. The future of corporate governance will necessitate a proactive approach to risk management, with board members increasingly held accountable for their oversight of technology-driven operations (Ellis 2024).

One of the Human Resource Managers indicated that "companies store a lot of data such as salaries for employees, employees' personal information, the likes of address and contact details, attendance and time records, training and development, and legal documents, for example, contracts, policies, and strategies for companies. In this case, the company must be secured to avoid the risk of hacking from external people. This also boosts the confidence of employees because they know that their individual information is protected". Figure 4 presented relationship on accountability, risk management and 4IR and it shows that most respondents agree that 4IR enhance accountability and managing risk.

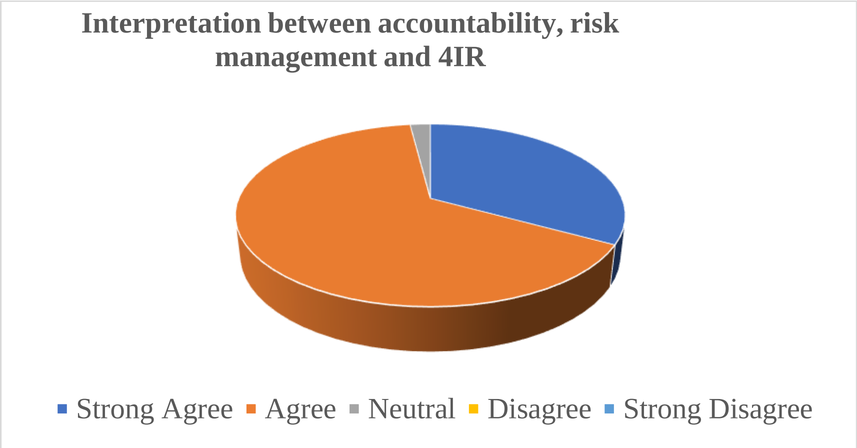

Figure 4: Respondents' interpretation of accountability, risk management, and 4IR

Agility and Adaptive Governance Models

The fast-paced nature of the 4IR demands agility in corporate governance. Traditional governance models, often characterised by lengthy decision-making processes and rigid hierarchies, may hinder a company's responsiveness to emerging challenges and opportunities (Mengisteab 2019). In contrast, adaptive governance models that prioritise flexibility and speed will be essential. Figure 5, indicated a relationship between governance models and 4IR Stakeholder 4IR Stakeholder and the study noticed that companies will likely embrace innovative governance practices such as decentralised decision-making, where frontline teams are empowered to make decisions quickly in response to changing market dynamics. Moreover, boards may adopt a more collaborative approach, leveraging insights from cross-functional teams that include diverse perspectives from various levels of the company (Turner 2022). This evolution towards agile governance structures will help companies stay competitive in a rapidly changing business environment.

One respondent amongst the Operations Officers stated that "it is sad that some of the managers are familiar with old governance models. Our old horses still believe in primitive models, yet the world is changing; there is a need to continue engaging with them so that they can embrace the concept, since they are decision makers. Company operations can be irrelevant if they resist change. There is a need to have a hybrid of old and new blood within the top management level to blend operations".

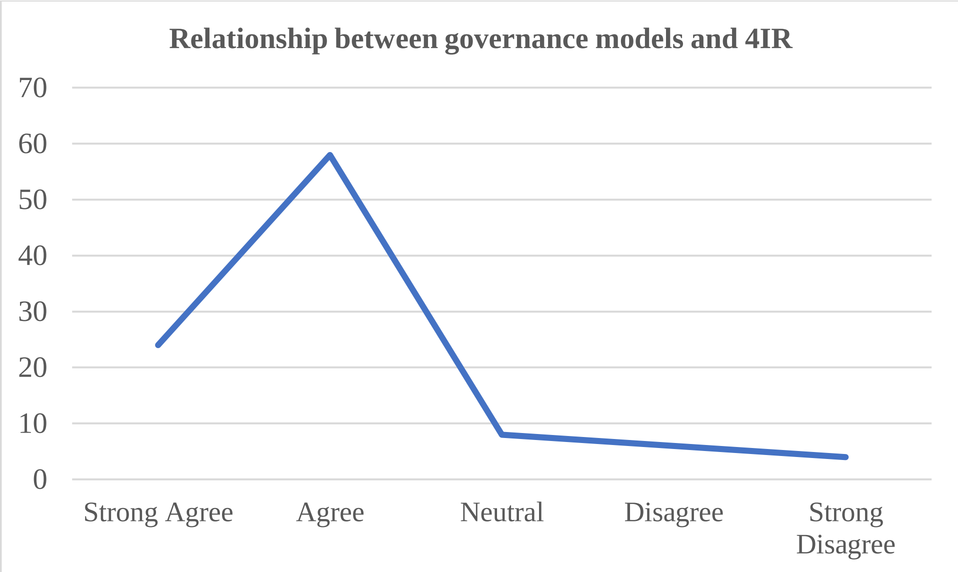

Figure 5: Relationship between governance models and 4IR Stakeholder 4IR Stakeholder

