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Management decision making in public administration information systems in South Africa: The role of the Auditor General of South Africa in improving effectiveness

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Abstract

The Auditor General of South Africa (AGSA), a statutory body that evaluates public sector information systems, is the main corporate governance instrument in the study. The different methods of corporate governance are explained in this article. The article examines the barriers to improving public sector information systems. Our analysis will focus on the efficiency of information systems in the public sector, closely linked to South Africa's National Development Plan 2030 and the Medium Term Strategic Framework, critical measures to achieve success. The study uses Atlas.ti 7 for qualitative textual analysis. This software analyses textual data from the 2017–2021 AGSA reports.

This thematic study highlights the micro and macro challenges faced by South Africa's public sector governance institutions. The problems stem from deficiencies in the information system, changes in the leadership, and a lack of transparency and access to information. We also face smaller issues such as a lack of executive accountability for their decisions, inadequate technology skills, ineffective project management, no disaster recovery procedures, declining IT governance and delays in filling key IT positions.

The study suggests promoting a transformative mindset to raise awareness of the critical role of information technology in public sector management. It also highlights the need to identify South African corporate governance practices that hinder information systems. The paper aims to improve the corporate governance framework for information systems in order to maximise the efficiency of the public sector.

Keywords: information systems (IS), public sector governance, audit reports, corporate governance, South Africa, strategic decisions, risk management, auditor general of South Africa (AGSA), economic impact.

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南非公共行政信息系统的管理决策：南非总审计长在提高效率中的作用

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简介

南非总审计长是评估公共部门信息系统的机构，是本研究中考虑的主要公司治理工具。本文解释了各种公司治理方法；探讨了与南非2030年国家发展计划和中期战略计划密切相关的公共部门信息系统改进的主要障碍，这些计划对于取得成功至关重要。 本研究使用Atlas.ti 7进行质性文本分析。该软件分析了2017年至2021年间南非总审计长的报告中的文本数据。本文探讨了南非公共部门管理机构面临的微观和宏观问题。问题的产生源于信息系统的缺陷、管理层更替、以及缺乏透明度和信息获取。此外，还有一些较轻微的问题，如领导者对其决策缺乏责任心、技术技能不匹配、项目管理效率低下、缺乏应急恢复计划、信息技术领域的公司治理恶化以及关键IT职位的替换不及时。 本研究建议推动创新思维，以提高对信息技术在公共部门管理中关键作用的认识。同时，强调了识别南非公司治理实践中阻碍信息系统发展的必要性。其主要目标是改进信息系统的公司治理结构，以最大限度地提高公共部门的效率。

关键词： 信息系统、公共部门管理、审计报告、公司治理、南非、战略决策、风险管理、南非总审计长、经济影响。

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Introduction

The concept of ‘governance’, derived from the Latin word ‘gubernare’, meaning ‘to rule’ or ‘to steer’, is particularly relevant in the field of corporate governance, which is concerned with the management and oversight of corporations [Singh, Singla, 2022]. Corporate governance has evolved due to the need for accountability after business failures and the adoption of rules by organisations such as the OECD [Otman, 2022]. Corporate governance techniques address issues such as internal controls, board operations, disclosure, transparency, and stakeholder trust [Kiranmai, Mishra, 2022]. This development is a global phenomenon, affecting countries at different economic stages [Gutterman, 2023]. Corporate governance establishes a relationship between shareholders (principals) and management (agents) in which managers are tasked with achieving the organisation’s objectives. Conflicts arise due to divergent interests between principals and agents, and governance systems are needed to manage these issues [Lazarides, Drimpetas, 2008; Lazarides et al., 2008; Papazafeiropoulou, Spanaki, 2016]. Research shows that high quality corporate governance reduces conflicts between directors and management, who often have superior information, leading to discrepancies in information management [Lazarides, Drimpetas, 2008; Salim et al., 2022].

