POST-ADOPTION FRAMEWORK FOR CONTINUED USE OF GENERALISED AUDIT SOFTWARE IN SOUTHERN AFRICAN SOEs

by

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ABSTRACT

As information technology (IT) continues to drive the transformation of organisations, the business environment is becoming more digitalised, with data and information increasingly becoming electronic in nature. The accelerated generation of voluminous data by organisations not only provides new opportunities for data-driven decision-making but also introduces new threats and risks that need to be mitigated.

The role of internal auditing has also been evolving. Internal auditing has moved from fulfilling a predominantly policing role to a role where a greater focus is placed on providing assurance and consulting on aspects of organisational governance, risk, and compliance initiatives. Audit standards recommend the use of data analytics by internal auditors to reveal relevant and timely insights from multiple data sources and large volumes of data in order to meet stakeholder expectations effectively and efficiently. However, it is evident from literature that the adoption of generalised audit software (GAS) by internal auditors is still below expected levels, and its utilisation is still very low. Consequently, the primary research question on which this study is anchored is based on gaining a better understanding of why GAS is underutilised by internal auditors after its adoption, despite the heightened awareness of the importance and value of audit analytics in the digitalised environment.

According to the literature reviewed, prior studies on GAS largely focus on the pre-adoption of GAS, primarily in developed economies, and give little attention to its post-adoption usage. Using an analysis of GAS user experiences, perceptions, and challenges, a conceptual framework was developed for the sustainable continued usage of GAS. A qualitative research design was adopted, and interviews were conducted to gather primary data from internal auditors in state-owned organisations (SOEs) in the Southern African region.

The findings of the study did not reflect significant differences attributed to GAS user experiences and perceptions arising from the different geographical locations in the Southern African region and the SOE sector. Instead, differences attributed to GAS user experiences and perceptions emanated from the internal organisational environment and GAS user characteristics. User competency, leadership, nature of data source, post-implementation monitoring, and pre-adoption constructs were found to be important factors that interacted to enable and drive the adoption and utilisation of GAS. The proposed conceptual framework makes a theoretical and practical contribution to the continued usage of GAS once it has been adopted.

Keywords: Generalised Audit Software, Computer-assisted Auditing Techniques, Internal Audit, Data Analytics, Post-adoption Framework, Continued Usage, Unified Theory of Acceptance and Use of Technology, Expectation Confirmation Theory of Information Systems, Big Data, State-owned Enterprises, Data-driven Decision-making.

OKUCASHUNIWE

Njengoba ubuchwepheshe bezolwazi (IT) buqhubeka nokuqhuba uguquko lwezinhlangano, indawo yebhizinisi iya ngokuya iba yidijithali, njengoba imininingwane nolwazi luya ngokuya luba okusetshenziswa ngogesi ngokwendalo. Ukukhiqizwa okusheshayo kwemininingwane enamandla yizinhlangano akuhlinzeki nje kuphela ngamathuba amasha okuthathwa kwezinqumo okuqhutshwa yimininingwane kodwa futhi kwethula izinsongo ezintsha nezingozi ezidinga ukuncishiswa.

Iqhaza lokuhlolwa kwamabhuku kwangaphakathi nalo liyakhula. Ukuhlolwa kwamabhuku kwangaphakathi sekusukile ekufezeni indima enkulu yobuphoyisa kwaya endimeni lapho kugxilwa kakhulu ekuhlinzekeni isiqiniseko nokubonisana ngezingxenye zokuphatha kwenhlangano, ubungozi kanye nezinhlelo zokuthobela imithetho. Izindinganiso zokucwaninga ziphakamise ukusetshenziswa kokuhlaziywa kwemininingwane ngabahloli bamabhuku bangaphakathi ukuze kwembulwe imininingwane efanele nefika ngesikhathi evela emithonjeni yemininingwane eminingi kanye nenani elikhulu lemininingwane ukuze kuhlangatshezwane nokulindelwe ababambiqhaza ngokusebenza kahle nangempumelelo. Kodwa-ke, kuyabonakala emibhalweni ukuthi ukwamukelwa kwezinhlelo kanye nolunye ulwazi lokusebenza olusetshenziswa yikhompuyutha yocwaningomabhuku olujwayelekile (GAS) ngabacwaningi mabhuku bangaphakathi kusengaphansi kwamazinga alindelekile, futhi ukusetshenziswa kwazo kusephansi kakhulu. Ngakho-ke, umbuzo oyinhloko wocwaningo okusekelwe kuwo lolu cwaningo usekelwe ekutholeni ukuqonda okungcono kokuthi kungani i-GAS isetshenziswa kancane ngabacwaningi bamabhuku bangaphakathi ngemva kokwamukelwa kwayo, naphezu kokuqwashisa okuphezulu kokubaluleka kanye nenani lokucwaninga imininingwane yokuhlaziya endaweni yedijithali.

Ngokuya ngemibhalo ebuyekeziwe, izifundo zangaphambilini ze-GAS zigxile kakhulu ekukwamukelweni kwangaphambili kwe-GAS, ngokuyinhloko emazweni athuthukile kwezomnotho, futhi azinaki kangako ukusetshenziswa kwayo ngemva kokwamukelwa. Kusetshenziswa ukuhlaziya okuhlangenwe nakho komsebenzisi we-GAS, imibono, nezinselele, uhlaka lomqondo lwakhiwe ukuze kusetshenziswe okuqhubekayo okusimeme kwe-GAS. Kwamukelwa ucwaningo olugxile ekutholeni imininingwane ngokusebenzisa ukuxhumana okuvulekile nokuxoxisana, kwase kwenziwa inhlolokhono ukuze kuqoqwe imininingwane yokuqala kubacwaningimabhuku bangaphakathi ezinhlanganweni zikahulumeni (ama-SOE) esifundeni esiseNingizimu ne-Afrika.

Okutholwe ocwaningweni akuzange kubonise umehluko omkhulu odalwe olwazini lwabasebenzisi be-GAS kanye nemibono evela ezindaweni ezehlukene zesifunda saseNingizimu ne-Afrika kanye nomkhakha wama-SOE. Esikhundleni salokho, umehluko obangwa olwazini lwabasebenzisi be-GAS kanye nemibono uvela endaweni yangaphakathi yenhlangano nezici zomsebenzisi we-GAS.

Amakhono omsebenzisi, ubuholi, ubunjalo bomthombo wemininingwane, ukuqapha ngemva kokuqaliswa, kanye nokwakhiwa kwangaphambilini kokwamukelwa kutholwe njengezici ezibalulekile ezisebenzisanayo ukuze kunikwe amandla futhi kuqhubekisele phambili ukumukelwa nokusetshenziswa kwe-GAS. Uhlaka lomqondo ohlongozwayo lwenza inkolelo-mbono kanye negalelo elibonakalayo ekusetshenzisweni okuqhubekayo kwe-GAS uma selwamukelwe.

Amagama asemqoka:

Izinhlelo kanye nolunye ulwazi lokusebenza olusetshenziswa yikhompyutha locwaningomabhuku olujwayelekile, Amasu ocwaningomabhuku asizwa yikhompyutha, Ucwaningomabhuku lwangaphakathi, Ukuhlaziywa kwemininingwane, Uhlaka lokwamukelwa lwangaphambili, Ukusetshenziswa okuqhubekayo, Umbono Ohlanganisiwe Wokwamukela kanye Nokusetshenziswa Kobuchwepheshe, Umbono Wokuqinisekisa Wokulindela Wezinhlelo Zolwazi, Imininingwane Emikhulu, Izinhlangano zikaHulumeni, Ukwenziwa Kwezinqumo okuqhutshwa yimininingwane,

OPSOMMING

Namate inligtingstegnologie (IT) steeds die transformasie van organisasies aandryf, word die sake-omgewing meer gedigitaliseerd, met data en inligting wat toenemend elektronies van aard is. Die versnelde generering van omvangryke data bied nie net nuwe geleenthede vir datagebaseerde besluitneming nie, maar bring ook nuwe bedreigings en risiko's wat getemper moet word.

Die rol van interne ouditering het ook verander – van 'n hoofsaaklik polisiërende rol na een met 'n groter fokus op die voorsiening van versekering en konsultering oor aspekte van organisasiebeheer, -risiko- en -voldoeningsinisiatiewe. Ouditstandaarde beveel aan dat data-ontleedkunde deur interne ouditeure gebruik word om relevante en tydige insigte van verskeie databronne, en groot volumes data, te onthul ten einde op gepaste en doeltreffende wyse aan belanghebbers se verwagtinge te voldoen. Dit blyk egter duidelik uit die literatuur dat die vlak van interne ouditeure se ingebruikneming van veralgemeende ouditsagteware (*GAS*) steeds laer as verwag is, en dat die gebruik daarvan ook nog baie laag is. Gevolglik is die primêre navorsingsvraag waarin hierdie navorsing geanker is, daarop gegrond om 'n beter begrip te vorm van waarom *GAS* onderbenut word nadat interne ouditeure dit in gebruik geneem het – ten spyte van die verhoogde bewustheid van die belangrikheid en waarde van oudit-ontleedkunde in die gedigitaliseerde omgewing.

Volgens die literatuur wat bestudeer is, het vorige studies oor *GAS* grootliks op die pre-ingebruikneming van *GAS* gefokus, hoofsaaklik in ontwikkelde ekonomieë, en is daar min aandag gegee aan die post-ingebruikneming-aanwending daarvan. 'n Ontleding van *GAS*-gebruikers se ondervindings, persepsies en uitdagings is gebruik om 'n konseptuele raamwerk te ontwikkel vir die volhoubare, voortgesette gebruik van *GAS*. 'n Kwalitatiewe navorsingsontwerp is gebruik, en onderhoude is gevoer om primêre data van interne ouditeure in staatsondernemings in die Suider-Afrikaanse streek in te samel.

Die bevindinge van die studie het nie beduidende verskille getoon wat toegeskryf word aan *GAS*-gebruikers se ervarings en persepsies, voortspruitend uit die verskillende geografiese liggings in die Suider-Afrikaanse streek en die staatsondernemings-sektor nie. Verskille wat toegeskryf word aan *GAS*-gebruikers se ervarings en persepsies is eerder afkomstig van die interne organisasie-omgewing en die eienskappe van *GAS*-gebruikers. Gebruikersbevoegdheid, leierskap, aard van databron, post-implementering-monitering, en pre-ingebruiknemingskonsepte is aangedui as belangrike faktore wat met mekaar in wisselwerking was om die ingebruikneming en toepassing van *GAS* moontlik te maak en voort te dryf. Die voorgestelde konseptuele raamwerk lewer ’n teoretiese en praktiese bydrae tot die voortgesette gebruik van *GAS* nadat dit geïmplementeer is.

Sleutelwoorde: Veralgemeende Ouditsagteware, Rekenaargesteunde Oudittegnieke, Interne Oudit, Data-ontleedkunde, Post-ingebruikneming-raamwerk, Voortgesette Gebruik, Saambindende Teorie van Aanvaarding en Gebruik van Tegnologie, Verwagting-bevestiging-teorie van Inligtingstelsels, Grootdata, Staatsondernemings, Datagedrewe Besluitneming.

DECLARATION

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I declare that the above thesis is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

I further declare that I submitted the thesis to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at UNISA for another qualification or at any other higher education institution.

23 April 2022

SIGNATURE **DATE**

DEDICATION

I dedicate this thesis to my wife, Amanda Chihande, my two daughters, Matipa and Mazvita Chihande, and my son, Kunashe Chihande, for their continuous support and encouragement in the pursuit of my dream to accomplish this study. Without their understanding and compromise, I would never have been able to complete this thesis.

