# LEVERAGING EMERGING TECHNOLOGIES TO ENHANCE PUBLIC ACCOUNTABILITY IN SOUTH AFRICAN HIGHER EDUCATION

**L. Smith**

Graduate School of Business and Leadership

University of KwaZulu Natal

Durban, South Africa

https://orcid.org/0000-0001-7731-6677

ABSTRACT

South African higher education institutions face significant challenges in maintaining transparency, accountability, and efficient governance. Amidst growing demands for improved quality and accessibility, coupled with fiscal constraints, there is a pressing need to enhance public accountability. The article explores the potential of leveraging emerging technologies as a catalyst for addressing these challenges. The article reviews the current landscape of South African higher education and the complexities surrounding accountability mechanisms. It highlights the critical role that technology can play in fostering greater transparency and accountability by facilitating data-driven decision-making, real-time reporting, and stakeholder engagement. Emerging technologies such as blockchain, artificial intelligence, and big data analytics are examined in the context of their potential applications in higher education governance. These technologies play a pivotal role in enhancing accountability by enabling institutions to analyse vast volumes of data, assess academic performance, and identify areas for improvement. Moreover, digital communication platforms and social media offer institutions an avenue to engage with the public, disseminate information, and collect feedback in real-time enabling higher education institutions to showcase their accomplishments, address concerns, and maintain open lines of communication with stakeholders. The article discusses critical considerations, including data privacy, cybersecurity, and digital literacy, to ensure the successful implementation of these technologies. Additionally, it offers a comparative analysis of international best practices in leveraging technology for educational accountability, drawing valuable insights for South Africa's higher education sector. The article concludes by emphasising the transformative potential of emerging technologies in enhancing public accountability in South African higher education. It advocates for a strategic and collaborative approach involving institutions, government bodies, and relevant stakeholders to harness the benefits of these technologies while addressing associated challenges. By embracing technological innovations, South Africa's higher education sector can pave the way for improved governance, increased transparency, and ultimately, better outcomes for institutions and the public they serve.

**Keywords:** Accountability, Technology, Higher education, Quality, Accessibility

## INTRODUCTION

In the dynamic landscape of higher education, the integration of emerging technologies has become a pivotal factor in shaping institutions and fostering accountability (Nguyen, 2024). South Africa, with its diverse educational landscape, faces unique challenges and opportunities in the pursuit of public accountability within higher education (Boughey and McKenna, 2021). Therefore, the use of cutting-edge technologies provides a promising avenue to address these challenges, offering innovative solutions to enhance transparency, efficiency, and overall governance (Pansara, 2023). This discourse delves into the theme of "Leveraging Emerging Technologies to Enhance Public Accountability in South African Higher Education." It explores the intersection of technology and accountability, examining how advancements such as artificial intelligence, data analytics, blockchain, and other digital tools can be strategically employed to promote transparency, curb corruption, and improve the overall effectiveness of higher education institutions. South African higher education institutions have the responsibility to meet the demands of a rapidly evolving global landscape while ensuring accessibility and quality (Jili, Ede and Masuku, 2021). Therefore, the incorporation of emerging technologies aligns with the broader agenda of modernising educational practices and aligning them with international standards (Walcutt and Schatz, 2019). However, in a country with a history of socio-economic disparities, leveraging technology for accountability becomes paramount in ensuring fair and equitable access to educational opportunities.

This exploration will scrutinise specific technological applications within the South African higher education context, examining how they can contribute to better governance structures, streamlined administrative processes, and enhanced communication channels. Additionally, the article will consider potential challenges and ethical considerations associated with the integration of these technologies, aiming to strike a balance between innovation and responsible use. As we navigate the complexities of contemporary education, this study seeks to shed light on the transformative potential of emerging technologies in fostering a culture of accountability within South African higher education. By embracing these advancements, institutions can not only adapt to the demands of the 21st century but also contribute to a more inclusive, efficient, and accountable educational ecosystem (Chigbu et al., 2023).

## LITERATURE REVIEW

Public accountability in the context of higher education refers to the responsibility of educational institutions to be transparent, responsive, and answerable to the public and stakeholders (Kogan, 2022). This accountability ensures that institutions uphold their

commitments to academic excellence, financial responsibility, and societal relevance (Maki, 2023). The demand for public accountability in South African higher education has become increasingly important due to factors such as the diverse social landscape, historical inequalities, and the need for effective governance (Boughey and McKenna, 2021). Some of the key elements of public accountability include:

*Transparency*: Educational institutions should openly communicate information regarding their operations, decision-making processes, and financial matters to the public and relevant stakeholders (Reed et al. 2018).

*Responsiveness: Institutions* must be proactive in addressing the needs and concerns of the public, including students, parents, and the broader community (Okilwa and Barnett, 2021). This involves actively engaging with stakeholders and incorporating their feedback into decision-making processes.

*Ethical Conduct*: Upholding ethical standards is crucial for public accountability. As a result, institutions are expected to maintain integrity in research, teaching, and administrative practices, ensuring that they serve the best interests of both individuals and society (Svara, 2021). However, challenges arise when these standards are not clearly defined or consistently enforced, potentially undermining public trust and accountability.

*Financial Stewardship*: Higher education institutions are accountable for the responsible use of public funds. Transparency in budgeting, spending, and financial decision-making is essential to demonstrate effective financial stewardship (Barr and McClellan, 2018).

Public accountability in higher education is underpinned by key elements such as transparency, responsiveness, ethical conduct, and financial stewardship, all of which are essential for fostering trust and ensuring effective governance. However, in the South African context, these principles face significant challenges, including historical inequalities, funding constraints, governance issues, and limited use of emerging technologies. While transparency and ethical conduct demand that institutions openly communicate their processes and maintain integrity, these efforts are hindered by financial limitations and leadership challenges. Moreover, student activism and the slow adoption of new technologies further complicate the implementation of effective accountability measures, making it more difficult for institutions to fully address the needs and concerns of their stakeholders. Thus, while the foundational elements of public accountability are critical, the unique challenges within South African higher education require tailored strategies to ensure that these principles are effectively upheld.