[Kay, Silberston, 1995] describes traditional corporate governance as the accountability of managers to shareholders, a complex concept influenced by a number of factors. [Wild, 1994] emphasises the role of audit committees in enhancing accountability. In both governmental and organisational contexts, information systems (IS) are critical for efficiently managing the collection, processing, and distribution of information, thereby avoiding data saturation [Zvyagin, 2022]. [Gaines et al., 2012] notes the evolution of IS from a support role to a strategic partner, and [Almazán et al., 2017] discusses the impact of IS on organisational performance, both highlighting the role of IS in gaining competitive advantage and improving outcomes. Effective corporate governance ensures that IS provides essential information to controlling shareholders, or citizens in public institutions [Mehta, Chandani, 2020]. High quality information frameworks are crucial for improving decision making in governance [Água, Correia, 2021]. Transparent and reliable financial information is essential for governance and the protection of shareholder interests, especially in public companies where citizens are stakeholders. Timely and accurate information prevents data misuse and breaches [Bushman, Smith, 2003; Lazarides, Drimpetas, 2008; Fung, 2014; Chen et al., 2019].

In the area of overseeing individuals and their representative groups, a comprehensive framework of established norms, rules, legal statutes, and regulatory measures ensures the achievement of corporate governance [Lazarides, Drimpetas, 2008; Lazarides et al., 2008]. Although the implementation of robust

corporate governance frameworks is costly, it significantly enhances organisational functionality and performance by ensuring efficient operation, stability and minimised principal-agent conflicts in information systems (IS) [Lazarides, Drimpetas, 2008; Ali, Green, 2012; Papazafeiropoulou, Spanaki, 2016]. Effective information systems (IS) performance is defined by attributes such as regulation, interaction, information distribution, adaptability, data retention, and cybersecurity [Lazarides, Drimpetas, 2008; Chen et al., 2019]. Issues such as IT downsizing, IT budget cuts, and misinformation can undermine corporate governance [Ali, Green, 2012].

Effective IT governance, which includes top management participation, regulatory compliance, and efficient communication systems, is crucial for organisational success and preventing project failures [Ali, Green, 2012; Asgarkhani et al., 2017]. A well-designed IT governance framework is essential for achieving long-term viability, aligning the strategic interests of executive management with those of shareholders through established structures and mechanisms [Achim, Borlea, 2014; Jarboui et al., 2014; Locke, Duppati, 2014]. Corporate governance, shaped by organisations such as the Institute of Directors in South Africa (IODSA), provides the guidance and control necessary to ensure that organisations achieve their set goals and objectives [Gstraunthaler, 2010].

The performance of public sector organisations depends on their adherence to strategic and national objectives under government supervision. Theimplementation of strategic management is crucial for improving the efficiency of the public sector and achieving good governance [Locke, Duppati, 2014; Vasyunina et al., 2022]. Effective corporate governance systems, characterised by fairness, transparency, and value-enhancing activities, contribute to the optimal allocation of resources and improved business performance. These systems are critical to the success of public sector enterprises [Mohamad, Muhamad Sori, 2011; Locke, Duppati, 2014; Yapa, 2014; Ali Asghar et al., 2021].

A robust corporate governance framework can deter fraud and abuse of authority while enhancing public confidence in the management of economic resources [Matei, Drumaşu, 2014]. [Alnaser et al., 2014] asserts that effective corporate governance in public companies increases investor confidence and positively affects market performance. This concern is particularly important in developing countries, where fraud and abuse of authority tend to be more widespread [Ponduri et al., 2014]. To enhance accountability in the public sector, corporate governance practices have been adapted to better manage and steer organisations in line with government objectives [Papazafeiropoulou, Spanaki, 2016]. Corporate governance emerged in response to widespread embezzlement and financial misconduct in developed economies such as the US and the UK [Ali, Green, 2012; Matei, Drumaşu, 2015]. This need for governance has become a global concern, affecting all stages of the economy [Gutterman, 2023]. Notable incidents such as the Watergate scandal in the US in the 1970s, involving the illegal use of funds for political purposes, and abrupt corporate failures in the UK in the 1980s and 1990s, highlighted the need for a clearer distinction between shareholder and managerial powers [Matei, Drumaşu, 2015]. The creation of the Cadbury, Greenbury, Hampel, and Combined Codes in the UK was a response to the separation of ownership and control in organisations, and these codes have played a crucial role in shaping corporate governance standards both at home and abroad [Walsh, Seward, 1990; MacNeil, Esser, 2022]. Corporate governance encompasses elements such as principal-agent interactions, performance and accountability, regulatory frameworks, and external audits. It sets out a structure of rules, customs and processes that shape how a company is organised and what it aims to achieve [Elamer et al., 2022].