I also dedicate this thesis to my mother, Osipitiota Chihande, for being a source of inspiration, pushing me to desire to be a better person.

I also dedicate the thesis to my twin sister, Michelle Chihande, and younger sister, Melody Chihande, for their continuous encouragement and belief in me.

Lastly, I also dedicate this work in memory of my late father, Favour Chihande, who encouraged me to pursue my studies, and for his relentless support to make me the man I am today.

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LIST OF ABBREVIATION

ACL	Audit Command Language
CAATs	Computer Assisted Audit Techniques
CAE	Chief Audit Executive
CU	Continued Usage
ECT	Expectation Confirmation Theory
ECM-IS	Expectation Confirmation Model Information Systems
EE	Effort Expectancy
ERP	Enterprise Resource Planning
FC	Facilitating Conditions
GAS	Generalised Audit Software
GDP	Gross Domestic Product
GRC	Governance Risk and Compliance
IAU	Internal Audit Unit
IIA	Institute of Internal Auditors
IT	Information Technology
IS	Information Systems
ISACA	Information Systems Audit and Control Association
IoT	Internet Of Things
SOE	State Owned Enterprises
SI	Social Influence
TRA	Theory of Reasoned Action
TPB	Theory of Planned Behaviour

UTAUT	Unified Theory of Acceptance and Use of Technology
PE	Performance Expectancy
PU	Perceived Usefulness
PEOU	Perceived Ease of Use

Chapter 1 - Introduction

1.1 Background

This study set out to understand the post-adoption factors which contribute to the sustainable and continued usage of generalised audit software (GAS) by internal auditors in a State-Owned Enterprise (SOE) setting in Southern Africa. Following the appreciation of these factors, a conceptual framework for continued usage of GAS post-adoption was proposed.

1.1.1 Goal of the chapter

The goal of this chapter is to provide the background and context to the study, highlight the problem statement, and articulate the research questions and objectives established to address the identified research problem. An overview of the significance of the study, literature review, the research methodology and ethical considerations will be addressed.

1.1.2 Information Technology

Information technology (IT) has become integral to the strategies that organisations adopt to remain competitive in the global environment. According to Rezaeian *et al.* (2016), the past three decades have been characterised by a quest to implement Enterprise Resource Planning (ERP) software to support core business processes. This remains a key driver of many companies' information systems strategies in both the developed and developing world. In alignment, Daoud *et al.* (2021) mention that "IT has deeply permeated business organisations and has become an important component of conducting business. At present, it is considered as a decisive factor that determines the success of business organisations." In addition, the competitive landscape is being transformed by trending technology topics related to cloud computing, business intelligence, big data, digitisation, and internet of things, which are all contributing to the generation of voluminous data. In the midst of this myriad of technological innovations, Shahimi *et al.* (2016) recommend that in the current complexity and constantly changing business environment, it would be a sound organisational strategy to depend on the value-adding role of internal audit to improve organisational competitiveness. They argue that internal audit is an enabler of business performance and has now gained a more prominent role in the governance of organisations. According to Ahmi *et al.* (2016), due to the rapid development of IT and sophisticated accounting systems, the traditional manual way of performing the internal audit function "around the computer" is unlikely to deliver the expected significant value to stakeholders.

Over a decade ago, Michael (2006) noted that the accounting profession has begun to reconsider what an audit means and how it is carried out due to accelerated information flows and the availability of online real-time enterprise systems. According to Aksoy & Gurol, (2021), "digital transformation is the modification resulting from new opportunities technological advancements in all areas of life presents". They called the new technologies for internal auditors CAATs, which are tools sed to automate audit activities. It is noteworthy to mention that as much as new technologies present potential to generate efficiencies and competitive advantage, they also have the potential downside of exposing organizations to new risks triggered by IT complexity. Militaru *et al.* (2021) explain that the adoption of computer systems, has necessitate the need for the approach to audit to change because of the new ways information will be processed, stored, and presented. They explain that these changes result in changes to the internal control environment, risk assessment methods and procedures to test controls to attain audit objectives.

With this background, it seems reasonable to expect the internal audit profession to have a high adoption and frequent usage of computer-assisted auditing techniques (CAATs), particularly generalised audit software (GAS), to perform data extraction and analysis of transactional data generated by ERPs and other software packages.

1.1.3 Auditing Technology

According to Kelly & Prince (2021) "an information system (IS) collects, processes, stores, analyses, and disseminates information for a specific purpose". They further define the purpose of information systems as technological tools that provides relevant information to a targeted audience timeously in the right format or reports. Using CAATs and GAS, auditors can collect audit evidence and store it in a centralised repository, manage the audit process according to audit standards and produce required reports in an automated and timeous manner to achieve their audit objectives efficiently and effectively. This study with its focus on GAS, is therefore positioned within the context of information systems.

CAATs were broadly defined by Braun & Davis (2003) as the use of any technology to assist in the completion of an audit. This definition includes the use of automated working papers, fraud detection, information retrieval and analysis, computer-based training, and traditional word and excel processing application. Academic research on CAATs adoption dates to the early 2000s with a focus mainly on the motivational factors at the pre-adoption phase for external auditors (audit firms) in developed economies such as the UK and the USA. Nasir (2021) found that the literature on adoption and utilisation of audit software is very limited. According to Bierstaker *et al.* (2014) and Shamsuddin (2015), research on the use of CAATs by auditors is crucial as it is expected to be the solution to improving audit efficiency and effectiveness, more so in this digitalised era. This thinking is supported by both academic studies and surveys done by professional bodies, such as the Institute of Internal Auditors (IIA). Hence the need to expand studies in this area into other geographical locations, specific industry sectors, adoption phases and maturity levels of usage, the current operational environment, and for the internal audit unit as part of an organisation, as opposed to an outsourced service from audit firms.

Lee (2005) asserts that one of the most important CAATs is GAS, which is a class of packaged software that allows auditors to interrogate a variety of databases, application software, and other sources, and then conduct analysis and audit routines on the extracted or live data. This thinking is supported by several other researchers, including Braun & Davis (2003), Ahmi (2012), Nurmazilah, Mahzan & Lymer (2014), and Smidt, *et al.* (2018) who refer to GAS as the most frequently used CAATs. GAS is also loosely termed a data analytic software in both professional and academic environments. Given the significance of GAS as a CAATs tool, this study will focus on GAS rather than a generic study of CAATs to get a larger appreciation of its adoption and the drivers necessary for its continued use at post-adoption phase. The majority of studies the researcher has come across in this area refer to CAATs and are not GAS specific. The researcher is also cognisant of the fact that this can also be influenced by some researchers using both terms, GAS and CAATs, interchangeably, which provides an opportunity for this study to provide further clarifications and distinctions between the two.

Ahmi & Kent (2012) found that well-established GAS tools were available to enable auditors to achieve their objectives more effectively and efficiently. Despite the availability of such technology for many years, both studies by Ahmi & Kent (2012) and Muliawan (2015) on the adoption of GAS have found that there has been a low adoption of GAS by auditors and that it is also underutilised by those who have adopted it. Garven & Scarlatta, (2020) found that internal auditors are not yet fully adopting and leveraging off the use of information technology tools and techniques. According to Li *et al.* (2018), "although internal auditors are increasingly aware of the importance and value of audit analytics, prior research indicates that the use of audit analytics is below expectation". This is aligned with findings from other studies, which have predominantly focused on the developed economies, such as the US and the UK, and have largely focused on external audit, or both internal and external audit from an audit firm's perspective. Ahmi (2012) also found that previous studies have mostly focused on behavioural intention to adopt GAS rather than focusing on understanding the actual use of GAS at the post-adoption phase. Given that the adoption and benefits of GAS are not a new phenomenon the researcher is of the view that future research needs to focus on the actual usage of the technology rather than behavioural intentions, which have been widely explored. Given the little evidence of similar studies being conducted in Africa, this study is set to be done in Southern Africa, focusing on internal auditor's GAS usage at post-adoption phase, specifically for State-Owned Enterprises (SOEs). Previous sector-specific GAS studies have shown interest mainly in the financial sector.

1.1.4 Technology post-adoption

Thong *et al.* (2006) acknowledge that existing literature on IT-adoption has focused on initial adoption decisions and paid less attention to post-adoption decisions in relation to continued or discontinued usage of IT. They assert that it is premature to classify any IT adoption successful until the intention to continue usage of the IT can be confirmed. Kelly (2012) notes that "empirical evidence demonstrates that the benefits of IS often fall short of expectations or fail to materialize". He found that the common reason for this failure was attributed mostly to the underutilisation of IS. In alignment with this finding, Gupta *et al.* (2020), found that the majority of research focused on examining factors that caused the initial adoption of technologies with limited focus on post-adoption behaviours. In support, Zain & Hussin (2019) found in an earlier study that "lack of research in continuance use of IS poses an obstacle in IS usage in an organization". They were of the view that IS continuance (post-adoption) research is insufficient as far as detailed appreciation of drivers of this phenomenon. The researcher shares the same school of thought with a view that it is critical to understand the drivers and factors that impact users' continued usage of GAS technology.

The Expectation-Confirmation Model (ECM) of IT continuance by Bhattacherjee (2001) is a statistically validated model and a key theory that forms the theoretical basis of this study. The ECM posits that an individual's intention to continue IT usage is dependent on three variables: the user's level of satisfaction with the IT; the extent of the user's confirmation of expectations; and post-adoption expectations, in the form of perceived usefulness. This is also supported by a study by Chihande & Van Der Poll (2017) on post cloud computing adoption, which found that users of cloud computing expressed intentions to continue using the technology because their pre-adoption expectations were met and at times exceeded post-adoption.

1.1.5 State-Owned Enterprises

SOEs play an important role in developing critical economic infrastructure, managing state assets, creating equality, and supporting economic growth for the benefit of society. According to Sultan Balbuena (2014), SOEs are at the centre of the majority of Southern African economies' national development strategies. Despite this critical role, SOEs have been associated with inefficiencies, incompetence, and rampant corruption. A recent report by the Mail & Guardian (2017) in South Africa stated that "funding of parastatals is shrinking as concerns over their governance and financial performance begin to hit home amid credit rating downgrades". Based on these challenges, it is the researcher's view that there is a strong case for internal auditors in these environments to adopt and utilise GAS fully, to provide assurance of the internal control environment efficiently and effectively, and to add tangible value that can result in improvement of organisational processes.

This study sets out to assess the adoption and post-adoption usage of GAS by internal auditors in SOEs in Southern Africa. The study will focus on both adopters and non-adopters of GAS, which will provide insight into both pre- and post-adoption perceptions and experiences. The focus will mainly be on post-adoption experiences to determine factors that are necessary for the successful adoption and continued usage of GAS. This study investigated GAS users' post-adoption usage behaviour and user perceptions regarding GAS technology. The outcomes are expected to enrich future discussions by internal audit professionals, software developers, vendors, standards setters, academicians, and researchers to ensure GAS provides tangible value to the profession. The post-adoption experience of GAS users will provide insight into processes and strategies necessary for successful adoption and continued usage of GAS. Based on the findings, a conceptual framework for continued usage of GAS will be proposed.