## CHALLENGES AND ISSUES IN SOUTH AFRICAN HIGHER EDUCATION REGARDING PUBLIC ACCOUNTABILITY

The major challenges in the higher education sector are the issues of institutional transformation at public higher education institutions, student funding and student underperformance (Boughey and McKenna, 2021). These broad challenges can further be understood in more specific but contentious ways such as, firstly the historical inequalities in South Africa.

South Africa's history of apartheid has left a legacy of racial inequalities in education. The core mission of higher education remains the same, to ensure quality of learning and teaching, to enable the students to get the latest knowledge through exploratory research, and to sustain the development of societies by means of service whatever the era (Xing and Marwala, 2017). Addressing historical disparities and ensuring equal access to quality education for all remains a significant challenge confronting higher education. Transformation policies, such as the National Plan for Higher Education (NPHE) and initiatives like the Higher Education Qualification Sub-Framework (HEQSF), aim to redress these inequalities by expanding access to marginalized groups and improving institutional capacity (Chinasamy-Dampies, 2024). However, research highlights persistent challenges, including financial constraints, infrastructural deficiencies, and curriculum reforms that fail to adequately address historical disadvantages. Thus, while policy interventions have made progress, achieving truly inclusive and high-quality higher education for all remains a significant challenge.

Secondly, financial constraints to run higher education institutions in South Africa remains problematic and this negatively affects institutions' ability to provide quality education and investments in necessary infrastructure. Public higher education institutions in South Africa receive income from three main streams; income from government subsidy, student tuition fees and donations/entrepreneurial activities (Boughey and McKenna, 2021). Government grants are based on a funding formula that factors in student numbers, graduate numbers, and research output (Adam, 2020). The funding formula also provides for allocation of institutional factor grants to institutions with high proportion of students from previously disadvantaged backgrounds. A good number of higher education institutions in South Africa particularly historically disadvantaged ones rely heavily on funding from government subsidy for their operations while majority of needy students rely on funding from the National Students Financial Aid Scheme (NSFAS) (Boughey and McKenna, 2021). This does hinder the efforts to enhance public accountability as dependence often leads to a lack of strategic decision-making power at the institutional level, and universities align their priorities with government funding conditions rather than independently driving their own accountability frameworks. This

suggests that higher education institutions need to reduce their reliance on government subsidies by aggressively pursuing third-stream income sources such as industry partnerships, philanthropic donations, and research grants. They need to establish long-term funding relationships with private sector companies, international donors, and alumni to help in strengthening financial sustainability and maintaining accountability to multiple stakeholders. They need to provide public access to their financial reports, ensuring that expenditure aligns with strategic goals rather than solely responding to government funding conditions. They need to implement cost-recovery systems for research and consultancy projects, ensuring that academic departments generate income that supports teaching and learning. They need to adopt an entrepreneurial approach by leveraging commercial ventures and research commercialisation to reduce dependency on government funding.

Relying solely on government funding limits strategic autonomy; therefore, higher education institutions should explore partnerships, endowments, and commercialisation of research. A clear accountability framework ensures institutions remain accountable to multiple stakeholders rather than solely aligning with government conditions. Establishing strong ties with industries allows higher education institutions to secure private sector funding and internship opportunities for students. Government oversight bodies, such as the Department of Higher Education and Training (DHET) and the Auditor-General, often struggle to ensure full accountability due to bureaucratic inefficiencies and resource constraints (Milley and Dulude, 2021). The dependence on public funds reduces financial autonomy, weakens internal governance mechanisms, and increases the risk of inefficiency and corruption.

Thirdly, governance and leadership Issues in South Africa's higher education remains a challenge. Reports of poor governance and leadership challenges targeting corruption and mismanagement, has raised concerns about the effectiveness of accountability mechanisms within higher education institutions (Milley and Dulude, 2021). Establishing comprehensive internal control systems can enhance transparency and reduce opportunities for corruption. Encouraging institutions to voluntarily disclose financial and operational information fosters a culture of openness. Developing leadership skills tailored to the unique challenges of higher education institutions is crucial. Protecting individuals who report unethical practices is essential for rooting out corruption. Ensuring that whistleblowers are safeguarded against retaliation encourages the reporting of misconduct and supports institutional integrity. By adopting these best practices and learning from successful interventions, South African higher education institutions can enhance governance and leadership, thereby improving accountability and reducing instances of corruption and mismanagement.

Fourthly, there is a general limited use of emerging technologies. The slow adoption of emerging technologies in higher education can impede efforts to enhance transparency and communication (Becker et al., 2018). However, leveraging technologies such as data analytics, blockchain, and online platforms can streamline processes and improve accountability.

Lastly, student activism and engagement are crucial factors contributing towards the constant challenge of higher education accountability. South Africa has a rich history of youth and student activism with various organised student formations aligned to respective socio-political organizations (Hlatshwayo and Fomunyam, 2019). The student representative councils (SRC) at higher education institutions provide a united front for various student interests. In the recent past, students have put forward a united front in making a number of demands including the removal of colonial statues and symbols from campuses, an end to outsourcing of certain services, decolonisation of curricula and free higher education for all (Godsell, Chikane and Mpofu-Walsh, 2016). However, student movements and protests, while important for voicing concerns, have been partly accused of being part of the packages of the problems in higher education governance because of lack of rational and productive engagements between institutions and students (Czerniewicz, Trotter and Haupt, 2019).

These challenges, rooted in the legacy of apartheid and exacerbated by financial limitations and leadership concerns, can hinder efforts to achieve institutional transformation and student success. However, leveraging emerging technologies such as blockchain, data analytics, and online platforms offers a pathway to enhance transparency, improve communication, and build trust within the system. By addressing these challenges through technological innovation and capacity building, South African higher education institutions can not only overcome existing barriers but also strengthen their public accountability mechanisms.