Information systems (IS) facilitate the integration of accounting, finance, human resources, supply chain management, and production, improving data consolidation and the sharing of critical information [Lee, Whang, 2000; Bernstein, Haas, 2008; Carr, 2016; Chen et al., 2019; Fakhimuddin et al., 2021]. Studies show that IS integration with corporate governance improves information handling and overall performance [Ravichandran et al., 2005; Gorla et al., 2010; Lipaj, Davidavičienė, 2013; Almazán et al., 2017; Chen et al., 2019]. Effective IS planning and senior management support are critical to improving business performance [Raghunathan, King, 1988; Ragu-Nathan et al., 2004].

Assesstments of public sector effectiveness in IS and corporate governance reveal a complex relationship between governance and performance [Coles et al., 2001; Larcker et al., 2007]. Appropriate governance frameworks, including competent audit committees and internal audit, are essential [Dzomira, 2020; Oprea et al., 2023]. Effective IT governance is also critical to public sector performance, addressing challenges and improving governance standards [Ako-Nai, Singh, 2019; Chigudu, 2020; Cuadrado-Ballesteros, 2020].

Information processing theories suggest that effective IS should integrate business processes, provide comprehensive and accurate information, and facilitate timely decision making, directly impacting organisational operations [Habba et al., 2017; Pereira, Sá, 2017; Ricciardi et al., 2018; Amin, 2019; Chen et al., 2019; Quan, 2019; Stoilov, 2019; Susanto, Bong, 2019; Fatieieva, 2020]. Effective IS reduces the cost of decision making and improves the quality and timeliness of information [Chen et al., 2019]. In the public sector, political decisions and conflicts can affect management priorities, often leading to poor governance [Chen et al., 2019].

In South Africa, corporate governance often fails to meet the needs of the public, resulting in numerous investigations and leadership changes [Masegare, Ngoepe, 2018]. Effective governance should involve a multifaceted approach that includes legal, political, and social dialogue, continuous evaluation, and stakeholder engagement, as highlighted in the King Code and Batho Pele guidelines [Masegare, Ngoepe, 2018]. Risk-based systems of an audit mechanism can increase the effectiveness of public administration sector entities in addressing sustainability and strategic challenges more robustly [Masegare, Ngoepe, 2018].

In South Africa, the public administration and state-owned entities operate under specific corporate governance systems and frameworks to ensure fairness and impartiality in the discharge of their responsibilities. Despite the challenges it faces, the public sector plays an important role. It contributes around 10% of global output and is an important economic consideration [Daiser et al., 2017]. To address transparency issues and improve public

sector governance, the South African government has introduced several measures. These measures aim to improve accountability, operational efficiency, and the alignment of public organisations with national objectives:

1.CGICT Framework: South Africa's Department of Public Service and Administration (DPSA) has developed the CGICT Framework, which provides guidelines for ICT governance in government organisations. This framework aims to align corporate ICT governance practices across state bodies and public enterprises and supports the auditing activities of the Auditor General of South Africa (AGSA) [Public service corporate.., 2012; Mawson, 2017].

2. Public Finance Management Act (PFMA): The PFMA is critical to updating financial management practices and ensuring transparency, accountability and collaboration in the budgeting process in South Africa. It sets out criteria for financial management at national and provincial levels to improve financial accountability and openness [Madue, 2007; Siswana, 2007].

3.King IV Code: This code governs corporate governance in South Africa, emphasising sustainability, corporate social responsibility, and detailed reporting. Influenced by African values such as Ubuntu, it adapts to changing socio-economic and political conditions to promote connectivity and humanity [Gstraunthaler, 2010; Dube, 2016].

4. ISO 38500 Standard: ISO 38500 outlines key principles to guide the wise and effective use of information technology in organisational contexts. This standard provides as a framework for corporate governance of IT, ensuring that IT supports and enhances the overall business objectives and strategy. It is essential for IT governance in the South African public sector, providing a framework for assessing IT governance and suggesting improvements for inter-organisational IT systems [Campbell et al., 2011; Public service corporate.., 2012].