1.2 Statement of the problem

While GAS holds the promise to improve audit effectiveness and efficiency in this increasingly digitalised world characterised by large volumes of transactional data, previous studies, such as those done by Debreceny *et al.* (2005), Greenstein & McKee (2004), Greenstein *et al.* (2005), Janvrin *et al.* (2008) ,Ahmi (2012), Smidt *et al.* (2018) and Daoud, *et al.* (2021) have found that the audit profession is either slow to adopt GAS technologies or infrequently uses GAS once adopted. Marks (2013) and Garven & Scarlatta, (2020) note that many internal auditors are not using technology to change the practice of internal auditing itself in executing how they understand and monitor risks, plan, and manage their work, test transactions and controls, and communicate the results of their assessments. According to Daoud *et al.* (2021), "the importance of CAATs is widely acknowledged by auditors, however, the current usage of CAATs is not as broad as expected".

If the post-adoption experience of GAS diminishes in comparison to initial pre-adoption expectation, GAS technology will suffer from decreased usage and may subsequently even fall into disuse. According to Zain & Hussin (2019), whilst initial acceptance of an IS is an important step towards the success of IS, the ultimate viability of IS pivot on its continuing use. Given the envisaged benefits of GAS adoption to the internal audit profession, it is imperative that the internal audit profession strives to leverage off GAS technology to provide value and remain relevant to the diverse stakeholders in an environment where matters on governance, risk management and controls are central to the attainment of strategic objectives. The reasons behind the low utilisation of GAS and factors that will drive its continued usage need to be understood.

Against this background, this study sets out to fill the gap by making a critical assessment of the level of GAS adoption in developing countries (Southern Africa) with a specific focus on factors influencing the continued usage of GAS in SOEs at the post-adoption phase.

A conceptual framework for the continued usage of GAS at post-adoption will be proposed.

1.3 Research Questions

The following research questions will be investigated:

I. What are the factors driving the continued usage of GAS technology by internal auditors at the post-adoption phase for SOEs in Southern Africa?

II. What challenges have been encountered with GAS usage in SOEs by internal auditors?

III. What is the extent of the internal auditor's confirmation of GAS achievement of performance expectations (expected usefulness vs perceived usefulness)?

IV. Why are internal auditors slow to adopt or decide not to adopt GAS?

V. What is the state of adoption of GAS by internal auditors in SOEs in Southern Africa?

1.4 Research Objectives

The objectives of the research are to:

I. Establish the level of GAS adoption by SOE's internal auditors in Southern Africa.

II. Establish the level of GAS satisfaction by internal auditors who have adopted the technology.

III. Elicit the reasons for no or slow adoption of GAS by internal auditors.

IV. Identify the challenges experienced by GAS users at the post-adoption phase.

V. Identify the factors and conditions necessary for continued usage of GAS.

VI. Develop a conceptual framework for continued usage of GAS.

1.5 Significance of the study

The researcher has not come across any evidence of previous academic research focusing on the continued usage of GAS by internal auditors at post-adoption. While academic research on GAS is very limited, there have been several surveys carried out by professional bodies to which auditors belong, outlining CAATs usage in practice. The limited academic research on GAS adoption has focused on behavioural intentions and motivations for external auditors (audit firms) in developed economies using the Unified Theory of Acceptance and Use of Technology (UTAUT). It was also found that the majority of such studies were not GAS-specific and refer to the general CAATs technology. This study will provide both practical and theoretical significance as outlined below.

1.5.1 Practical Significance

1. The provision of new data on the status of adoption of GAS by the internal audit functions in a Southern Africa context.

2. The researcher has not come across any evidence of a study either on CAATs or GAS that has focused on SOEs. SOEs play an important role in developing critical economic infrastructure, managing state assets, creating equality, and supporting economic growth for the benefit of society. Unfortunately, according to the Organisation For Economic Co-operation and Development (OECD) (2015), SOEs in South Africa have been associated with inefficiencies, rampant fraud, and corruption. The researcher believes that this is an area in which GAS adoption by internal audit units in SOE’s can contribute tangible value by exposing internal control weaknesses for management to improve.

3. Understanding factors that drive continued usage of GAS technology will be valuable to both adopters and non-adopters of GAS from internal audit units, which should assist in making future informed decisions.

4. Provision of valuable information to software developers, consultants and the related professional bodies who seek to foster an improved environment for the continued use of GAS to improve the effectiveness and efficiency of the internal auditor's assurance role.

5. As emphasised by Thong *et al.* (2006)," The potential benefits from increasing user retention rate can include a substantial reduction in operating costs and possibly a dramatic increase in profits." This implies that it is important to research the factors that influence individuals' post-adoption behaviour of an IT to establish its long-term viability through continued usage. From a more practical level, this study will provide practitioners with insights on how to address customer satisfaction and continued usage behaviour in relation to GAS.

1.5.2 Theoretical Significance

1. A conceptual framework will be developed to support the continued usage of GAS. According to Lindgreen *et al.* (2021), "robust conceptual frameworks play a critical role in advancing academic and practical knowledge".

2. The focus of this study moves away from the common research area of understanding the motivation and behavioural intentions of GAS adoption to the actual usage of GAS by adopters. This is critical in providing insight on actual experiences of GAS in the actual environment at the post-adoption phase.

3. The extension of the ECM-IS model to a GAS context will provide new knowledge to factors driving the continued use of GAS technology.

4. New knowledge will be provided in the context of GAS adoption and usage for internal auditors in developing countries (Southern Africa) focused on the SOE sector. The researcher has not come across prior research on GAS specific to the SOE sector or the Southern African region.

1.6 Literature Review

This section of the chapter is organised into subsections which will provide definitions of key concepts used in the study, an overview of internal auditing, how technology is impacting the profession, and the concept of post-adoption.

Firstly, definitions of key concepts and terms of this study are provided below.

1.6.1 Definitions of key terms used in the study

Computer Assisted Auditing Techniques (CAATs*)* – Broadly defined, they include any use of technology to assist in the completion of an audit. This definition includes automated working papers and traditional word processing applications. (Braun & Davis, 2003).

Generalised Audit Software (GAS) – Ahmi (2012) defined GAS as one of the families of the software that is frequently utilised in CAATs. It is an off-the-shelf package that can provide a means to gain access and interrogate data maintained on computer storage media. It is one of the tools used by IT Auditors to obtain evidence directly from the quality of the records produced and maintained by application systems.

Data Analytics – Wang & Cuthbertso (2015) refer to data analytics as a process by which insights are extracted from operational, financial, and other forms of electronic data internal or external to the organisation.

State-Owned Enterprises (SOEs) – According to Economic Co-operation and Development (OECD), SOEs are enterprises where the state has significant control through full, majority, or significant minority ownership.

Internal Auditing - As defined by the Institute of Internal Auditors (IIA), "Internal auditing is an independent, objective assurance and consulting activity designed to add value and improve an organisation's operations".

IT Governance - Sadikin *et al.* (2014) define IT Governance as a "framework that supports the management of all information resources (human resources, costs, infrastructure) in order to achieve corporate objectives effectively and efficiently".

Performance expectancy (PE) - Venkatesh et al. (2011) defines PE as the degree to which an individual believes that using the system they are considering adopting will help him or her to attain gains in task performance. Venkatesh *et al.* (2011) note that this construct essentially captures users' cognitive expectations about the performance of the system.

Effort expectancy (EE*)* - Venkatesh et al. (2011) define EE as the degree of ease the adopter associates with the use of the system they are considering using.

Social influence (SI) - Venkatesh et al. (2011) refers to SI as the degree to which the individual perceives that important others believe he or she should use the new technology they are considering.

Facilitating conditions (FC) - Venkatesh et al. (2011) refer to the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the technology they are considering adopting.

1.6.2 Internal Auditing

According to The Institute of Internal Auditors (IIA) (2021), the consultative, objective, and independent assurance role of internal auditing, improves organisations' efficiencies. The IIA is an international professional association representing the internal audit profession globally through the provision of best practice guidance and frameworks. Internal auditors, unlike external auditors, are typically employed by the organisations and report to the audit committee within that organisation.

According to Cascarino (2015), the role of internal auditors has been evolving for the past 70 years, from one that mainly focused on providing assurance of internal control structures to one where there is increased expectation to add value as internal control, risk, and corporate governance consultants for the organisation. This evolution into a more advisory role has been necessitated by the increased demand for sound corporate governance processes. Momeni & Nakhaee (2018) had the same finding a few years later; that the role of internal auditors has been continually evolving, with a greater shift towards assurance and consulting services, driven by the need to add more value and enhance organisational performance. The need for internal audit activity has been further propelled by the emergence of larger organisations that are characterised by complex processes and operations.

A study by Hashem *et al.* (2020), which explored the possibility of strengthening the work of internal audit by using information technology (IT), recommends the use of IT to improve the quality of the audit process. In today's digitalised environment, the use of IT is inescapable; hence, in the researcher's view, it is important for internal audits to leverage off technological advances for better efficiencies and effectiveness.

1.6.3 Internal Audit and technology

According to Kassem & Stefan (2019), the use of IT in organisations has been largely related to how transactions are handled, mainly in terms of how it is recorded, processed, and reported on. As a result, a significant number of internal controls for financial data are ingrained in computer program procedures and processes that are written and driven by the IT sector. They found that technology was central to the operations of an organisation, and subsequently, most types of audits would inevitably require a level of IT adoption and integration to be meaningful and effective. Beridze (2017) found that with the increased dependence of organisations on IT systems, it was becoming increasingly essential to perform IT audits for reasonable assurance on the reliability and functionality of these systems. According to Handoko *et al.* (2020) internal audit is responsible for detection and fraud and have to be aware that in the industrial revolution 4.0, fraud is no longer in a manual or physical form. They recommended the use of CAATs by internal auditors to obtain and analyse organizational data which is now in electronic format.

Furthermore, according to Xie (2020), the current digitalised economy means modern organisations are encountering challenges in how to adequately control digital risk. They are of the view that internal audit needs to play an important role in advising and providing assurance on digital risks. In the study, it was found that internal audit is currently trying to keep pace with the development of the digital economy, hence a need for the profession to adapt to this new environment to deliver value. Adoption of both application-level and feature-level audit analytics was recommended as one of the measures of responding to the digital environment. Internal audit can discover high-risk areas by using tools, like GAS, when mining big data relating to operational and financial information.

In support, Lamboglia *et al.* (2021), found that in the past few years there has been an increased academic interest in the study of audit technology impact and adoption. They found that the three main study topics of interest were related to the adoption of continuous auditing and continuous monitoring, the use of software tools in the audit profession and the relationship between information systems and audit. According to Beridze (2017), "Although considerable research exists on IT control and on internal auditing, there is limited study that refers to IT evaluation control activities in the public sector auditing." This study intends to fill this gap by focusing on the use of GAS for assurance in an SOE context.

Despite many studies, such as those by Alkebsi & Aziz (2017), Mokhitli & Kyobe (2019), Pedrosa *et al.* (2020), Kamal & Helal (2020), and Xie (2020), which established that IT provided an opportunity for internal audit to improve performance, it was unexpected that the adoption and utilisation of technology by internal auditors were still lagging. According to Li *et al.* (2018) "Although internal auditors are increasingly aware of the importance and value of audit analytics, prior research indicates that the use of audit analytics is below expectation". Al-Hiyari *et al.* (2019), found the actual use of CAATs by internal auditors in Jordan was below expectations, given the envisaged benefits CAATs can provide to internal auditors. In their study, they found that the importance and relevance of CAATs by auditors were widely recognised, especially given the advantages it provided over traditional manual audits. In contrast to some earlier findings, Awuah *et al.* (2021), in a study on IT adoption within SOE's in Ghana, found CAAT adoption within internal audit units as high, however, the actual usage was found to be very limited.