## LEVERAGING EMERGING TECHNOLOGIES FOR ENHANCED PUBLIC ACCOUNTABILITY

To address some of these challenges, higher education institutions in South Africa can leverage emerging technologies. Some potential strategies would include:

### Blockchain for Transparency

Implementing Blockchain technology for secure and transparent record-keeping can enhance trust in academic credentials, financial transactions, and decision-making processes (Kutty and Javed, 2021). This statement highlights the potential of blockchain technology in enhancing transparency and trust, particularly in academia and finance. However, while blockchain offers

security and immutability, its implementation comes with challenges such as scalability, high energy consumption, and regulatory concerns. Additionally, widespread adoption depends on institutional willingness and technical expertise. It would be useful to consider whether all academic institutions and financial bodies have the necessary infrastructure to integrate blockchain effectively. Moreover, while blockchain prevents tampering, it does not inherently verify the accuracy of records at the point of entry, which could still allow fraudulent data to enter the system.

## Data Analytics for Performance Monitoring

Utilising data analytics tools can help institutions monitor performance metrics, identify areas for improvement, and provide evidence-based insights for decision-making (Schildkamp, 2019). The statement effectively highlights the importance of data analytics in performance monitoring. While data analytics is powerful, it comes with challenges such as data privacy concerns, the need for skilled personnel, and potential biases in data interpretation.

## Online Platforms for Communication

Developing user-friendly online platforms can facilitate transparent communication between institutions, students, and the public, enabling timely dissemination of information and feedback (Al-Ayyubi and Maulana, 2023). This effectively highlights the importance of user-friendly online platforms in fostering transparent communication. Beyond disseminating information, effective platforms such as discussion forums, live question and answer sessions, or AI-driven chat, encourage interaction and enhance engagement.

## Cybersecurity measures

As institutions digitize their operations, ensuring robust cybersecurity measures is essential to safeguard sensitive data and maintain public trust (Abdel-Rahman, 2023). Furthermore, robust cybersecurity measures are essential as institutions digitise their operations, protecting sensitive data and maintaining public trust.

## Capacity Building for Emerging Technologies

Providing training and resources to staff and leadership in higher education institutions will be crucial for effectively implementing and leveraging emerging technologies (Tarisayi, 2024). The successful implementation of new technologies in higher education depends heavily on

staff readiness. A well-rounded approach in technical skills, pedagogical integration, or ethical considerations related to emerging technologies enhance effective application.

Drawing from the strategies cited, enhancing public accountability in South African higher education clearly requires a multi-faceted approach that addresses historical challenges while embracing emerging technologies to foster transparency, responsiveness, and ethical conduct within institutions. Equally, developing user-friendly online platforms can facilitate transparent communication between institutions, students, and the public, ensuring timeous dissemination of information and feedback.

In the context of fostering accountability, emerging technologies contribute to several key areas. These include enhanced transparency through real-time access to data and policies, improved data accuracy through automation and digital record-keeping, increased accessibility to educational resources, and streamlined administrative processes. By integrating these technologies, higher education institutions can address historical challenges and create an accountable, transparent, and responsive ecosystem that benefits all stakeholders, including students, faculty, administrators, and the broader community. This approach not only strengthens public trust but also promotes continuous improvement within the education sector.

## IMPORTANCE OF TECHNOLOGY IN ACCOUNTABILITY

The importance of technology in fostering accountability can be examined through various lenses, including transparency, data accuracy, accessibility, efficiency and streamlined processes.

### Transparency

Emerging technologies contribute significantly to transparency in higher education (Buckley et al., 2022). Through digital platforms and information systems, institutions can provide stakeholders with real-time access to relevant data, policies, and procedures. This transparency helps build trust among various stakeholders, including students, parents, faculty, and government bodies, by ensuring that information is readily available and easily accessible. This openness reduces the likelihood of misconduct or fraudulent activities, promoting a culture of accountability. Universities can leverage blockchain and cloud-based platforms to provide real-time access to financial reports, faculty credentials, and academic policies, ensuring transparency in decision-making processes. Learning management systems (LMS) and AI-driven analytics enable students and educators to track academic progress, identify areas of improvement, and ensure fair assessments. Blockchain-based credentialing allows students and

employers to verify academic records instantly, reducing the risk of fraudulent qualifications. Automated admissions platforms enhance fairness by making admission and scholarship selection criteria more transparent and accessible. Institutions can implement web-based dashboards that provide parents, students, and faculty with updates on governance, curriculum changes, and institutional policies. AI-driven tools can help institutions maintain ethical standards by ensuring fairness in grading, hiring, and funding allocation through unbiased algorithms. Open-access repositories and funding transparency platforms help ensure ethical research practices and prevent conflicts of interest. By implementing these best practices, higher education institutions can enhance accountability, foster trust, and mitigate risks associated with misinformation or fraudulent activities.

## Data Accuracy

Technology enables the collection, storage, and analysis of data with a high degree of accuracy (Buckley et al., 2022). Automation and digital record-keeping systems reduce the likelihood of errors associated with manual data entry. This is particularly important in higher education, where precise data is essential for decision-making, resource allocation, and performance assessment. Accurate data also facilitates the monitoring of institutional performance against established benchmarks and indicators, ensuring that accountability measures are based on reliable information (Mugellini, Villeneuve and Heide, 2021). Digital platforms that allow real-time tracking of institutional performance help leaders and stakeholders make informed decisions. These dashboards can visualise key indicators such as student performance, resource allocation, and research output. Blockchain technology ensures the security and immutability of academic records, financial transactions, and institutional reporting. This minimises risks related to data manipulation and fraud. Digital platforms that encourage interaction between students, faculty, and administrators enhance transparency by providing clear communication channels, feedback mechanisms, and access to policy documents. Using AI-powered tools to analyse data trends can help detect and mitigate biases in decision-making, particularly in areas such as student admissions, grading, and resource distribution.

## Accessibility

Technology enhances the accessibility of information and resources in higher education (Mtebe, Fulgence and Gallagher, 2021). Online platforms, e-learning tools, and digital libraries make educational materials more readily available to students and faculty. This increased accessibility not only fosters a more inclusive learning environment but also allows for greater

scrutiny of educational processes. This accessibility also encourages a sense of responsibility among all parties involved, reinforcing the culture of accountability. Stakeholders can easily access and review information related to curriculum, student performance, and institutional policies, contributing to a more informed and engaged community. Institutions can publish annual reports, performance metrics, and accreditation results on publicly accessible websites. This allows stakeholders, including students, parents, and policymakers, to evaluate the institution's progress and effectiveness.