5. COBIT 5 Framework: Designed to assess and manage the governance of information systems and technology, COBIT 5 provides a systematic approach to the challenges of information governance and management. It helps organisations achieve their goals by balancing benefits, risks, and resource utilisation [COBIT 5.., 2013; De Haes et al., 2013; Kozina, Sekovanic, 2015; Mora Aristega et al., 2017].

6. Auditor General of South Africa (AGSA): The AGSA is an independent body responsible for auditing public sector organisations to uphold constitutional democracy and good governance. Mandated by Chapter 9 of the Constitution and the Public Audit Act, the AGSA oversees the allocation of public funds and enhances public confidence through audits that focus on material irregularities. Enforceable corrective measures, such as debt certificates, are issued for non-compliance to recover lost funds [Hatchard, 2018][1] .

The discussion of specific regulations and their impact on corporate behaviour and results is often inadequate in many publications. The public sector benefits from establishing corporate governance in a number of ways, including reduced costs, higher quality services, more flexible IT systems, greater information security and more effective risk management. [Oprea et al., 2023; Singh, 2023]. Values such as honesty, transparency, and accountability in corporate governance help public institutions achieve their goals and meet public needs [Yohana, 2022]. For all organisations, particularly in the public sector, effective corporate governance is essential for sustainable resource management and operational longevity, and have a significant impact on performance [Latchu, Singh, 2022]. In the public sector, corporate governance principles can significantly reduce fraud and financial distress. In addition, the adoption of corporate governance adresses issues related to the configuration of information systems, increases managerial accountability, strengthens IT capabilities and promotes efficient project and information management in the South African public sector. Poor corporate governance can lead to an inefficient and unresponsive economic infrastructure, ultimately hindering the achievement of strategic government goals [Gichoya, 2005]. Effective IT governance is essential for aligning IT initiatives with business objectives and includes strategies such as senior management involvement, adherence to ethical practices, and effective corporate communications [Ali, Green, 2012]. The lack of strong corporate and IT governance in the South African public sector poses a major obstacle to achieving the goals of the National Development Plan 2030 (NDP) and the Medium-Term Strategic Framework (MTSF) [Mathase et al., 2019]. These frameworks are key components of South Africa's development strategy, aligning national priorities with global sustainable development goals [Fourie, 2018]. The Sustainable Development Goals (SDGs), comprising 17 interconnected targets, aim to address critical global issues such as poverty, inequality, and climate change. These goals are underpinned by the concept of sustainable development, which balances meeting the demands of the present with ensuring that future generations can meet their own needs [Clark, Wu, 2016; Pedersen, 2018].

1. Literature review

The performance of information systems (IS) performance is a key aspect of major government-led public sector reforms aimed at improving the accessibility of public bodies, promoting collaboration, openness, and the availability of information [Trotta et al., 2011; Castelo, Gomes, 2023]. IS contribute to transparency in public sector organisations by enabling resource monitoring and facilitating optimal decision making [Trotta et al., 2011; Yesimov, Bondarenko, 2018]. Despite this, information systems (IS) operations are influenced by the pressures for process standardisation within public administration [Trotta et al., 2011]. For change in the public sector to be successful, information systems (IS) need to improve organisational performance to achieve strategic goals and foster citizen engagement, thereby reducing bureaucratic barriers to critical decision-making [Trotta et al., 2011]. Challenges in IS procurement, such as miscommunication between vendors and procurement agencies, hinder the achievement of intended goals [Riihimäki, Pekkola, 2021]. While IS are essential to the ability of public sector organisations to innovate and create value [Senyo et al., 2021], their impact is more thoroughly documented in the commercial sector than in the public sector of developing countries [Senyo et al., 2021]. Reforms that exclude IS lead to misalignment and failure to achieve objectives [Senyo et al., 2021].

[1] Integrated annual report 2020–2021 (2021). AGSA. www.groundup.org.za/topic/sassa/.

There is a growing interest in using IS to improve and streamline public sector service delivery [Kassen, 2022]. IS not only collect, store, process, and deliver reliable information to citizens and government agencies, but also offer flexibility in managing and processing public sector information, subject to accurate implementation and an appropriate performance environment [Kassen, 2022]. Corporate governance in state-owned organisations is a key driver of economic governance and has a significant impact on public service accountability, business performance, and operational efficiency [Mahadeo, Soobaroyen, 2012; Goel, 2015; Heo, 2018].