According to Bradford & Henderson (2017), despite GAS showing its potential to significantly improve the efficiency and effectiveness of audits, many auditors are not using the technology. Ahmi *et al.* (2017), established that the low implementation of CAATs by internal auditors in the public sector was due to high implementation and maintenance cost, limited access of auditee's data, and a preference of auditors to somehow audit manually. They recommended training for auditors and involvement of the head of the internal audit for successful implementation and adoption of CAATs. A recent study by Serpeninova *et al.* (2020) found the most used types of CAATs used by internal auditors as GAS, electronic spreadsheets, and electronic Working Papers.

In alignment, Mohamed *et al.* (2019) were of the view that the internet of things (IoT) was revolutionising the way audit work was executed with data analytics tools enabling auditors to analyse and visualise larger volumes of data.

The adoption of technologies in auditing has been considered for many years as crucial to increasing the efficiency and effectiveness of auditing work. The objective of this study is to propose a conceptual framework for better utilisation and continued usage of GAS post the adoption phase.

1.6.4 Post-adoption of Technology

According to Dube *et al.* (2020), technology adoption is a widely studied area in the information systems (IS) field. They acknowledge that the objective of most studies on technology adoption focused on identifying, predicting, and describing variables that affect adoption behaviour driving the adoption and implementation of technological innovations. In agreement, studies by Rad *et al.* (2017), Oertzen & Odekerken-Schröder (2019), and Cho & Lee (2020) had also found most technology adoption studies to focus on pre-adoption factors. Oyetade *et al.* (2020), state that "technology adoption examines the choices an individual makes in adopting and accepting or otherwise rejecting new technologies". They also found that the studies on predicting the adoption of technology had been done extensively.

According to Gupta *et al.* (2020), extant studies examine the initial adoption of digital technologies with a limited focus on post-adoption behaviours. Their study proposed a novel extended expectation–confirmation model, which explored the impact of pre-adoption expectancies and confirmation of post-adoption satisfaction and continuance intentions. They found that pre-adoption performance influenced consumption-driven confirmation, which in turn influenced post-adoption on perceived usefulness and user satisfaction.

Sobia *et al.* (2017) also found that previous studies had a narrow focus on post-adoption, focusing on continuance intention of technology, as opposed to focusing on the actual continuance usage behaviour. This study will explore both intention and actual usage to get a more holistic view of factors at play at the post-adoption of GAS.

As evident in the prior section, the importance of adopting technology like GAS by internal auditors is a fast-growing need to promote audit efficiency and effectiveness. Despite its growth, little is known about factors that motivate users beyond their initial adoption to engage in post-adoption behaviours, such as continuance intention, as most studies tend to focus on pre-adoption factors and motivators.

1.7 Research Methodology

The previous sections indicated the background to the study, problem statement, research objectives, research questions, and literature review. This section explains the research methodology that was adopted for the study and the approach used to develop the conceptual framework to support the continued usage of GAS post-adoption. A qualitative design was adopted for this study and the researcher was personally involved in the collection of data from participants. Figure 1.1 depicts the research process followed in this study.

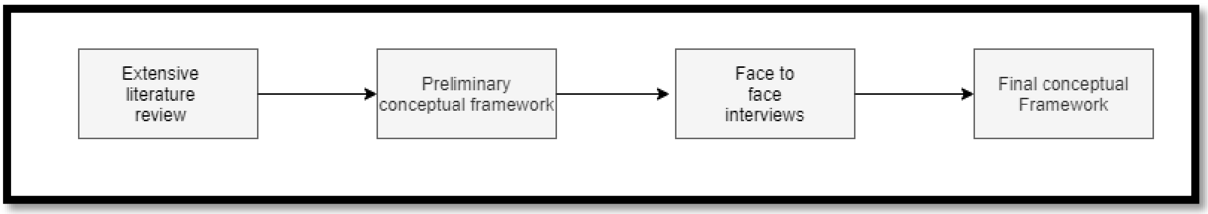


Figure 1.1 *Research process* ***Source:*** *Researcher's own construct*

Figure 1.1 reflects the research process followed, which entailed an in-depth review of literature and face-to-face interviews to inform the development of the conceptual framework. A preliminary conceptual framework was proposed after the review of literature and then later refined when data collected from face-to-face interviews were analysed. The extensive literature review led to the identification of propositions that informed the development of the preliminary framework.

1.7.1 Research Approach

An inductive approach was used to collect and analyse data through the extensive review of literature and interviews, to understand the research context. Propositions and findings from the collected data were adopted to develop and refine the conceptual framework for the post-adoption continued usage of GAS.

1.7.2 Research Choice

A qualitative research design was chosen for this study. The use of the qualitative design was effective in providing the contextual background and a better understanding of the research problem during the review of the literature. Propositions were developed as the literature was reviewed, which resulted in the development of the preliminary conceptual framework. The qualitative data collection method provided the researcher with the opportunity to understand and appreciate the experiences and perceptions of internal auditors in relation to GAS usage post-adoption. The information derived from the qualitative data analysis was useful in providing background and context which informed the proposed conceptual framework.

1.7.3 Time Horizon

The time horizon for this study was cross-sectional in nature, as data were collected from different internal auditors from different SOE organisations, within the same period. The data was collected once, over a short period for analysis and interpretation.

1.7.4 Target and study population

The unit of analysis for the study were internal auditors employed in SOEs within the Southern Africa region. The Head of Internal Audit and IT Auditors of SOEs in Southern Africa were the target population.

1.7.5 Sampling Methods

A non-random sampling technique was adopted to select the sample case study SOEs and participants. The convenience non-random sampling technique that was used to select interview participants was the purposive sampling technique. The researcher was of the view that the purposive sampling technique enabled the non-random selection of cases that were likely to provide the most useful insights to this study. Five (5) case organisations were selected, from which interview participants from the respective internal audit departments were selected. The five (5) case organisations were from the financial, agricultural, and power utility sectors. The organisations were from Zambia, Botswana, and Malawi, which are countries within the Southern African region. The selected countries and SOEs were based on the researcher having readily available access to participants from case organisations deemed relevant from a GAS adoption perspective by the researcher. Given the confidential nature of internal audit work, the researcher considered it important to access willing participants to increase the likelihood of them sharing in-depth information relevant to the study based on trust founded on the relationship with the researcher.

1.7.6 Data Collection Instruments

Two (2) research instruments were used to collect primary and secondary data. Secondary data was collected and reviewed from scholarly articles, peer-reviewed conference proceedings and journals from the internet (Google Scholar), the UNISA Online and physical Library and textbooks. Secondary data was used to develop the preliminary conceptual framework.

Primary data was collected with the use of one-to-one interviews. Semi-structured interviews were used to collect data from sixteen (16) participants. Since the study spanned several geographical locations across Southern Africa, both face-to-face and electronic interviews via web conferencing platforms were adopted to conduct interviews to accommodate participant convenience, preference, and research budget. Both interview methods were effective in collecting data.

1.7.7 Data analysis and interpretation

Data collected were primarily qualitative in nature; therefore, qualitative data analysis methods were employed. A small fraction of quantitative analysis was done to achieve descriptive statistics to provide more context to the background, experiences, and credentials of participating internal auditors. Interpretive techniques were used to analyse and make sense of the qualitative data collected during interviews. The analysis of the qualitative data was inductive in nature, intending to identify propositions, important constructs, possible patterns, and relationships, through a process of discovery.

1.7.8 Ensuring Trustworthiness

Ensuring trustworthiness is crucial for a qualitative study of this nature. The measures adopted by the researcher to ensure trustworthiness were credibility, dependability, conformability, transferability, and authenticity. The different strategies adopted to ensure trustworthiness in each of these areas are described in greater detail in Chapter 3 of this study, which will focus on the Research Methodology.

1.7.9 Ethical Considerations

According to Arifin (2018), “The protection of human subjects through the application of appropriate ethical principles is important in all research study.” The researcher adopted several strategies to safeguard participant anonymity, confidentiality, and to ensure that their participation was informed and voluntary. Greater detail on how each of these strategies was implemented, is provided in Chapter 3 of this study, which addresses the Research Methodology.

1.7.10 Study Delineation

This study focuses on the post-adoption user behaviour and experiences of internal auditors who have adopted GAS technology and were employed by SOEs within the Southern African region. The focus of the study will therefore exclude internal auditors from other geographical regions outside Southern Africa and those employed by other sectors that are not SOEs.

The study will exclude internal auditors who have not adopted GAS technology; therefore, the study does not focus on the factors and behaviours at play at pre-adoption of GAS.

1.8 Outline of Chapters

The chapters to be covered in this study are discussed below:

Chapter 1 focuses on providing the background and overview of the study. The research problem, questions, objectives and key constructs of the study are defined. The significance of the study, an overview of the literature review and the research methodology are provided.

Chapter 2 provides a detailed review of literature concerning main concepts and theoretical frameworks in line with the research objectives. Propositions emanating from the literature review are suggested, which results in the development of a preliminary conceptual framework in this chapter.

Chapter 3 describes and justifies the qualitative research methodology that was adopted for this study. Strategies employed to ensure trustworthiness and ethical considerations are also detailed.

Chapter 4 presents an analysis of the organisations and interview participants that participated in the study, to provide more context and a profile of the targeted study population.

Chapter 5 discusses the findings from the interviews. The findings are presented as themes emerging from the analysis of the data, which inform the refinement and finalisation of the conceptual framework.

Chapter 6 provides conclusions and recommendations in line with the research questions. Future research is also suggested.

1.9 Conclusion

In this introduction chapter, the background to the study on the continued usage of GAS post-adoption was provided. The problem statement, research questions and objectives, significance for the study and key concepts to the study were defined. The qualitative research methodology and a brief review of literature were reported. Strategies for ensuring trustworthiness and ethical considerations were also described.

It was found that the research on the use of CAATs by auditors is crucial as it is expected to be the solution to improving audit efficiency and effectiveness, more so in this digitalised era. GAS, a type of CAATs, is the focus of this study. Past research on technology has largely focused on understanding adoption drivers and behaviours as opposed to the actual usage of technology post-adoption, which is a focus area in this study.

The next chapter will focus on an in-depth review of literature, suggesting propositions and developing the preliminary conceptual framework.

Chapter 2 – Literature Review

2.1 Introduction

In the previous chapter, the background of the study, statement of the problem and research objectives were explored and determined. It was found that the internal audit profession was not utilising GAS to the expected levels, despite the increased awareness of how valuable the tool is to making the profession more effective and efficient. It was also established that most GAS studies have focused on the pre-adoption factors and paid less attention to the utilisation and post-adoption factors. Ethical considerations, the significance of the study, and the structure of the thesis were illustrated.

An in-depth review of relevant literature will be done in Chapter 2, to provide more context to the research objectives of the study. This chapter is organised into key themes of the study, which are the internal auditing profession, the impact of technology on organisations, state-owned enterprises, internal audit adoption and use of technology, and theoretical underpinnings of this study. Propositions in line with the reviewed literature will be identified and used to develop a preliminary conceptual framework for factors driving and supporting the continued usage of GAS post-adoption.

2.2 The Use of Propositions

Propositions were identified in the study while the literature was reviewed. The identified propositions contributed to the development of the preliminary conceptual framework. The propositions were identified and categorised into the following two (2) groups:

i. **Content –** These propositions indicate content of concepts identified while the literature is reviewed. Content propositions are labelled *PC1, PC2, ..., PCj.*
ii. **Association –** These propositions represent the links identified between concepts. Associations are indicated by *PA1, PA2, ..., PAk*.

Identified propositions are highlighted following the relevant literature review section or title and then reflected in the preliminary conceptual framework towards the end of the chapter.