Higher education institutions can establish forums, student councils, and faculty advisory boards where key stakeholders have a say in institutional policies, curriculum design, and budget allocations. Transparency in governance builds trust and fosters collaboration. Clearly outlining tuition fees, funding allocations, and scholarship opportunities ensures that students and parents understand the financial aspects of higher education. Regular audits and publicly accessible financial reports help prevent corruption and mismanagement. Transparency in research funding, peer-review processes, and publication guidelines promotes academic integrity. Institutions can maintain open-access repositories where research findings are freely available, preventing knowledge monopolies. Higher education institutions should provide detailed information about admission criteria, grading policies, disciplinary actions, and code of conduct expectations. Accessible student handbooks and online portals help ensure that policies are applied fairly and consistently.

## Efficiency and Streamlined Processes

Emerging technologies can streamline administrative processes in higher education institutions, reducing the likelihood of bureaucratic inefficiencies (Balzer, 2020). Automated workflows, data analytics, and management information systems contribute to more efficient resource allocation and decision-making. This efficiency not only saves time and resources but also enhances the overall accountability of institutions by ensuring that processes are conducted in a timely and effective manner. This further suggests that the integration of emerging technologies in South African higher education, holds immense importance in addressing accountability challenges (George and Wooden, 2023). Through improved transparency, data accuracy, accessibility, and streamlined processes, technology contributes to the creation of an accountable and responsive higher education ecosystem. This, in turn, benefits students, faculty, administrators, and the broader community by fostering a culture of trust, responsibility, and continuous improvement within higher education institutions.

The literature review highlights the critical elements of public accountability in South African higher education, such as transparency, responsiveness, ethical conduct, and financial stewardship. These elements are shaped by the unique challenges facing the sector, including historical inequalities, funding constraints, governance issues, and limited adoption of emerging technologies. To further explore how these challenges impact public accountability, the institutional theory provides a useful theoretical framework. Institutional theory allows us to examine how South African higher education institutions conform to societal norms, values, and external pressures in their adoption of technologies aimed at enhancing accountability. By applying this framework, the study can analyse the extent to which normative, imitative, and coercive pressures influence institutions' efforts to leverage emerging technologies like blockchain, data analytics, and online platforms. This approach helps to link the literature on public accountability with a deeper understanding of the institutional dynamics driving the adoption of technological solutions, ultimately contributing to a more comprehensive analysis of accountability practices within the South African higher education landscape.

## THEORETICAL FRAMEWORK

The theoretical framework underlying the study is the institutional theory. Institutional theory is the most appropriate theoretical framework for the study because it provides a structured lens to examine how higher education institutions respond to external pressures, societal expectations, and regulatory influences in their adoption of technology. This framework is particularly relevant as it explains how organisations conform to institutional norms, values, and governance structures. In the context of South African higher education, the adoption of emerging technologies for public accountability can be understood through key elements of institutional theory. By applying institutional theory, this study will effectively analyse how South African higher education institutions navigate institutional pressures to adopt emerging technologies, ensuring compliance, competitiveness, and public trust. The theory provides a comprehensive foundation for understanding the motivations and barriers institutions face in leveraging technology for accountability, making it the most suitable choice for this research. Institutional theory has been applied to understand and explain organisational behaviour such as its management practices, organisational structuring and administrative measures and responses to other organisational field participants (Okafor et al., 2020). Institutional theory further explores how organisations conform to and are influenced by societal norms, values, and expectations. In this context, the focus would be on how South African higher education institutions adopt and adapt to emerging technologies to enhance public accountability.

Through the normative conformism theory, institutional theory emphasises how organisations conform to normative expectations (Durand, Hawn and Loannou 2019). In the context of South African higher education, normative pressures from society, government, and accrediting bodies may drive institutions to adopt emerging technologies as a means of increasing transparency and accountability.

The philosophy informing the imitative conformism avers that institutions often imitate each other's behaviours, particularly when facing uncertainty or ambiguity (Boxenbaum and Jonsson, 2017). In the South African higher education landscape, institutions may adopt similar technological solutions and practices to demonstrate their commitment to accountability, copying the actions of reputable and successful peers.

On the other hand, coercive conformism believes that the external pressures from government regulations or public demands for accountability among others, can force institutions to adopt certain practices (Abu Talib, Abdul Latiff and Aman, 2020). In the context of this study, South African higher education institutions might be influenced by government policies or public expectations to leverage emerging technologies for greater transparency and accountability.

Regarding legitimacy, it is assumed that institutions ought to seek legitimacy to maintain their social standing (Buchanan, 2018). By adopting emerging technologies for accountability, South African higher education institutions can enhance their legitimacy, demonstrating responsiveness to contemporary challenges and societal expectations.

The organisational field aspect considers the interconnectedness of organisations within a specific environment (Wooten and Hoffman, 2017). In this study, the South African higher education sector can be viewed as an organisational field, with the focus on how the adoption of emerging technologies influence relationships, collaborations, and accountability practices across institutions. The institutional theory reflects how South African higher education institutions conform to external pressures, imitate successful practices, and seek legitimacy through the adoption of emerging technologies for public accountability. This theoretical framework provides a comprehensive lens to understand the dynamics shaping the integration of technology in pursuit of greater transparency and accountability in the higher education sector.

## RESEARCH METHODOLOGY

In this research, a comprehensive methodology was employed to ensure the robustness and validity of the findings. The study primarily relied on an extensive literature review to gather secondary data from existing scholarly sources, providing a solid theoretical foundation. Primary data were collected through a series of unstructured interviews to complement and validate the secondary data. The qualitative method approach not only allowed for a thorough examination of existing knowledge but also ensured that the insights derived were grounded in current, real-world perspectives (Randolph, 2019). By integrating both literature review and primary data collection, this methodology offers a holistic understanding of the research topic, bridging theoretical frameworks with empirical evidence (Turner, Cardinal and Burton, 2017). This section outlines the key steps and approaches taken in gathering, evaluating, and synthesising the information for the research article.