South Africa's public sector faces significant challenges related to IS security breaches. The uptake and application of information systems in Africa's public sectors, including South Africa, is particularly limited [Akande, Van Belle, 2013]. Notably, South Africa has the highest rate of ransomware incidents and business email breaches on the continent, revealing critical IS weaknesses [Devanny, Buchan, 2024]. In the South African public sector, examples of IS breaches include:

1. October 2019: Shadowy Hackers infiltrated Johannesburg's municipal website and billing system, demanding a ransom of four bitcoins (about $ 30,000) to prevent the release of data [Daniel et al., 2023].

2. May 2020: Unintentional changes to the UIF website led to a data leak exposing personal information of UIF claimants; a security researcher identified and reported problem, which was subsequently resolved by the UIF [Pieterse, 2021].

3. September 2021: The Department of Justice and Constitutional Development suffered a ransomware attack that compromised its IT systems. The Information Regulator fined the department ZAR 5 million ($ 279,000) for breaching POPIA, issued through an infringement notice [Dugas, 2022].

Public sector organisations experienced significant downtime due to information system failures attributed to corporate governance weaknesses [Pieterse, 2021; Daniel et al., 2023]. However, there is limited literature addressing corporate governance challenges specific to information systems (IS) and their role in improving public sector effectiveness in the context of reform [Kassen, 2022]. The purpose of this research was to identify the primary operational barriers affecting information systems (IS) in the South African public sector that operate within a robust corporate governance framework, whether mandated by law or established by regulation. The research question was, 'What are the barriers to IS in the South African public sector with a comprehensive corporate governance system in place?

2. Description of the research methodology

This document presents an auditor's analysis of the barriers to information systems (IS) in the South African public sector. We approached the governance questions using a constructivist philosophical framework, which emphasises the construction of knowledge about the world through subjective understandings informed by experiences and participants' perspectives. The research is based on a qualitative methodology that focuses on understanding phenomena by examining real and historical events in their actual contexts [Leedy, Ormrod, 2023]. We are investigating the Auditor General of South Africa (AGSA) to obtain a thorough understanding of the challenges facing the information systems (IS) function in the public sector. The study focuses on the unique characteristics of the South African public sector that contribute to understanding and identifying difficulties that affect the functionality of information systems (IS) in this context [Leedy, Ormrod, 2023]. Documentary data taken from the AGSA's annual integrated and general reports for the years 2016 to 2020 serve as the study's unit of analysis. The AGSA website provided the annual integrated and general reports. Documents are essential tools that substantiate and illustrate how individuals manifest and record their roles within society. They serve as both a method and a medium through which societal and organisational dynamics are understood and experienced [Flick, 2013]. The data relevant to the research inquiry is characterised by its qualitative aspects.

In order to fully understand the obstacles faced by the information systems (IS) function within the public sector, this research adopts the Auditor General of South Africa (AGSA) as a focal case study. The research focuses on the unique characteristics of the South African public sector, which helps to identify and understand the barriers to IS functionality in this environment [Leedy, Ormrod, 2023]. The analysis focuses on documentary data from the AGSA's annual integrated and general reports, which coverthe years 2016 to 2020 and are available on the AGSA website. These documents act as evidence of how entities articulate and document their social roles and actions, and serve as a medium for capturing and experiencing social and organisational behaviour [Flick, 2013]. The study is qualitative in nature, using thematic analysis to uncover the corporate governance challenges associated with information systems. Thematic analysis involves organising the data into fundamental themes that explain the core phenomena in the dataset [Flick, 2013]. This analysis is carried out using Atlas.ti 7 software.

3. Findings and discussion

A thorough examination of the annual and general reports for the five years to 2020 has led to conclusions about the challenges facing information systems (IS). This analysis involved distinct codes and 60 quotations. Figure 1 provides a comprehensive overview of these challenges as assessed by the Auditor General of South Africa (AGSA).

Figure 1 provides a comprehensive picture of these challenges as assessed by the Auditor General of South Africa (AGSA).