2.3 Internal Auditing

According to Lin & Wang (2011), who adopted the Institute of Internal Auditor's definition, "internal auditing is an independent function within an organisation that checks and evaluates the activities of the organization." The IIA is an international professional association representing the internal audit profession globally through the provision of best practice guidance and frameworks. Razi & Madani (2013) define auditing as an "investigative and regulatory process by which auditors detect fraud and unethical business practice, and check for completeness, accuracy, and deviations from standard accounting procedures." Internal auditors, unlike external auditors, are typically employed by the organisations and report to the audit committee within that organisation. Through the application of a systematic and disciplined approach to evaluate and improve the effectiveness of risk management, internal controls, and governance processes, internal audit contributes towards the achievement of organisational objectives. This implies that when internal audit effectively and efficiently executes its mandate, it provides management and executives with insight and guidelines necessary for the survival of the organisation.

According to Smidt *et al.* (2014), the modern internal auditor now acts as the "eyes and ears" of management and is therefore consulted on aspects related to a company's operations as a trusted advisor. They described the broad role of internal audit as ranging from corporate trainers, internal and external stakeholder advocates, risk managers, controls experts, and efficiency specialists to problem-solving partners. The role of internal auditors has transformed into being one of the custodians of governance structures.

This thinking is also supported by Cascarino (2015), who notes that the role of internal auditors has been evolving for the past 70 years from one that mainly focused on providing assurance on internal control structures to one where there is increased expectation to add value as internal control, risk, and corporate governance consultants for the organisation. This evolution into a more advisory role has been necessitated by the increased demand for sound corporate governance processes. Mohd. *et al.* (2015) note that the IIA has recognised the changing roles of internal auditors as an indispensable cornerstone of effective organisational governance.

Moorthy *et al.* (2011) note that internal audits "are designed to evaluate the effectiveness of an operation's internal controls by first gathering information about how a unit operates." The process follows the determination of potential points of inefficiencies and errors, and then a review of the internal controls designed to prevent or detect such occurrences. Amongst other functions, internal auditors are responsible for reviewing the reliability and integrity of financial and operating information, as well as reviewing operational systems to ensure compliance with policies, plans, procedures, laws, and regulations. Internal auditors, therefore, test the performance of the identified controls to establish how well they work. Mohd (2015) acknowledges that the responsibility of internal audit entails the collection and analysis of voluminous transactional data to provide interpretive reports of relevant business facts that will enable management to keep track of its business development initiatives.

In today's digitalised economy, the operational and financial transactional information that the internal auditor needs to review is generated and managed within electronic systems such as ERPs. As a result, a review of business systems in today's environment is characterised by using appropriate information retrieval and analysis programs and procedures. The fact that today's transactions are growing in complexity and quantity presents challenges for internal auditors who continue to use the traditional manual way of working. Mohd (2015) argues that the traditional way of internal auditors may no longer be suitable for handling these changes. Hence the profession's need to leverage off technology to execute their work more effectively and efficiently.

In alignment with Mohd's (2015) view, Miller (2011) had recommended earlier internal auditors to effectively use data analytic technology for the efficient and effective review of all transactional data, to verify that errors, omissions, and fraud has not occurred. Reviewing electronic information manually by examining paper copies of the transactions is no longer possible nor effective, especially with respect to the need to analyse a hundred per cent of information as opposed to sampling. As organisations are using ERPs and accounting software to process their transactional information, auditors need to focus on computerised internal control systems by testing their accuracy and completeness as part of providing assurance.

The evolution of the internal audit role, to include being more strategic, implies that the role has become central to the organisation’s corporate governance initiatives and is critical in enabling the achievement of strategic objectives. The expectations by various stakeholders of internal audits are increasing in today’s dynamic and complex operating environment, which calls upon the profession to adopt new ways of working to remain relevant and add tangible value. It is, therefore, expected that the profession will not continue to audit “around the computer” but instead adopt technological developments to perform their role effectively and efficiently.

However, surprisingly, recent studies have found this not to be the case, with the profession lagging in the adoption and utilisation of internal audit software. On the back of this, this study sets out to develop a framework that identifies factors that are necessary for the continued usage of GAS. It is expected that the sustainable usage of GAS will enable the internal audit profession to provide valuable insights to the organisation and therefore remain relevant.

The discussion on internal auditing and how the role of internal auditors is evolving led to the first content proposition:

- PROPOSITION PC1: As organisations adopt ERPs and computerized software packages to process their transactional information, internal auditor’s ought to use technology to audit the computerised internal control environment effectively and efficiently.

2.4 Impact of Technology on the Audit Landscape

Dating back to over a decade ago, technology has been significantly impacting the way of doing business at a tremendous speed of change. It has become a driving force of competitiveness in the global market. According to Marks (2013), “New technologies are transforming the world at a constantly accelerating pace, with no end in sight.” The paper refers to IBM’s 2012 Global CEO Study Report, which acknowledges that for the first time since 2004, technology was topping the external forces impacting organisations. At the time of his study, Alles *et al.* (2008) noted that half a century had passed since the original utilisation of computers in business and that from the very beginning the tremendous potential impact of automation on accounting and auditing was understood and brought to the attention of the profession and academia. It was, therefore, the researcher's expectation that by now, a decade later, GAS technology would be fully utilised and integrated into the internal auditor's way of working.

According to Smith *et al.* (2006), the traditional audit trail is diminished or eliminated as information systems become more complex. As a result, the procedures to test the accuracy and reliability of financial information generated by these complex systems require new processes that address the loss of the audit trail. This is supported by Moorthy *et al.* (2011), who comment that most of the information required for auditing is provided by computers and networks in electronic format. They, therefore, suggest that to have effective audits the computer must be adopted as an auditing tool to audit automated systems and data, understand the systems business processes, and understand the environment in which the systems operate.

Alles *et al.* (2006) note that the tremendous scale and scope of adoption of ERP systems since the early nineties has resulted in many companies having automated and integrated business processes. According to Earley (2015), this is resulting in the generation of large amounts of computerised data in organisations which is further fuelled by recent advances in processing speed, cloud storage and the increase of social networks, which enhances data storage and ease of access to that data. In support of this, Tarek *et al.* (2017) report that IT affects contemporary businesses by increasing the ability to store, capture, analyse and process large amounts of information. The auditing profession is therefore impacted in several areas including the planning process, evidence collection, skills required to conduct an audit, the knowledge necessary to perform audit work and the risks encountered by the auditors.

According to Singhal & Pipaliia (2012), technology is not only impacting the way business is done positively but is also increasingly introducing new risks and therefore changing the requirements for a robust internal control environment. He'roux & Fortin (2013) established that because of the significance of IT on every facet of organisational activities, IT governance has gained importance as a key aspect of corporate governance. In a study by Sun *et al.* (2015), they were also cognisant of the fact that the increasing volume of transactions and the digitisation of accounting processes reduce human oversight, which results in increased business risks. Badea & Elefterie (2016) comments that the work of auditors is directly influenced by the organisation's computerised environment, mainly because new opportunities and risks are created by this environment; therefore, new rules regarding security and acceptable gaps will be required.

Razi & Madani (2013) emphasise that IT is central to the running of business processes and, therefore, it is inevitable that IT applications will be used for internal auditing of accounting processes. They acknowledge that audit software is a type of emergent technology, which is critical in promoting good corporate governance, minimising risk, and implementing a system of internal controls within the organisation. In line with this, Vasile-Daniel (2010), in an earlier study, opined that to cope with increased electronic transaction data, financial auditors need to use CAATs to audit complex information systems, such as ERPs*.* Earley (2015) also recommends the use of software to analyse large volumes of data, i.e. data mining tools, as well as the adoption of more sophisticated data visualisation tools to potentially increase the ability to understand the story the data is telling. Tsaia *et al.* (2015) viewed the ability of ERP systems to gather and unify transactional information as an enabler for the utilisation of GAS technology by enabling easier access of data from one integrated source. As evidenced in the literature, many academics have recommended the adoption of GAS technology to the audit profession based on scientific evidence of how it will add value to the process of audit. Despite these recommendations, the researcher found that the actual usage of GAS is not at the pace of technological advancements; hence, it is underutilised. This study sets out to also identify the possible reasons for this.

Singhal & Pipaliia (2012) posit that internal auditors need to recognise and leverage off the capabilities of computers and technology in collecting, generating, and evaluating information for strategic decisions, risk management and controls, and effective organisational governance. They were of the view that enhanced audit effectiveness should improve corporate governance through the increased monitoring, accountability, and accuracy of the organisation's transactions and financial reporting. Data analysis through the adoption of GAS can help auditors meet their auditing objectives, comply with auditing standards, support the enterprise risk management process, uncover fraud and money laundering, recover costs, improve compliance with regulations and provide better insight into business operations and performance.

Internal auditing software such as GAS should therefore be considered as an important factor affecting the performance and relevance of the profession. According to Bierstaker *et al.* (2014) and other information systems researchers (Davis, Bagozzi, & Warshaw, 1989; Venkatesh, Morris, Davis, & Davis, 2003), technology cannot improve performance if it is not consistently and continuously used post-adoption. In support, Mutsapa *et al.* (2017) observe that most of the innovation adoption frameworks in organisations focus and end at the adoption phase. They, therefore, suggest that for an innovation to be acculturated by the organisation, there is a need for the continuous effort of assimilation to further create the impact and value of its usage. This implies that for GAS technology to provide sustainable, tangible value to the relevance of the internal audit profession, it needs to be continually used post-adoption.

The discussions in the above section led to three (3) content propositions:

- PROPOSITION PC2: To cope with the increased volume of electronic transactional data, internal auditors ought to use GAS to audit the complex systems.
- PROPOSITION PC3: Data analytic technology with data visualisation capabilities provide a better understanding of voluminous data for better decision-making.
- PROPOSITION PC4: Digitisation of accounting processes reduce human oversight, giving rise to emerging and increased business risks.

The discussion also led to the following association proposition:

- PROPOSITION PA1: The usefulness of GAS is dependent on the automated and digitalised environment of an organisation, i.e., GAS cannot be used to analyse a manual process.

2.5 State-Owned Enterprises (SOEs) in Southern Africa

Globally, SOEs are referred to by numerous names, including state-owned companies, government corporations, government business enterprises, government-linked companies, parastatals, public enterprises, public sector units or enterprises, and so on. The different naming conventions are, however, consistent in relating SOEs to public entities, which are independent bodies partially or wholly owned by the government. For the purpose of this study, the definition by the Organisation for Economic Co-operation and Development (OECD) is adopted, which defines SOEs as enterprises where the state has significant control through full, majority, or significant minority ownership.

Mustapha *et al.* (2018) noted that SOEs accounted for about 6% of the world's GDP, making them a crucial sector to industrial development. A report by OECD (2014) on the governance of SOEs for Southern Africa states that most Southern African economies have placed SOEs at the heart of their national development strategies. According to Mahadeo & Soobaroyen (2015), SOEs in developing countries play a crucial economic, social, and political role. They remain strategically important for many developing countries and are important influencers in the economy and society. As a result, there is an increasing expectation that they adopt better governance standards. Thomas (2012) supports this in a South African context by highlighting that in the post-1994 democratic era, the government put effort into establishing and safeguarding basic infrastructure, largely through SOEs as ''instruments of social development'' to reflect greater democracy and inclusiveness in the economy that formerly excluded the majority of South Africans. According to Sultan Balbuena (2014), based on data collected by the World Bank just over a decade ago, SOEs accounted for almost 20% of the total non-agricultural economic activities in a typical low-income developing country. The size and significance of the SOE sector in Southern Africa make good governance of these firms critical.