The secondary data were collected through a comprehensive review of relevant literature, including journals, reports, research articles, and electronic sources. An extensive review of existing literature was conducted to establish a solid foundation for the research. Academic databases, scholarly journals, and reputable electronic sources were systematically explored to identify relevant studies and frameworks related to public accountability, emerging technologies, and their intersection in the context of South African higher education.

This review aimed to identify gaps, trends, and insights that would inform the research objectives and contribute to developing a conceptual framework. The inclusion and exclusion criteria were defined to ensure the selection of literature aligns with the research focus. Inclusion criteria comprised studies published within the last decade, with a specific emphasis on those related to public accountability mechanisms, emerging technologies, and their application in the higher education sector in South Africa. Peer-reviewed articles, reports from reputable institutions, and scholarly publications were prioritised. Electronic databases were systematically searched using relevant keywords and phrases. Advanced search techniques were employed to refine the search and obtain the most relevant and recent literature. Additionally, government reports, policy documents, and white papers were accessed to provide insights into the regulatory landscape and official perspectives on public accountability in South African higher education.

The identified literature was thoroughly analysed using qualitative methods. Key themes, trends, and findings were extracted and organized to comprehensively synthesise the existing knowledge in the field. The synthesis process aimed to establish connections between emerging technologies and public accountability practices, identifying potential areas of improvement

and innovation. Based on the findings from the literature review and analysis, a conceptual framework was developed to guide the exploration of how emerging technologies can be effectively leveraged to enhance public accountability in South African higher education. The framework served as the theoretical foundation for the research and informed the subsequent stages of data collection, analysis, and interpretation.

To corroborate the findings of the literature, primary data were collected using a sample of ten participants comprising members of the management team from four universities and universities of technology, as well as seven Technical and Vocational Education and Training (TVET) colleges in Kwa-Zulu Natal. The respondents comprised a diverse mix of academic and technical staff, including two professors from universities, two lecturers from universities of technology, two lecturers from TVET colleges, two technical staff from TVET colleges, and two faculty staff members specialising in 4IR each from universities, and the other from universities of technology. This diverse representation provided a well-rounded perspective on 4IR adoption across different institutional types in KwaZulu-Natal.

The research participants were carefully chosen using a purposive sampling to represent a diverse and relevant sample within the higher education sector in KwaZulu-Natal. A deliberate effort was made to include a variety of perspectives from different types of higher education institutions, ensuring a comprehensive understanding of the subject matter. The primary instrument used for data collection was unstructured interviews, which allowed for guided questioning while also providing flexibility to explore topics in depth based on the participants' responses. The face-to-face interviews were designed to capture detailed and qualitative insights from the participants. The respondents highlighted the potential benefits of transparency and accountability, while also recognising the need to address challenges such as digital literacy and infrastructure. The participants also highlighted the potential of emerging technologies to increase transparency, improve communication, and streamline administrative processes in higher education institutions. They emphasised the importance of digital platforms for real-time reporting and monitoring, which can enhance accountability to stakeholders. However, challenges such as digital literacy, infrastructure limitations, and data security concerns were also noted. The consensus was that while emerging technologies offer significant opportunities for enhancing public accountability, a strategic and inclusive approach is essential for effective implementation.

Throughout the research process, ethical guidelines were adhered to, ensuring proper citation and acknowledgement of sources, and respecting the intellectual property rights of the authors whose work was reviewed. The research also considered the potential impact and

implications of the findings on various stakeholders in South African higher education. The methodology employed in this research facilitated a rigorous and systematic exploration of the literature, providing a solid foundation for the investigation into leveraging emerging technologies to enhance public accountability in South African higher education. The insights gained from this process, along with the perspectives of the selected members of the management teams from various higher education institutions, contribute to the development of a greater understanding of the challenges and opportunities in the intersection of emerging technologies and public accountability within the higher education context in South Africa.

## FINDINGS AND DISCUSSIONS

In an era where digital transformation is redefining global education systems, the role of technology in enhancing accountability within higher education institutions has become increasingly significant. South Africa's higher education institutions operate within a diverse and evolving landscape that includes universities, universities of technology, and Technical Vocational Education and Training (TVET) colleges. While some institutions are internationally recognized, systemic challenges such as outdated curricula, financial mismanagement, and governance inefficiencies hinder the effective use of technology to promote accountability. This discussion explores respondents' perceptions of the gaps in leveraging technology to strengthen accountability in higher education institutions. It examines how institutional legitimacy, governance structures, and financial transparency are influenced by digital innovations. Additionally, it highlights the potential of emerging technologies such as data analytics, blockchain, and digital governance systems to address these challenges and reshape higher education for greater sustainability and competitiveness.

## Perceived Gaps in Technologies for Accountability in Higher Education

The findings of the study indicate that South Africa has a diverse higher education system that includes universities, universities of technology, and Technical Vocational Education and Training (TVET) Colleges. While some institutions are globally recognised for their quality of education and research, concerns persist about the overall quality across the system (Moloi and Motaung, 2014). Higher education institutions face issues such as outdated curricula, insufficient resources, and a lack of alignment with industry needs (Pramjeeth, Nupen and Jagernath, 2023). These gaps hinder the implementation of technology-driven solutions for accountability. South African higher education institutions must embrace technology to deepen reforms by eliminating barriers to innovation (Xing and Marwala, 2017). The study further

revealed that financial mismanagement and inadequate funding have challenged institutions, affecting their ability to provide quality education and infrastructure. Transparent financial practices and accountability mechanisms are crucial for ensuring funds are effectively used (Yasin and Mokhtar, 2022). However, governance issues, including corruption and maladministration, negatively impact transparency efforts (Adeyemi, 2012).

## Perceptions of Organizational Legitimacy in Technology Driven Accountability in Higher Education

Ensuring transparent and accountable governance, along with establishing proper structures, is essential for maintaining public trust (Modise and Modise, 2023). Higher education institutions need to reconceive their business ecosystems, redefine their competitive edges, and integrate routine education activities into digital platforms. Up-to-date digital infrastructure and enhanced connectivity among stakeholders in higher education are necessary to improve organisational legitimacy and accountability (Xing and Marwala, 2017). The transformation of higher education institutions in the 4IR era is a necessity rather than an option. By reshaping institutions as orchestrators of digital learning, embracing digital transformation, and integrating education activities into advanced infrastructures, higher education institutions will ensure sustainability and global competitiveness. Institutions that effectively utilise digital tools for governance and administration are perceived as more legitimate, fostering trust and credibility among stakeholders.