3.1. Macro issues affecting the functioning of information systems (IS)

From a broader perspective, the effectiveness of information systems within the public sector is significantly influenced by the overarching framework of corporate governance, the variability of economic conditions, changes in political leadership, and the persistent deficit of trustworthy information available to the public, which hampers accountability and transparency. Changes in government leadership complicate the implementation and resolution of issues highlighted in audit findings. In addition, economic downturns continue to challenge the operational efficiency of information systems, as reported by the Auditor General of South Africa (AGSA):

- The year 2017–2018 was characterised by a weakening economy and lower credit ratings, which placed fiscal constraints on the provision of public services and the generation of money.

Government bodies in the public sector are accountable to the taxpayer, who is the representative of the citizenry. The information they release to the public is critical to establishing the checks and balances necessary for accountability, in line with the findings of the AGSA:

- The lack of accurate and timely progress reports from government institutions is problematic, as it undermines the public's ability to hold officials accountable for meeting strategic goals.

3.2. Micro-issues affecting the functioning of information systems (IS)

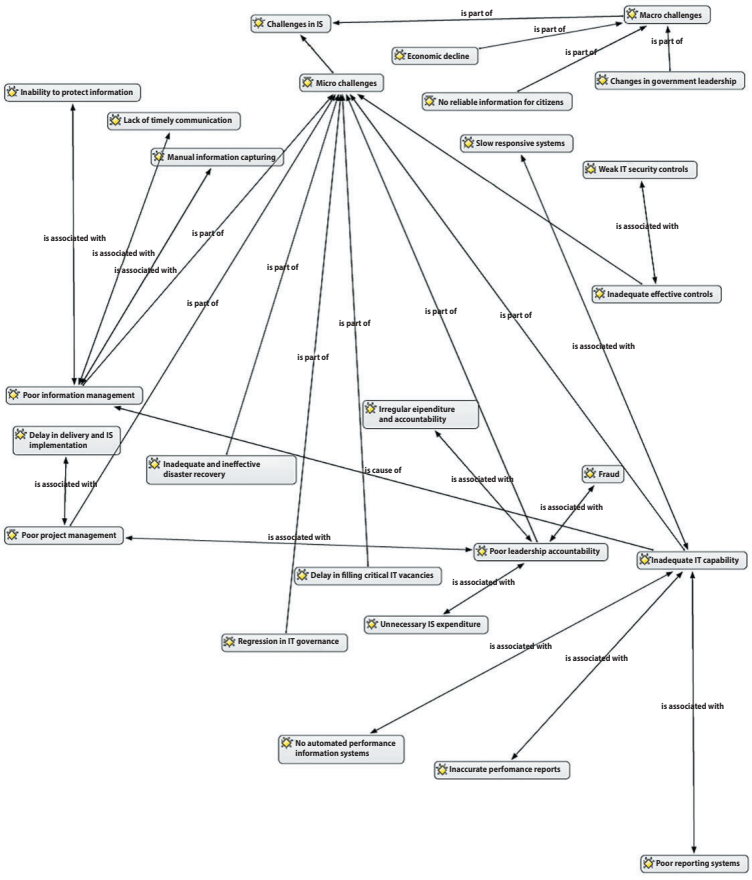
Micro-level barriers to the effective operation of information systems in public sector organisations, such as inadequate IT security measures, limited technological capabilities, lack of leadership accountability, project management deficiencies, ineffective information handling, inadequate disaster recovery plans, gaps in IT governance, and delays in hiring IT staff , represent critical organisational management challenges. Inadequate IT controls, combined with the absence of strong and effective safeguards, ultimately hamper the functioning of these systems. The AGSA highlights these issues as follows:

- The continuing shortage of IT security expertise, coupled with inadequate funding, remains a major concern.
- The public sector has been hampered by inadequate funding for defence measures and outdated IT systems.
- Despite significant government investment in advanced technology to streamline operations, the data generated by these systems is unreliable, creating opportunities for fraud and misuse.
- Government agencies have had their systems compromised by hackers, resulting in the inability to provide essential services. In some cases, hackers have demanded ransoms to restore systems.
- Inadequate support from service providers for outdated systems meant that necessary security updates could not be applied, resulting in significant IT security vulnerabilities.

Furthermore, in addition to the deficiencies in IT controls, there is a significant gap in the controls needed to maintain and improve the functionality of the information system. The AGSA highlighted significant observations as follows:

- Government organisations are concerned about the IT environment, as they struggle to establish effective security and user control policies. The implementation of automated control systems that maintain organisational continuity should be prioritised.
- The IT security has not changed because management has been unable to recruit IT professionals with the essential skills required to maintain the current IT infrastructure.