Engagement and Corporate Social Responsibility

The 4IR places an increased emphasis on stakeholder capitalism, where companies recognise the importance of engaging with a broader range of stakeholders beyond just shareholders. The growing demand for corporate social responsibility underscores the need for companies to align their values with societal expectations (Gwala and Mashau 2022). As a result, corporate governance frameworks will increasingly incorporate stakeholder engagement practices to address environmental, social, and governance concerns. Effective stakeholder engagement will not only enhance reputational capital but also provide valuable insights into consumer preferences and trends (Ogunbukola 2023). Based on Figure 6, the study found that companies that prioritise long-term sustainability and engage in meaningful dialogue with stakeholders will likely cultivate stronger relationships and enhance brand loyalty. Consequently, future governance structures will prioritise stakeholder involvement and accountability as essential components of corporate strategy. As the 4IR reshapes the landscape of corporate governance, companies must embrace new paradigms that prioritise transparency, accountability, agility, and stakeholder engagement. To thrive in this era, boards must evolve their governance frameworks to meet the complexities of the modern business environment, balancing profit generation with a commitment to ethical practices and social responsibility (Ardiansyah and Alnoor 2024).

One of the board members stated that, "the future of corporate governance will be defined by companies that leverage technology for the greater good, fostering long-term sustainability and shared value for all stakeholders. This transformation will not only enhance company effectiveness but also ensure resilience in the face of rapid technological advancements and shifting societal expectations". It acts as a blueprint for digital transparency and citizen-centric governance.

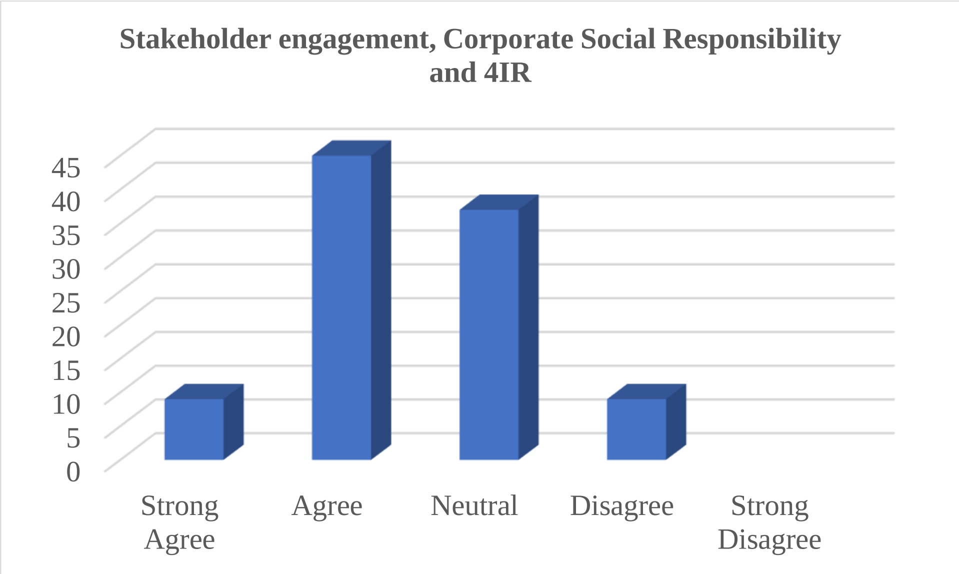

Figure 6: Stakeholder engagement, Corporate Social Responsibility, and 4IR

Evolving Regulatory Compliance with Technology

Governments are developing regulations to accommodate and address the implications of AI, automation, and big data. Companies must stay agile, monitoring and implementing regulatory compliance processes that adapt to new rules on digital ethics, privacy, and labour. Figure 7, posited that, regulatory technology can automate compliance tasks, analyse regulatory risks, and monitor ongoing adherence to governance standards, which is particularly valuable in data-heavy sectors.

During the interview, one of the Marketing Managers further lamented that, "government policies must be accommodative and create an ecosystem for AI investment. Currently, our policies are fragile; they are not conducive to investors, hence regulatory compliance with technology remains a nightmare".