Thomas (2012) reports that given the importance of the role of SOEs in achieving socio-economic objectives of government and their influence on the competitiveness of the country, it is essential that SOEs are well governed with ''prudent accountability and transparency in respect of the management and allocation of valuable state resources." Mbo & Charles (2017) find that despite the publicised inefficiencies and poor performance of SOEs, compelling evidence suggests that SOEs remain relevant in developing countries, typically Sub-Saharan Africa, where SOEs operate virtually in all sectors. Sultan Balbuena (2014) reports that many Southern African economies have placed great value on SOEs for their development strategies, partly due to failures of privatisation and structural reform programs rolled out in the 1990s.

Unfortunately, the most crucial SOEs have experienced major governance failures due to weak accountability, excessive politicisation and unclear objectives.

SOEs in South Africa are criticised over mismanagement, incompetence, poor governance, weak internal controls, and corruption, with examples of entities like South African Airways (SAA), Transnet, Eskom, and the South African Broadcasting Corporation (SABC) faced with challenges and concerns in relation to the legality of multi-billion-Rand procurements. These entities, amongst others, are often headlining the news in the country concerning bad governance. According to The Conversation (19 June 2017), SOEs in South Africa absorb a substantial amount of resources and impose a heavy burden on the fiscus, and their underperformance may spur more credit downgrades.

According to Thomas (2012), governance of SOEs is regulated by the Public Finance and Management Act, as amended (Republic of South Africa, 1999), and the related Protocol on Corporate Governance (Department of Public Enterprises, 2002). Unfortunately, there is little evidence supporting improved governance of SOEs in South Africa resulting from the increased legislative measures. With SOEs playing a vital role in providing citizens with basic infrastructure, utilities and employment, the governance challenge cannot be ignored.

According to Ahmi *et al.* (2014), the internal audit function has a high potential for promoting and improving government performance. They note that governments are making large investments in IT; hence, it is important to reduce risks associated with the use of computers. In alignment with this finding, Malope *et al.* (2021) also found that the Fourth Industrial Revolution (4IR) brought about numerous opportunities for the digitisation of SOEs. They note advanced analytics and artificial intelligence as important 4IR components. With the use of data analytics using GAS, auditors play a critical assurance role in ensuring and monitoring that effective measures are in place to produce reliable data for decision making.

As reported by Mbo & Charles (2017), existing studies on SOEs have taken a rather narrow focus, focusing mainly on the prevailing SOEs' inefficiencies while failing to contribute to a clear understanding of performance drivers in SOEs; which remains a critical gap. It is the researcher's view that the independent assurance and risk management role of internal auditors can contribute to improved performance and efficiencies, reduced revenue leakages and an improved control environment. It is expected that the adoption and frequent usage of GAS by internal auditors will improve the efficiency and effectiveness of executing their role in SOEs by enabling them to have independent and direct access to the data, irrespective of the ERP or information system adopted. This study focuses on SOEs across Southern Africa, identifying and evaluating how GAS is currently being used post-adoption and based on the findings, recommend a conceptual framework to guide and sustain its continued usage, and in turn, contribute to the effectiveness and attainment of strategic objectives by SOEs. The countries that will be covered in this study include Botswana, Malawi, and Zambia.

2.6 CAATs and GAS Technology

According to Lymer et al (2008), the type of CAATs embraced by internal auditors include electronic working papers, fraud detection, information retrieval and analysis, network security, continuous monitoring, audit reporting, a database of audit history, computer-based training, electronic commerce, and internet security. Lin & Wang (2011) refer to CAATs as various tools, technologies, and software that help auditors to conduct control and confirmation tests, analysis and verification of financial statement data, and continuous monitoring and auditing. Another definition of CAATs, by Smidt *et al.* (2014), is a “Computer-based tool and technique that permit auditors to increase their personal productivity as well as that of the audit function.”

From the definition, it can be established that GAS is a type of CAATs technology. CAATs is the use of any technology to execute an audit. This study focuses on GAS technology. According to Kim (2012), auditors utilise GAS technology for data extraction and analysis, fraud detection, internal control evaluation, electronic commerce control, and continuous monitoring. A recent definition by Konthong *et al.* (2016) refers to GAS as “the application software created to read, retrieve, process and store data with the help of functions performing specific audit routines and with self-determined conditions.”

There is a general consensus amongst previous studies, such as by Sayana (2003); Singleton (2006); Alali *et al.* (2011); Ahmi (2012); Nurmazilah, Mahzan & Lymer (2014); Ahmi *et al.* (2016); and Kim *et al.* (2016), that GAS is the most important and common type of CAATs. Lin & Wang (2011) suggest that CAATs technology are mainly used for data analysis, data acquisition, and operation analysis. However, most of the studies have looked at CAATs, whilst this study will focus on GAS as a type of CAAT that is the most important and commonly used. GAS is a type of CAAT that is used for accessing and analysing data from ERPs and other software packages. Several studies, such as Paukowits & Paukowits (2000), Vasile-Daniel (2010), and Alali *et al.* (2011) have referred to GAS as CAATs or have used the term interchangeably. For example, Alali *et al.* (2011) define CAATs as "tools and techniques that directly evaluate the internal logic of an application." This definition refers only to the functionality of GAS but does not broadly define the holistic functionality of CAATs technology. The review of literature has therefore focused on literature on GAS and that which refers to CAATs in the GAS context. The frequent use of the term CAATs when referring just to GAS can also suggest the prominence of GAS as a CAATs tool, such that some definitions of CAATs tend to only focus on the GAS functionality.

Some examples of GAS, as cited by Debreceny *et al.* (2005), are audit command language (ACL), interactive data extraction and analysis (IDEA) and Panaudit Plu. Ahmi & Kent (2013) found IDEA to be the most popular type of GAS adopted by external auditors. Lin & Wang (2011) identified data processing, technical support, service of the software company, and cost as important factors for the selection of auditing software. They concluded from their study that the GAS software preference was ACL, IDEA, and Focaudit based on these factors. According to Alali & Pan (2011), the most prominent GAS tools are ACL, IDEA and Panaudit Plus. Ahmi (2012) refers to ACL, IDEA, TopCAATs, ActiveData for Excel, Panaudit Plus, CA's Easytrieve, Statistical Analysis System (SAS), and Statistical Package for Social Sciences (SPSS) as the variety of commercial GAS tools in the market. This study will also identify the most used GAS by SOEs in Southern Africa and establish the features and characteristics of the preferred tool in that market and how these impact the sustainable use of the tool post-adoption.

According to Debreceny *et al.* (2005), GAS can aid in performing substantive tests to obtain audit evidence. GAS can help to identify material inaccuracies and falsifications in the financials as part of achieving audit objectives of validity, completeness, ownership, and disclosure of the data generated by the accounting system. Some of the tasks that can be performed with the use of GAS to facilitate the audit procedures are re-performing a variety of calculations; exception reporting and identifying unusual transactions; comparing; summarizing or re-sequencing data and performing analysis; duplication detection; ageing analysis of accounts like loans receivables and selecting audit samples for tests of transactions.

Paukowits & Paukowits (2000) note that GAS can aid in the ranking of assertions through the application of analytic functions, such as counting, totalling, stratifying, classifying, and sorting, which can provide valuable insights on risks and the magnitude of the potential exposure to loss. They suggest that risks associated with financial and operating performance represent prime candidates for data analysis with GAS, unlike compliance type exposures whose audit techniques typically involve physical, documentary, and testimonial evidence for drawing conclusions. Audit conclusions for financial and operating performance are typically drawn by forming logical relationships through the review of quantitative evidence. They conclude that the successful application of GAS requires a well-designed and disciplined approach that factors risk into the equation from the very beginning of the audit. This is supported by Alali *et al.* (2011), who recommends the adoption of risk assessment standards that require auditors to adopt a risk-based audit approach, which can be enhanced by the use of GAS when performing risk assessments, to perform preliminary analytical reviews to improve the quality of audit evidence and making audit conclusions less subjective. In addition, the use of GAS is a professionally recommended audit procedure as supported by Mahzan & Lymer (2014).

Vasile-Daniel, (2010) reports that the Information Systems Audit and Control Association (ISACA) recommends the adoption of GAS when performing the following audit procedures:

1. Tests of details of transactions and balances;
2. Analytical review procedures;
3. Compliance tests of IS general controls;
4. Compliance tests of IS application controls; and

5. Penetration testing.

The growing importance of the need to adopt GAS dates to over a decade ago. Singleton (2006) states that no other skill is as impactful and valuable as knowledge and expertise of GAS to an IT Auditor's career. They note that GAS can be adopted for financial audits, operational audits, Sarbanes- Oxley-related tests and anti-fraud audit programs, therefore predicting that future audits will require IT Auditors skilled in the use of GAS. In the South African context, the King Code of Corporate Governance would be an equivalent code to SOX. It is therefore important to emphasise, as supported by Sayana (2003), that despite audit software being provided with many features and capabilities, the technology arguably cannot perform the audit on its own as it depends on the auditor to design the procedures and tests that meet the audit objective. In alignment with this, Paukowits & Paukowits (2000) had highlighted in an earlier study that although GAS facilitates the process of pinpointing likely risk areas, auditors need to be aware that its successful adoption and utilisation is dependent on the creative input and critical thinking abilities of the user. The lack of the necessary analytic thinking, skills, and know-how of using GAS can threaten its continued usage.

The previous discussion, illuminating the significance of the user's skills to achieve meaningful output from GAS, led to the following content proposition:

- PROPOSITION PC5: Successful adoption of GAS depends on the critical thinking abilities of the internal auditor.

The discussion also led to the second association proposition:

- PROPOSITION PA2: GAS users' characteristics and capabilities impact the extent of benefits derived from GAS usage.

Lai *et al.* (2018) found that despite internal auditors being increasingly aware of the value and benefits of audit analytics, prior research indicates that the use of audit analytics is below expectations. In support of this, Al-Hiyari *et al.* (2019) report that the usage of CAATs by internal auditors remains unsatisfactory. Their study recommends that policymakers motivate internal auditors to adopt CAATs by educating them on the benefits of automated tools as well as implementing a reward system to motivate internal auditors to use CAATs. The study by Lai *et al.* (2018) focused on identifying and examining factors at the organisational level that influenced post-adoption usage of audit analytics. Their findings indicated that application-level usage is determined by management support, technological competence, and standards whilst professional help, and application-level usage drive feature-level usage.

The above discussion led to the next content proposition:

- PROPOSITION PC6: Management support ought to be provided to drive and support the usage of GAS.

According to Widuri *et al.* (2016), GAS has been widely adopted in developed countries as part of the auditing systems whilst research on its adoption and impact in developing countries is still in its infancy. This study will fill this gap by contributing to the understanding of GAS post-adoption usage in developing countries, which will contribute to the body of knowledge in this area which is not yet widely researched.

2.7 Benefits of GAS

The expected benefits from the use of GAS can be categorised as follow:

2.7.1 100% Analysis of Data

Sayana (2003) acknowledges that the ability of GAS to achieve 100% scrutiny of transactions was a critical benefit given that data volumes are growing and that there are increased management expectations on the assurances function. According to Singleton (2006), the ability to analyse 100% of the transactional data instead of working with samples is a benefit from the use of GAS as it enables the provision of greater assurance. Because of 100% population analysis of transactional data, the auditor is empowered to have a better sense of the audit direction and procedures. The use of GAS commands such as PROFILE and STATISTICS provides the auditor with an overall understanding of the data. This benefit is further supported by Alali *et al.* (2011), Ahmi & Kent (2013), and Badea & Elefterie (2016), who agree that GAS software enables 100% analysis of the data population at a fraction of the cost of manual testing. Ahmi & Kent (2013) reason that with the growth in the volume of transactions in many businesses, it will not be possible to analyse all the data using manual methods. Smidt *et al.* (2014) agree that the use of CAATs can enable auditors to achieve broadened audit coverage in comparison to the traditional audit procedures.