Fig. 1. Challenges in functioning of IS



Source: compiled by the authors.

- Inadequate controls for secure information processing have led to a significant decline in the effectiveness of IT governance.
- Control concerns remained prevalent, particularly in the areas of security and user control, due to the limited capabilities of the systems.
- Those responsible for IT management and compliance, including the implementation of governance systems, are often reluctant to monitor and address existing weaknesses in IT control mechanisms.
- There is a lack of assurance that IT service providers are meeting agreed performance standards due to inadequate monitoring of contracts.In the public sector, managers have often focused on symptom management rather than improving the efficiency and effectiveness of information systems.
- Inadequate funding hinders the procurement of modern IT infrastructure and improved internet connectivity.

Inadequate recovery processes within public sector entities have been shown to have a negative impact on revenue collection and service delivery. The Auditor General of South Africa (AGSA) highlights deficiencies in information technology (IT) capabilities as evidenced by slow and unresponsive systems, poor reporting systems, erroneous performance reports, and the absence of an automated performance information system. These

IT deficiencies affect the operational efficiency of information systems, according to the AGSA:

- The oversight of public sector organisations was considered insufficient to adequately address the IT control weaknesses identified in the audit findings.
- The lack of attention paid by leaders to holding public sector management accountable and addressing the underlying causes of information system inefficiency leads to an increase in the intensity of slow response..

Public bodies in South Africa's provinces encountered deficiencies in their reporting systems, as highlighted in the following perspective:

- There is a lack of guidance at national level to address the difficulties associated with reporting systems. Effective reporting systems help public organisations to allocate resources efficiently throughout the planning and budgeting process.

The lack of control mechanisms has a direct impact on the quality of information generated for decision making. The Auditor General of South Africa (AGSA) has attributed this problem to both accounting staff and IT:

- The lack of effective accountability in monitoring and evaluation units, together with the instability of information systems, makes it difficult to obtain reliable data, which is essential for enabling well-informed and high-quality decision-making in public sector bodies.

The extensive reliance on manual processes was a significant challenge for many public sector organisations, hindering the rapid implementation of critical decisions. The AGSA found that:

- In the absence of advanced automated tracking tools, public sector organisations have relied on Microsoft Excel, which is vulnerable to potential manipulation. Evaluating the delivery of services to citizens in the public sector is critical, so monitoring performance is essential. As a result, the spread of inaccurate data weakens governments' efforts to meet their commitments to citizens.

Ensuring the accuracy and availability of recorded data is essential for accurate reporting. Despite the ambitious goals and priorities set out in the Strategic Plan, the lack of adequate information systems posed a significant challenge to their effective implementation. This shortfall reflects a wider issue of poor leadership, which has hindered the successful delivery of strategic information systems objectives. Inadequate management accountability is evidenced by cases of irregular expenditure, lack of accountability, wasteful expenditure on information systems and fraudulent activities. Irregular spending and lack of accountability have a negative impact on the performance of information systems. The following observations have been made:

- Weak accountability within governance structures has severely hampered service delivery in vital areas such as essential infrastructure, education, and public health.
- Public officials and managers were found to have been involved in the decision-making processes that led to expenditure that deviated from standard norms, such as irregular expenditure. They were unwilling to address these issues and instead chose to write off the expenses.

Inefficient allocation of resources, as evidenced by wasteful expenditure on information systems, hampers the functioning of the IS. This disclosure was made by the Auditor General of South Africa (AGSA), who made the following observation:

- The inefficient use of IT resources within public sector organisations is demonstrated by the procurement of non-essential software.

The AGSA has reported fraud trends in supply chain contracts that have impacted on the functionality of the IS:

- A review of of 259 audit findings in the public sector revealed investigations into contracts with fraud risks, research into fraud detection methods and assessments of high-risk contractual in the supply chain.

The main obstacle facing information systems (IS), due to poor project management, is manifested in delays in IS deployment and integration. This concern was underlined by the AGSA, which highlighted specific project management challenges:

- Sub-optimal implementation of information technology (IT) initiatives has resulted in the inefficient allocation of resources to avoidable expenditure. In addition, the systems supporting IT initiatives do not meet the expected standards.