## Respondents' Opinions on Technology for Accountability in Higher Education

The study suggests that ensuring and maintaining high quality education standards across all institutions is challenging. Effective quality assurance mechanisms are required to monitor academic programmes and research activities (Bentley, Henderson and Lim, 2017). Despite efforts to address historical inequalities, challenges related to transformation and achieving equity in higher education persist. Respondents highlighted that accountability ensures inclusivity policies are implemented effectively. Accountability measures should focus on improving support structures for students and aligning curricula with market needs. Data analytics can enhance monitoring and evaluation processes, providing insights into student performance, resource allocation, and institutional efficiency. Furthermore, blockchain technology can be used for secure and transparent record-keeping, ensuring the integrity of academic credentials and reducing fraud (Ramasamy and Khan, 2024). Implementing digital

governance systems can streamline administrative processes, enhance transparency, and facilitate effective communication within institutions.

## Technology Deficiency and Accountability in South African Higher Education

The research revealed that financial barriers significantly affect access to higher education. Annual tuition fees for undergraduate programs range between R30,000 to R60,000, while the average household income after tax is about R145,000 (McKenzie, 2016). This implies that tuition fees alone per dependent would account for 20 per cent to 40 per cent of the average household's annual income, excluding accommodation, books, and subsistence costs. The financial strain on students and their families has led to high dropout rates and poor academic performance (Bergman et al., 2018). Challenges such as financial mismanagement, inadequate infrastructure, and inefficient administrative processes have been exacerbated by the lack of adequate technology use. Institutions that fail to implement transparent and technology-driven accountability measures struggle with governance and service delivery. The research suggests that leveraging online learning platforms can provide wider access to education, but robust systems are needed to monitor and maintain the quality of online education. Addressing accountability issues is crucial for the sustainable development of South African higher education system. The integration of emerging technologies, such as blockchain, data analytics, and digital governance systems, can enhance transparency, efficiency, and overall accountability. The study revealed that higher education institutions that embrace digital transformation will be better positioned to meet the demands of a rapidly evolving educational landscape and contribute to the development of a digitally competent society.

## LIMITATIONS

The methodology employed in this study is subject to several limitations that may influence the findings and their broader applicability. The inherent biases in the selected literature pose a challenge, as existing research may reflect dominant perspectives while overlooking alternative viewpoints, thereby affecting the comprehensiveness of the analysis. Additionally, time and financial constraints restricted the scope of data collection, limiting access to a wider range of respondents and more extensive fieldwork. The dynamic nature of emerging technologies further complicates the study; as rapid advancements may render certain findings obsolete or require continuous adaptation of theoretical frameworks. Moreover, the ever-evolving landscape of higher education in South Africa, shaped by policy changes, socioeconomic factors, and institutional reforms, introduces an additional layer of complexity, making it

difficult to capture a fully representative picture of the sector. These limitations were carefully considered during data interpretation and the formulation of recommendations to ensure that conclusions remain relevant, while acknowledging the need for ongoing research in this field.

## RECOMMENDATIONS

Enhancing public accountability in South African higher education using emerging technologies requires a comprehensive approach that addresses the specific challenges faced by the system. Here are some proposed solutions tailored to the South African context:

### Blockchain for Credential Verification

*Challenge:* Fraudulent qualifications and misrepresentation of academic credentials.

*Solution*: Implementation of a Blockchain-based credential verification system to ensure the authenticity of academic qualifications. This can prevent credential fraud and improve the credibility of academic qualifications.

### Data Analytics for Performance Monitoring

*Challenge:* Inefficient use of resources and lack of data-driven decision-making.

*Solution:* Implement data analytics tools to monitor and analyse performance metrics in real-time. This can help institutions identify areas for improvement, optimise resource allocation, and enhance overall efficiency.

### E-Learning Platforms for Accessible Education

*Challenge:* Limited access to quality education, especially in remote areas.

*Solution:* Develop and promote e-learning platforms that provide accessible and affordable education. These platforms can reach students in remote areas, offering a wide range of courses and reducing barriers to higher education.

### AI-driven Student Support Systems

*Challenge:* Insufficient support for students, leading to high dropout rates.

*Solution:* Implement AI-driven student support systems that analyse data to identify students at risk of dropping out. These systems can provide personalised interventions, such as academic support or counselling, to improve student retention rates.

## Transparent Financial Management using Blockchain

*Challenge:* Lack of transparency in financial management, leading to corruption.

*Solution:* Utilise Blockchain technology for financial transactions and budgetary processes to enhance transparency and accountability. This can reduce the risk of corruption and ensure that funds are allocated appropriately.

## Cybersecurity Measures for Data Protection

*Challenge:* Vulnerability to cyber threats and data breaches.

*Solution:* Strengthen cybersecurity measures to protect sensitive student and institutional data. This includes implementing robust encryption, regular security audits, and educating staff and students about cybersecurity best practices.

## Mobile Applications for Communication and Feedback

*Challenge:* Ineffective communication between stakeholders (students, faculty, and administration).

*Solution:* Develop mobile applications that facilitate seamless communication and feedback loops among stakeholders. This can improve transparency, foster collaboration, and enhance overall communication within the higher education community.

## Internet of Things for Campus Security and Resource Management

*Challenge:* Security concerns and inefficient resource management.

*Solution:* Implement Internet of Things (IoT) devices for campus security, such as smart surveillance cameras and access control systems. Additionally, IoT can be used to monitor and manage resources efficiently, reducing waste and improving overall sustainability.

## Collaboration with Industry for Skill Development

*Challenge:* Mismatch between graduate skills and industry needs.

*Solution:* Leverage emerging technologies to facilitate collaboration between higher education institutions and industries. This includes virtual internships, collaborative research projects, and

industry-relevant curriculum development to ensure that graduates are equipped with the skills demanded by the job market.

## Open Data Initiatives for Accountability

*Challenge:* Limited access to information about higher education institutions.