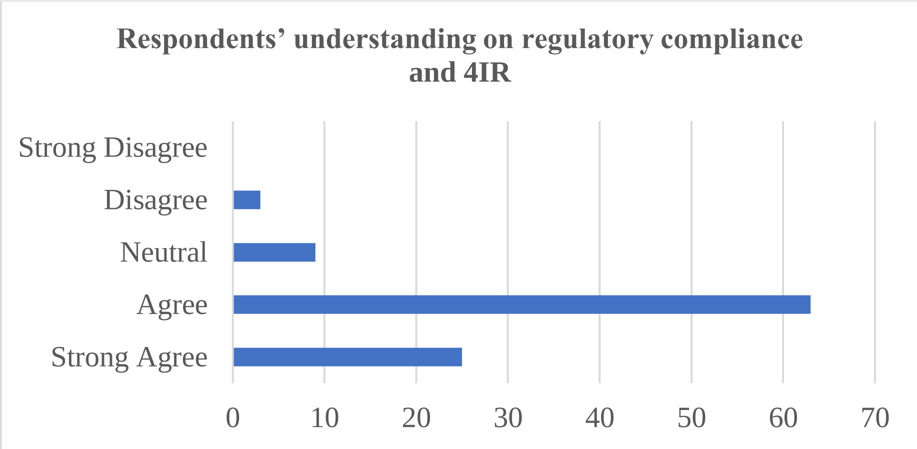

Figure 7: Respondents' understanding of regulatory compliance and 4IR

Diversity in Leadership and Digital Skills on Boards

Boards increasingly require expertise in digital transformation, AI, and cybersecurity to make informed decisions in a tech-driven world. Figure 8, indicated that directors with digital and technological backgrounds are essential as companies look to compete and innovate. Diverse boards, in terms of gender, ethnicity, and professional backgrounds, are linked to improved performance and resilience. It was explained in an interview with board members that the demand for inclusivity extends beyond optics; it reflects a company's commitment to social responsibility. Governance may incorporate strategies for ongoing employee training, re-skilling programs, and policies that ensure fair treatment amid increasing automation. Availability of digital tools enhances transparency, responsiveness, and participatory governance. The integration of AI and data analytics enables predictive governance and real-time decision-making.

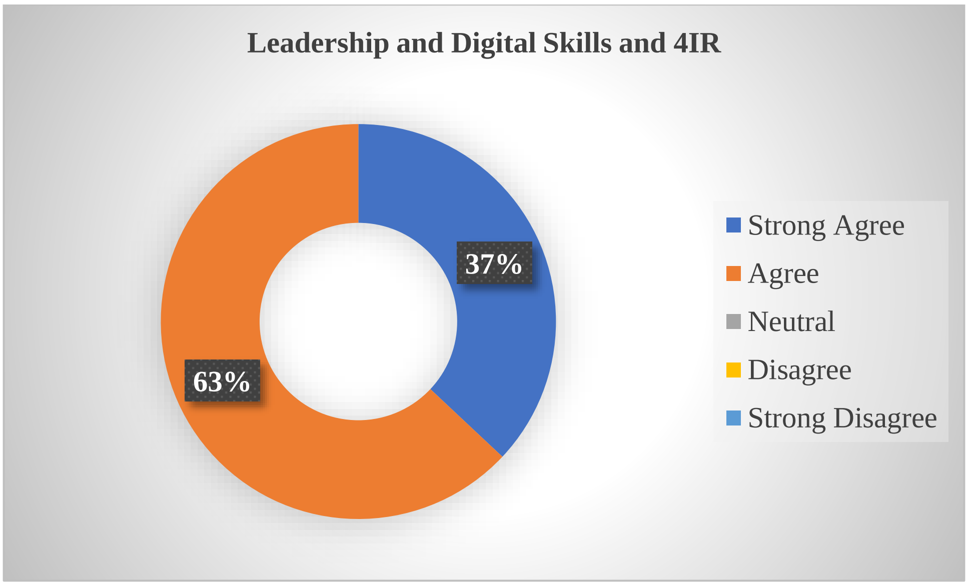

Figure 8: Leadership and Digital Skills and 4IR

CONCLUSION AND RECOMMENDATIONS

Corporate governance in the Fourth Industrial Revolution will be marked by the integration of technology, a commitment to ethical and sustainable practices, and a redefined focus on broader stakeholder interests. Boards will need to adapt quickly, develop new skills, and embrace technology-driven oversight to navigate this era effectively. The future of corporate governance in the 4IR will rely on embracing technology while protecting stakeholder interests, fostering transparency, and embedding ethical, agile, and responsible policies to meet the demands of an increasingly tech-driven. 4IR has expanded the circle of stakeholders beyond traditional investors to include customers, technology providers, and even automated systems. The Fourth Industrial Revolution presents a transformative opportunity for companies to re-strategise corporate governance in the public sector. Based on the findings, the study makes the following important recommendations:

i. Strengthening digital governance frameworks: The public sector is required to develop and implement digital governance policies that align with 4IR advancements. Clear ethical guidelines for AI, big data, and automation in decision-making, among others, are to be created so that they are used during the daily operations of activities writing public institutions.

ii. Enhancing transparency and accountability: There is a need to utilise blockchain technology for security, transparent public records and transactions, as well as the implementation of real-time digital auditing tools for financial accountability. This improves public participation in governance because there will be citizen engagement.

iii. Upskilling the public sector workforce: The public sector needs to invest in digital literacy and AI training for its employees. In addition, by encouraging them to continue learning and reskilling programs for adapting to new technologies and promoting a culture of innovation within government institutions. There is a need for capacity development programs that empower innovation and co-creation. This implies training of leaders who are digitally literate, ethically grounded, and resilient in the face of change within the public sector.

iv. Leveraging Emerging Technologies for Governance: The utilisation of AI in public services for decision-making and process automation promotes good corporate governance. Implementation of IoT for smart infrastructure management, as well as decentralisation of governance models. Digital-era governance requires investment in digital infrastructure, upskilling of civil servants, and reform of bureaucratic procedures.

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