According to Aksoy & Gurol, (2021) it is recommended for internal auditors to use CAATs to analyse entire data sets, to avoid stakeholders approaching audit results with suspicion or concerns, when drawn from a fraction of the data population.

The above discussion led to the following proposition:

- PROPOSITION PC7: The ability of GAS to achieve a hundred per cent (100%) analysis of large data populations contributes to the perceived usefulness of GAS by internal auditors.

2.7.2 Increased Speed of Analysis

According to Sayana (2003), the fact that 100% analysis of data could be achieved in a fraction of the time required with manual methods, was yet another benefit enabled by GAS. The enhanced audit speeds and efficiency are further enabled by the ability to program (script) in GAS to achieve repetitive analytics. This is supported by Lin & Wang (2011), who note that with GAS, users can leverage off the automation to achieve overall auditing as opposed to sampling auditing. They acknowledge that this capability will enhance the validity of auditing results and at the same time enable expansion of the audit scope to focus on high-risk areas. Singleton (2006) and Badea & Elefterie (2016) emphasise the ability to use a single command to run a sequence of tests as a major benefit of GAS, which automates the execution of numerous instructions at the click of one button. Increased speed of analysis means internal auditors can achieve more with less or similar resources and, therefore, can expand the coverage of their audit plans, which translates to increased confidence in the assurance process as well as the delivery of higher value to stakeholders. Automation achieved by GAS will therefore shorten the time required for auditing which also achieves cost-effectiveness.

The preceding discussion gave rise to the next content proposition:

- PROPOSITION PC8: Adoption of GAS by internal audit units (IAU) increases the speed of performing analytic work enabling them to achieve an expanded audit scope in a given period.

2.7.3 Ability to Analyse Data from Multiple formats

Sayana (2003) refers to the capability of GAS to analyse data regardless of the data formats or the underlying technology used by the ERP or transactional software as a benefit. Internal auditors must access data from different data sources that their various organisations have adopted. The ability of GAS to access data from a wide range of ERPs and data sources makes the technology dynamic enough to be used in different technological environments. For example, ACL can directly access data from ERPs and accounting packages, such as Oracle, SAP, Sage, Navision, Microsoft Dynamics, Salesforce, etc.

The above discussion led to the following content proposition:

- PROPOSITION PC9: The ability of GAS to connect to multiple data sources increases its perceived usefulness by IAU.

2.7.4 Read-Only Access

Singleton (2006) comments that once data is in ACL, a type of GAS, it is locked as read-only. This is a benefit of GAS as it does not provide the opportunity for the data to be changed or manipulated. This is also supported by Konthong *et al.* (2016), who comments that data in GAS is locked down as read-only to protect the authenticity of records. Ahmi & Kent (2013) comment that data in GAS is usually read-only, making it impossible for the auditor to unintentionally change the data as they work. Therefore, the benefit of this feature is that it ensures that the integrity of the data is preserved during analysis and not subject to erroneous or deliberate human manipulation.

The discussion resulted in the identification of the tenth content proposition:

- PROPOSITION PC10: The read-only access capability of GAS increases the perceived usefulness of GAS to IAU.

2.7.5 Audit Trail

The ability of GAS to maintain an audit trail, which is the automatic recording of commands run for a data analytic test that forms part of the working papers, was noted as a benefit of GAS by Singleton (2006) and Badea & Elefterie (2016). This was also supported by Ahmi & Kent (2013) who identified the ability of GAS software to maintain an audit trail as a benefit that enables logs of tests done by the auditor to be reviewed by peers and seniors. Advanced features of GAS can then further allow programming of tests (scripts) to perform repetitive analysis, which enhances audit speeds and efficiencies. They however mention that it appears it is mostly IT auditors who realise the advanced benefits of GAS, especially those who are familiar with IT. It is easier for these auditors to be trained in the use of GAS with the key component of the training focused on encouraging them to "think outside the box" to identify the tests they can build with the GAS commands.

The preceding discussion gave rise to another content proposition:

- PROPOSITION PC11: The capability of GAS to maintain an audit trail increases the perceived usefulness of GAS to IAU.

2.7.6 Support auditor independence

According to Lin & Wang (2011), a benefit of GAS is leveraging off the automation to achieve overall auditing as opposed to sampling auditing. This implies auditors can have greater independence and be less dependent on information and communications technology (ICT) personnel to achieve their audit objectives. According to Badea & Elefterie (2016), the fact that GAS technology is read-only ensures the GAS system is independent of the system being audited as it prevents any opportunity for corruption of the company's data. Internal auditor's need to be independent of any external influences when they execute their mandate so that they can provide independent assessments and assurance. With GAS technology, the internal auditor will have the independence to access the necessary data from the ERP system without depending on a third party to make it available to them. Data is a key component of testing controls subjectively and getting visibility into the high and potential risk areas of an organisation.

Moorthy *et al.* (2011) summarise the following as key reasons for the adoption of audit tools and software:

1. On a personal level, learn a new skill.
2. Improve company decision-making using improved data.
3. Increase the efficiency of an audit.

4. Reduce routine tasks to provide more time for creative and business analysis.
5. Provide improved transparency governance of the organisation.
6. Identify quantitative root causes for issues.
7. Reduce fraud and abuse.
8. Identify savings in supplier, customer, human resource, computer, and enterprise management.

The above pointers are benefits that GAS technology can provide once adopted and fully utilised in a continuous manner. It is the researcher's view that these benefits are significant considering the increased expectation of internal auditors by stakeholders in a digitalised economy where there is a high dependence on data and information for decision-making. The benefits GAS can provide also provide an opportunity for the internal audit profession to leverage off, to provide more value and, therefore, remain relevant. On the back of this, the researcher sets out to develop a conceptual framework for the continued use of GAS at the post-adoption phase, with the belief that it will benefit the internal audit profession as well as GAS vendors to build sustainable strategies.

The summary discussion on the benefits of GAS led to the below propositions:

- PROPOSITION PC12: IAU should adopt GAS to enhance its independent assurance role.
- PROPOSITION PC13: IAU should adopt GAS to automate repetitive data analytic work for increased value delivery in a digitalised environment.

2.8 Internal Audit Adoption and Use of GAS

According to Sayana (2003), over a decade ago, large, and medium enterprises already had most of their business processes driven by computers. He suggested that performing an audit without the adoption of information technology was not an option for the achievement of an effective and efficient audit. This was supported by Ahmi & Kent (2013), who observed how auditors' adoption of technology had transformed over the decades in response to the evolutionary impact of technology on the business environments. Auditors who fail to keep pace with these changes are unlikely to achieve effective and efficient work. Vasile-Daniel (2010) highlighted that IT complexity affected the nature of audit testing which therefore required financial auditors to adopt GAS especially when auditing organisations with ERP systems. Lin & Wang (2011) refers to the fact that in the knowledge-based economy, auditing is gradually transforming from manual to computer-assisted operations.

Razi & Madani (2013) note that auditing is a very time consuming and resource-intensive process. Because of resource constraints, organisations tend to only audit a small portion of business units. However, the availability of CAATs can make the audit process efficient and less labour intensive. The concept of the internal audit profession using technology to improve effectiveness and efficiency has been around for years. According to Alles *et al.* (2008), the potential impact of audit automation on the audit process was originally researched by Vasarhelyi (1984), which is now over two decades ago. The author adds that empirical studies at the time of his research had already shown that IT-enabled audit automation indeed led to significant productivity gains.

The importance of audit automation and adoption of IT in audits has progressed due to both technological developments and changing regulatory environment. According to Alali *et al.* (2011), audit and risk assessment standards encourage the use of CAATs and GAS to conduct audits. Several studies, such as those by Shamsuddin *et al.* (2015), Kim *et al.* (2016), Elefterie & Badea (2016), and Tsaia *et al.* (2015) have shown that the deployment of IT and decision support systems to automate certain parts of the audit process usually results in a better controlled, higher quality audit. According to Mahzan & Lymer (2014), the adoption of CAATs by auditors is a professionally recommended audit procedure.

Coderre (2009) found that the use of technology for audit gained considerable ground from the year 2000 because of legislation such as Sarbanes-Oxley (SOX). The use of data analytics provided much-needed efficiencies, reducing the overall SOX compliance costs, and expanding the scope and reliability of audit tests. In South Africa, the King Report of Corporate Governance was introduced in 1994, which also put the focus on the importance of internal audits. According to the King IV Report on Corporate Governance for South Africa (2016), disruptive technologies, such as robotics, artificial intelligence, biotechnology, etc., are impacting industries and business models significantly, therefore, driving the Fourth Industrial Revolution. They report that technological advances, such as the internet of things (IoT), generate a large volume of data, which has led to the adoption of more sophisticated analytics that converts data into deep insights that inform human and organisational behaviour. According to Barua *et al.* (2010), the role of internal audit has evolved towards taking leadership in implementing effective governance and controls. A study by Alles & Gray (2016) refers to a prediction by EY, which states that the nature of future audits will significantly differ from the traditional audits, largely due to the evolution of technology and analytics. Auditors who can leverage off these new technologies will be better positioned to understand the business, identify risks, and deliver additional insights.

A study by Braun & Davis (2003), which surveyed governmental auditors on their perception of GAS, identified that a high percentage of responses associated the adoption of GAS with improved effectiveness and efficiency. Despite these high responses implying that GAS is beneficial, there was a misalignment when it came to the assessment of actual GAS usage and realisation of tangible benefits, with the confidence level reducing at the post-adoption phase. This poses a risk to the continued usage of GAS as this implies that user expectations are not realised at the post-adoption phase.

A study by Debreceny *et al.* (2005) on the nature and extent of utilisation of CAATs by financial institutions in Singapore found that internal auditors were not using GAS as part of their regular work but rather as a tool for special investigations. The external auditors for the same institutions made no use of GAS because they did not find it applicable to the nature of the testing they were doing and were also limited by the quality of computerised internal controls maintained by the banks they were auditing. The study concludes that bank auditors in Singapore do use GAS but only to a limited extent. In alignment with this finding, Ahmi & Kent (2013) observed that despite the greater promotion of benefits provided by GAS, auditors did not seem interested in this tool, as supported by the evidence that auditors had not adopted GAS extensively. Razi & Madani (2013) also found that the pace of IT penetration in accounting audit processes had been slow, with research in this area few and far between.

Despite previous literature suggesting the need for internal auditors to adopt technology to remain relevant and add more value, previous studies argue that the adoption and usage of technology by internal auditors is not at the expected rate. Debreceny *et al.* (2005), Janvrin *et al.* (2008), Smidt *et al.* (2014), Ahmi *et al.* (2016) and other earlier researchers have found that GAS acceptance is fairly low. In contrary to this Awuah *et al.* (2022) found adoption of CAATs in Ghana to be high, however the actual usage across various use cases like risk assessment, fraud detection, substantive testing, and analytical procedures as still low. According to Mahzan & Lymer (2014), the usage of GAS has evolved over time, but evidence has found the pace of growth and extent of its use has not kept pace with the developments of the underlying businesses they audit. Smidt *et al.* (2014), who focused on internal auditors in the banking sector in South Africa, found that audit sampling is still used more frequently compared to GAS, despite the increasing volumes of transactions that banks process daily. Alles (2015) observes from history that the audit profession is seemingly slow to adopt technological changes, such as the computer and the internet, and predicts the same outcome in relation to the use of Big Data. They are, however, cognisant of the fact that auditors have begun to use GAS and, therefore, the importance of encouraging GAS use continuously and to a greater extent to achieve tangible benefits. Against this background, this study seeks to understand the underlying factors that influence its continued usage at the post-adoption phase, and from this, develop a conceptual framework that will support the sustainable adoption of GAS technology for the internal audit profession.