Inadequate information management was associated with failure to secure information, lack of timely communication and manual recording of information. The inability to secure information was expressed as follows:

- Public sector organisations sometimes face delays in providing valuable data for compliance and governance due to a lack of readily available information.
- There is a lack of accountability on the part of public sector leaders, who have been seen pressuring the AGSA (Auditor General of South Africa) to withhold providing substantive evidence.
- The review indentified deficiencies in information security protocols were discerned. Decisions based on information are crucial and require reliability, credibility and high standards of information integrity. In addition, information security is essential to prevent vulnerabilities and reduce the risk of unauthorised manipulation.

The delay in correspondence was attributed to shortcomings such as unfinished preparatory documents, inadequate documentation, particularly in the context of meetings, delayed correspondence and the late addition of supplementary documentation close to the end of the audit.

The performance of information systems (IS) has been hampered by the manual processing of information in the following ways:

- Manually entered data has the potential to contain errors, making it diffficult to use for decision making. In addition, the reliance on handwritten information is a significant barrier to planning and monitoring business activities.

The lack of sufficient and effective disaster recovery measures challenges the effectiveness of information systems by putting pressure on their efficiency. This pressure manifests itself in the following ways:

- More than 60% of inspected public sector organisations surveyed lacked a recovery strategy to ensure business continuity in the event of technology disruption, leaving them vulnerable to disaster.

- The lack of attention to risk management in the IT environment has rendered current procedures ineffective.
- A common disaster that disrupts the functioning of IS is the breakdown of the recovery link and systems, resulting in the unavailability of services and adversely affecting public sector activities.

The regression of information technology governance is a major concern that contributes to the ineffectiveness of public sector information systems, a sentiment echoed by the AGSA:

- IT governance was identified as a significant challenge in the administration of government bodies, requiring attention and focus. In several cases, the establishment of governance mechanisms was completely absent.
- The lack of monitoring of IT investments has hampered the ability to determine the return on investment achieved by IT-informed expenditure.
- IT committees lack the necessary tools to adequately surveil their performance against strategic objectives and mandates.
- The achievement of strategic objectives faces significant challenges,both in the immediate and longer term, exacerbated by deficiencies in the existing IT infrastructure that inhibit conditions conducive to the growth of the public sector.

Progress in implementing IT controls has been hampered by delays in filling IT posts. The position is articulated in the subsequent AGSA opinions:

- Key IT personnel were not recruited, resulting in a failure to effectively monitor IT controls and address audit-related issues.
- The decision to stop recruiting IT staff meant that key areas of information systems were neglected for long periods, exacerbating IT control issues
- The field of information technology (IT) is constantly changing, and it has been found that the existing management skills are not able to keep up with the emerging issues. As a result, IT problems have remained unresolved.

4. Conclusion and recommendations

An efficient information system has the capacity to streamline key decision-making processes in the public administration, government operations and for the citizens. The results of the study reveal several areas for improvement in the public sector's use of information systems. Challenges have been identified, including limited public access to reliable information, inadequate information technology security safeguards, ineffective leadership, inadequate in disaster recovery infrastructure, understaffing of critical personnel, and deficiencies in IT governance have been identified. The findings of this research have multiple implications for individuals, government agencies, and public sector stakeholders. While it may be impracticle to to fully address the inherent constraints that hinder the effectiveness information systems (IS) in the public sector, stakeholders express significant concerns that require a thorough examination of these barriers:

- How can information systems (IS) be used to provide accurate and timely information for critical decision making?
- What methods can be used to improve the effectiveness of IT cybersecurity protocols in mitigating security breaches?
- How might one assess the effectiveness of leadership in ensuring the smooth operation of information systems (IS)?
- What strategies can be implemented to improve the information systems governance process?

A significant limitation of this research is that it focuses exclusively on the AGSA's view of the challenges affecting the operational effectiveness of information systems (IS) in the public sector, neglecting the input of auditees. There is a noticeable lack of academic discourse on corporate governance issues relating to the functionality and effectiveness of information systems within South African governmendepartments. The report advocates for further research to gain a deeper understanding of the auditees, particularly public sector IT management, who have ultimate accountability and oversight responsibilities in the audited areas.

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