*Solution:* Promote open data initiatives that provide the public with access to relevant information about higher education institutions. This includes financial data, performance metrics, and other key indicators, fostering transparency and accountability.

Implementing these solutions requires collaboration between government agencies, educational institutions, technology providers, and other stakeholders. Regular assessments and updates are crucial to ensure the effectiveness of these technological interventions in enhancing public accountability in South African higher education.

## CONCLUSION

The exploration of leveraging emerging technologies to enhance public accountability in South African higher education reveals a promising pathway toward addressing longstanding challenges and fostering a culture of transparency, responsiveness, ethical conduct, and financial stewardship. The findings from respondents highlight critical issues such as historical inequalities, funding constraints, governance and leadership issues, limited use of emerging technologies, and student activism. These concerns align with broader literature emphasising the need for innovative, technology-driven solutions to strengthen accountability within higher education institutions.

Best practices from existing literature suggest that the integration of emerging technologies into accountability mechanisms significantly improves governance, institutional effectiveness, and stakeholder trust. Blockchain technology, as recognised in both the findings and the literature, plays a crucial role in enhancing transparency by providing an immutable and decentralised ledger, ensuring the authenticity of records and transactions. Studies emphasise its capacity to reduce fraud, enhance data integrity, and build trust among stakeholders.

Data analytics emerges as another best practice, allowing institutions to monitor performance, identify inefficiencies, and guide strategic decision-making. Literature supports the role of data-driven decision-making in improving institutional efficiency and effectiveness. Similarly, the adoption of online platforms for communication fosters real-time engagement, inclusivity, and accessibility, further reinforcing accountability principles.

However, both respondents' findings and best practices acknowledge challenges in implementing these technologies. Financial constraints, governance inefficiencies, cybersecurity risks, and resistance to change pose significant barriers. Literature underscores the need for robust cybersecurity measures to safeguard sensitive information and maintain the integrity of accountability systems. Additionally, quality assurance, financial transparency, and student access and success remain key concerns requiring targeted interventions.

To successfully integrate emerging technologies into accountability frameworks, best practices emphasise capacity-building initiatives that equip institutional stakeholders with the necessary digital skills. Furthermore, a collaborative, multi-stakeholder approach involving government, academia, and industry is essential for the sustainable adoption of these technologies.

Thus, the findings from respondents largely align with best practices identified in the literature. Emerging technologies present a viable solution for enhancing accountability in higher education institutions by addressing transparency, efficiency, and governance concerns. However, overcoming financial and infrastructural barriers, ensuring cybersecurity, and fostering digital literacy remain essential prerequisites for success. Leveraging emerging technologies in South African higher education holds the promise of addressing existing challenges and fostering a culture of continuous improvement and accountability. By embracing innovation and adopting a holistic approach, institutions can pave the way for a more transparent, responsive, and ethically grounded higher education system that ultimately benefits all stakeholders involved.

## REFERENCES

Abdel-Rahman, M. (2023). Advanced cybersecurity measures in IT service operations and their crucial role in safeguarding enterprise data in a connected world. *Eigenpub Review of Science and Technology, 7*(1), 138–158.

Abu Talib, N. Y., R. Abdul Latiff, and A. Aman (2020). An institutional perspective for research in waqf accounting and reporting: A case study of Terengganu state Islamic Religious Council in Malaysia. *Journal of Islamic Accounting and Business Research, 11*(2), 400–427.

Adam, E. (2020). "Governments base performance-based funding on global rankings indicators": A global trend in higher education finance or a global rankings literature fiction? A comparative analysis of four performance-based funding programs. *International Journal of Educational Development*, *79*, 102197.

Adeyemi, O. O. (2012). Corruption and local government administration in Nigeria: A discourse of core issues. *European Journal of Sustainable Development, 1*(2), 183–183.

Al-Ayyubi, M. S., and B. Maulana. (2023). Designing a web-based information system for scholarship management: Supporting access and rapid dissemination of information. *ITEJ (Information Technology Engineering Journals), 8*(1), 14–33.

Balzer, W. K. (2020). *Lean higher education: Increasing the value and performance of university processes*. New York, NY: Productivity Press.

Barr, M. J., and G. S. McClellan. (2018). *Budgets and financial management in higher education*. John Wiley & Sons.

Becker, S. A., M. Brown, E. Dahlstrom, A. Davis, K. DePaul, V. Diaz, and J. Pomerantz. (2018). *NMC horizon report: 2018 higher education edition*. Educause.

Bentley, D., F. Henderson, and C. B. Lim. (2017). The legislative requirements for measuring quality in transnational education: Understanding divergence while maintaining standards. *Higher Education Quarterly, 71*(4), 338–351.

Bergman, Z., M. M. Bergman, K. Fernandes, D. Grossrieder, and L. Schneider. (2018). The contribution of UNESCO chairs toward achieving the UN sustainable development goals. *Sustainability, 10*(12), 4471.

Boughey, C., and McKenna, S. (2021). Understanding higher education: Alternative perspectives. Cape Town: African Minds.

Boxenbaum, E., and Jonsson, S. (2017). Isomorphism, diffusion and decoupling: Concept evolution and theoretical challenges. In R. Greenwood, C. Oliver, T. Lawrence, and R. Meyer (Eds.), The Sage handbook of organizational institutionalism (pp. 77–101). Los Angeles: Sage.

Buchanan, A. (2018). Institutional legitimacy. Oxford Studies in Political Philosophy, 4(1), 53–78.

Buckley, J., Adams, L., Aribilola, I., Arshad, I., Azeem, M., Bracken, L., ... and Zhang, L. (2022). An assessment of the transparency of contemporary technology education research employing interview-based methodologies. International Journal of Technology and Design Education, 32(4), 1963–1982.

Chigbu, B. I., Ngwevu, V., and Jojo, A. (2023). The effectiveness of innovative pedagogy in the industry 4.0: Educational ecosystem perspective. Social Sciences & Humanities Open, 7(1), 100419.

Chinasamy-Dampies, D. (2024). *Increasing diversity of participation in Higher Education: A case study of the Elsenburg Agricultural Training Institute* (Doctoral dissertation, Stellenbosch University).

Czerniewicz, L., Trotter, H., and Haupt, G. (2019). Online teaching in response to student protests and campus shutdowns: Academics' perspectives. International Journal of Educational Technology in Higher Education, 16(1), 1–22.

Durand, R., Hawn, O., and Ioannou, I. (2019). Willing and able: A general model of organizational responses to normative pressures. Academy of Management Review, 44(2), 299–320.

George, B., and Wooden, O. (2023). Managing the strategic transformation of higher education through artificial intelligence. Administrative Sciences, 13(9), 196.

Godsell, G., Chikane, R., and Mpofu-Walsh, S. (2016). Fees must fall: Student revolt, decolonisation and governance in South Africa. New York: NYU Press.

Hlatshwayo, M. N., and Fomunyam, K. G. (2019). Theorising the #MustFall student movements in contemporary South African higher education: A social justice perspective. Journal of Student Affairs in Africa, 7(1), 61–80.

Jili, N. N., Ede, C. I., and Masuku, M. M. (2021). Emergency remote teaching in higher education during COVID-19: Challenges and opportunities. International Journal of Higher Education, 10(5), 1–9.

Kogan, M. (2022). *Education accountability: An analytic overview.* London: Routledge.

Kutty, R. J., and Javed, N. (2021). Secure blockchain for admission processing in educational institutions. *2021 International Conference on Computer Communication and Informatics (ICCCI)*, 1–4. IEEE.

Maki, P. L. (2023). *Assessing for learning: Building a sustainable commitment across the institution.* London: Routledge.

McKenzie, R. (2016). The nature and conduct of macroeconomic policy in South Africa. In K. Hart and V. Padayachee (Eds.), *Economic change in modern South Africa: Globalization and marginalization* (pp. 193–204). Cambridge: Cambridge University Press.

Milley, P., and Dulude, É. (2021). On maladministration in higher education: Towards a multi-level theoretical framework for understanding its emergence and persistence in an era of neoliberal, managerial and corporatist reforms. *International Journal of Leadership in Education, 24*(5), 588–612.

Modise, J. M., and Modise, P. S. (2023). Improved public trust, integrity and good governance with respect to corruption. *International Journal of Innovative Science and Research Technology, 8*(3), 2573–2583.

Moloi, K. C., and Motaung, R. R. (2014). Challenges of total quality in education through quality assurance principles in one institution of higher education in South Africa. *Mediterranean Journal of Social Sciences, 5*(1), 137.

Mtebe, J. S., Fulgence, K., and Gallagher, M. (2021). COVID-19 and technology enhanced teaching in higher education in Sub-Saharan Africa: A case of the University of Dar es Salaam, Tanzania. *Journal of Learning for Development, 8*(2), 383–397.

Mugellini, G., Villeneuve, J.-P., and Heide, M. (2021). Monitoring sustainable development goals and the quest for high-quality indicators: Learning from a practical evaluation of data on corruption. *Sustainable Development, 29*(6), 1257–1275.

Nguyen, A. Q. (2024). Strategies for innovating higher education governance in Vietnam in the digital age. *American Journal of Open University Education, 1*(5), 5–26.

Okafor, O. N., Adebisi, F. A., Opara, M., and Okafor, C. B. (2020). Deployment of whistleblowing as an accountability mechanism to curb corruption and fraud in a developing democracy. *Accounting, Auditing & Accountability Journal, 33*(6), 1335–1366.

Okilwa, N. S. A., and Barnett, B. G. (2021). Strategies and practices of leading schools during the current COVID-19 crisis. *International Studies in Educational Administration (Commonwealth Council for Educational Administration & Management (CCEAM)), 49*(3).

Pansara, R. (2023). From fields to factories: A technological odyssey in agtech and manufacturing. *International Journal of Management Education for Sustainable Development, 6*(6), 1–12.

Pramjeeth, S., Nupen, D. M., and Jagernath, J. (2023). Challenges impacting higher education leaders in achieving the sustainable development goal of quality education in South Africa. *African Journal of Inter/Multidisciplinary Studies, 5*(1), 1–13.

Ramasamy, L. K., and Khan, F. (2024). Secure and transparent educational data record-keeping with blockchain. In L. Kumar and F. Khan (Eds.), *Blockchain for global education* (pp. 147–164). Wiesbaden: Springer Nature Switzerland.

Randolph, J. (2019). A guide to writing the dissertation literature review. *Practical Assessment, Research, and Evaluation, 14*(1), 13.

Reed, M. S., Vella, S., Challies, E., De Vente, J., Frewer, L., Hohenwallner-Ries, D., Huber, T., et al. (2018). A theory of participation: What makes stakeholder and public engagement in environmental management work? *Restoration Ecology, 26*(S1), S7–S17.

Schildkamp, K. (2019). Data-based decision-making for school improvement: Research insights and gaps. *Educational Research, 61*(3), 257–273.

Svara, J. H. (2021). *The ethics primer for public administrators in government and nonprofit organizations* (3rd ed.). Burlingtong: Jones and Bartlett Learning.

Tarisayi, K. S. (2024). Strategic leadership for responsible artificial intelligence adoption in higher education. In *CTE Workshop Proceedings* 11, 4–14.

Turner, S. F., Cardinal, L. B., and Burton, R. M. (2017). Research design for mixed methods: A triangulation-based framework and roadmap. *Organizational Research Methods, 20*(2), 243–267.

Walcutt, J. J., and Schatz, S. (2019). *Modernizing learning: Building the future learning ecosystem.* Advanced Distributed Learning Initiative.

Wooten, M., and Hoffman, A. J. (2017). Organizational fields: Past, present and future. In R. Greenwood, C. Oliver, T. Lawrence, and R. Meyer (Eds.), *The Sage handbook of organizational institutionalism* (2nd ed., pp. 55–74). Los Angeles: Sage.

Xing, B., and Marwala, T. (2017). Implications of the fourth industrial age on higher education. Tạp chí Nghiên cứu dân tộc. *arXiv preprint*, arXiv:1703.09643.

Yasin, H., and Mokhtar, M. (2022). Practices of accountability and transparency in financial management among secondary school principals. *International Journal of Academic Research in Business and Social Sciences, 12*(9), 198–216.