According to Bierstaker *et al.* (2014), Tsai *et al.* (2015), and Kim *et al.* (2016), audit standards suggest that auditors should use GAS for testing data and evaluating risk. However, they still found that few studies have examined the adoption of GAS, especially regarding the use of auditing software and its significance to the performance of the function. Despite the benefits of the adoption of GAS, most studies have found that the internal audit profession is either not adopting or are underutilising GAS. Coderre (2015) suggests that data analytics is no longer just a “nice to have” for internal auditors who need to have insight into diverse information for testing purposes. Leveraging off GAS provides internal auditors with the ability to provide hindsight, oversight, insight and foresight and a data-driven perspective of the audited entity and associated risks. However, he observes that study after study, GAS usage falls consistently below what is desired, whilst in practice, the use of GAS has distinct advantages. This brings about the concern of why this is the case and what needs to be done to ensure the continued and more effective adoption of GAS.

According to Bhattacherjee (2001), numerous studies have focused on and examined variables that motivate individuals to accept a new IS and the process of adopting the new technology. Susanto *et al.* (2016) also found that most literature on IT adoption and use focuses on initial adoption. This is also the case with most studies on the adoption of GAS that the researcher came across. While initial acceptance of IS is an important first step toward realising IS success, the long-term viability of an IS and its eventual success depends on its continued use rather than initial use. This study, therefore, sets out to identify the factors necessary for the continued use of GAS. If the post-adoption experience of GAS diminishes in comparison to initial pre-adoption expectation, GAS technology will suffer from decreased usage and may even fall subsequently into disuse. Its disuse threatens the existence of GAS vendors, which means a lack of realisation of return on investment (ROI) by auditors who have already taken the first step and ultimately a loss of opportunity by the internal audit profession to meet stakeholder expectations and provide more value in the current digitalised economy.

The discussion led to the development of two (2) content propositions:

- PROPOSITION PC14: Audit standards recommend that auditors should use GAS for testing data and evaluating risks.
- PROPOSITION PC15: The evolution of technology and analytics in the Fourth Industrial Revolution is driving the need for IAU to use GAS for better insights into risks and the internal control environment.

The discussion also led to the development of two (2) association propositions:

- PROPOSITION PA3: Audit standards by internal audit professional bodies ought to play a role in driving the adoption of GAS by the profession.

- PROPOSITION PA4: The digitalisation of the internal and external environment is driving the need for internal auditors to adopt GAS to be effective and relevant.

2.9 Studies on GAS Adoption

With the evolution and growing importance of the internal audit role towards the achievement of corporate governance in a highly competitive environment, this study will focus on internal auditors. The researcher found that most academic literature on GAS has focused on external auditors in audit firms. Several of the few studies that focused on internal auditors were done in a developed country context, focusing on the motivational factors or behavioural intentions at the pre-adoption phase. None of the studies the researcher came across, focused on SOEs but have been generic across the different market sectors. The researcher also found no evidence of previous research on GAS usage by internal auditors in SOEs in a developing country focusing on the post-adoption phase, intending to establish a conceptual framework for the continued usage of GAS. Table 2.1 provides a summary of the studies on GAS that the researcher came across and provides evidence that the majority of these studies focused on pre-adoption studies, when compared against those focus on post-adoption. This study, therefore, sets out to address this gap.

Table 2.1 portrays the gap in literature as identified by the researcher from the literature review.

Research Paper & AUTHOR	Year of study	For Internal Audit	External Audit (Audit Firm)	Internal & External	Country	Sector	CAATs OR GAS	Model	Pre-Adoption	Adoption /Usage
Computer-assisted audit tools and techniques: analysis and perspectives. (Robert L. Braun)	2003	X			USA		GAS		X	
Employing generalized audit in the financial services sector: Challenges and opportunities. (Roger Debreceny)	2005			X	Singapore	Financial	Both		X	
Adoption of Computer Assisted Audit Tools and Techniques (CAATTs) by Internal Auditors: Current issues in the UK. (Lymer, Nurmazilah Mahzan and Andrew)	2008	X			UK		CAATs	UTAUT	X	

Research Paper & AUTHOR	Year of study	For Internal Audit	External Audit (Audit Firm)	Internal & External	Country	Sector	CAATs OR GAS	Model	Pre-Adoption	Adoption /Usage
An examination of contextual factors and individual characteristics affecting technology implementation (Mary B. Curtis, Elizabeth A. Payne)	2008		X				CAATs	UTAUT	X	
Auditor Acceptance of Computer-Assisted Audit Techniques (Diane Janvrin, D. Jordan Lowe, James Bierstaker)	2008		X				CAATs	UTAUT	X	
Discussion of "An examination of contextual factors and individual characteristics affecting technology implementation decisions in auditing" (Rowe, Rob)	2008		X				CAATs		X	
HOW FINANCIAL AUDITORS USE CAATs AND PERCEIVE ERP SYSTEMS? (Vasile-Daniel, Cardoş)	2010	X			Romania		CAATs			
A selection model for auditing software (Ching-Wen Lin, Chih-Hung Wang)	2011									
USE OF AUDIT SOFTWARE: REVIEW AND SURVEY (Alali, Fatima A; Pan, Fang)	2011		X		California		CAATs			X
Adoption of Generalised Audit Software (GAS) by External Auditors in the UK (Ahmi Aidi)	2012		X		UK		GAS	IT audit quality		X
An analysis of attributes that impact adoption of audit software: An empirical study in Saudi Arabia" (Muhammad A. Razi, Haider H. Madani)	2013				SAUDI ARABIA (SEMI-DEVELOPED)		CAATs		X	
Examining the adoption of computer-assisted audit tools and techniques: Cases of generalized audit software use by internal auditors" (Nurmazilah Mahzan, Andy Lymer)	2014	X			UK		GAS		X	
IT adoption by internal auditors in public sector: A conceptual study (Aidi Ahmi, Siti Zabedah Saidin, Akilah Abdullah)	2014	X			Malaysia	Governm ent	CAATs	TOE	X	
Modeling voluntary CAAT utilization decisions in auditing (Mary B. Curtis, Elizabeth A. Payne)	2014		X				GAS	UTAUT		

Research Paper & AUTHOR	Year of study	For Internal Audit	External Audit (Audit Firm)	Internal & External	Country	Sector	CAATs OR GAS	Model	Pre-Adoption	Adoption /Usage
What factors influence auditors' use of computer-assisted audit techniques? (James Bierstaker, Diane Janvrin, D. Jordan Lowe)	2014		X				CAATs	UTAUT	X	
UTR-CTOE: A New Paradigm Explaining CAATs Adoption (Mootooganagen Ramen, Bhavish Jugurnath)	2015		X				CAATs	UTR-CTOE	X	
Computer Assisted Audit Techniques and Audit Quality in Developing Countries: Evidence from Nigeria (OMONUK JB, ONI AA)	2015		X		Nigeria		CAATs			X
FACTORS INFLUENCING USAGE LEVEL OF COMPUTER ASSISTED AUDIT TECHNIQUES (CAATs) BY INTERNAL AUDITORS IN MALAYSIA (Amanuddin Shamsuddin, Logenthiran Rajasharen, Dhinesh Maran, Mohamed Feyas Mohamed Ameer, Punnir Maratha Muthu)	2015	X			Malaysia		CAATs	UTAUT	X	
Adopting generalized audit software: an Indonesian perspective (Rindang Widuri, Brendan O'Connell, Prem W.S. Yapa)	2016		X		Indonesia		GAS	TOE	X	
Inhibitors and Enablers of GAS Usage: Testing the Dual Factor Theory (David L. Henderson, Marianne Bradford, Amr Kotb)	2016	X	X				GAS	DUAL FACTOR	X	X

***Table 2.1** GAS Research Papers Literature Review Matrix* ***Source:** Synthesised by the researcher*

As shown by Table 2.1, the majority of studies on GAS, such as by Lymer *et al.* (2008), Janvrin *et al.* (2008), Bierstaker *et al.* (2014) and Zainol (2017), have used the Unified Theory of Acceptance and Use of Technology (UTAUT) to understand the intention of auditors to use GAS at the pre-adoption phase. This is supported by Ahmi & Kent (2013), who found that most studies have focused on behavioural intention as to what has been explained in UTAUT, Theory of Planned Behaviour (TPB) and Technology Acceptance Model (TAM), as opposed to understanding the actual and continued usage of GAS. Kim & Crowston (2011) also found that most initial post-adoption studies adopted similar theories used in the adoption studies such as the TAM, Theory of Reasoned Action (TRA) and UTAUT. The researcher is of the view that adoption and post-adoption are two different constructs. Therefore, the use of the same theories to assess factors at play in the two phases may not be ideal to comprehensively capture all issues at play. Consequently, this study will adopt the extended expectation-confirmation model of information system (ECM-IS) and UTAUT as the theoretical frameworks from which insight will be provided to develop the conceptual GAS post-adoption framework.

Ramen & Jugurnath (2015) claim that one of the most mature research areas in the information systems literature is that of explaining auditor acceptance of technology. Much research has focused on the adoption of IT with a significantly lesser number focused on the post-adoption and continued usage of IT. Ahmi *et al.* (2014) provide examples of the available theories used in studying IT adoption, including TAM by Davis (1989); the Technological-Organisational-Environmental (TOE) framework by Tornatzky and Fleischer (1990); the TPB by Ajzen (1991); the diffusion of innovation (DOI) theory by Rogers (1995); and UTAUT by Venkatesh, Morris, Davis and Davis (2003). These theories have been adopted for several GAS studies at the pre-adoption phase to understand the factors that influence and motivate the adoption of this technology.

A study by Lymer *et al.* (2008) demonstrates that the two constructs from UTAUT that have the most influence on internal auditors' motivation to adopt CAATs were performance expectancy (PE) and facilitating conditions (FC). Several studies following this research, such as by Janvrin *et al.* (2008) , Mahzan & Lymer (2014) and Damer *et al*. (2021), support that PE and FC are the biggest influencers for the adoption of CAATs and GAS. According to Shamsuddin *et al.* (2015), effort expectancy (EE) is the most influential factor that affects the usage level of CAATs by internal auditors in Malaysia as compared to other factors, such as PE, social influence (SI) and FC. Kim (2012) had found in an earlier study that perceived usefulness had more influence on technology acceptance when feature complexity was low, and perceived ease of use had more impact on feature acceptance when feature complexity was high. GAS technology is high in feature complexity as evidenced by the complexity challenge identified in literature, which, therefore, implies perceived ease of use should have a significant impact on audit technology acceptance.

However, all factors were found to have a positive impact on the usage level of CAATs. Based on some studies, internal auditors have referred to GAS as a complex tool to use, believing that IT auditors are more likely to find it easier to use the tool. Ahmi (2012) found that despite auditors recognising the advantages of GAS, the low adoption or usage could be explained by what they believed to be the significant learning curve and lack of ease of use, which influences the EE construct.

Lymer *et al.* (2008) developed a model for the successful adoption of CAATs based on the UTAUT. In the researchers view the model captures the important factors that drive CAATs adoption at the pre-adoption and adoption phases. However, the researcher is of the view that an expansion of factors impacting and driving post-adoption of GAS would be beneficial. The framework is shown below in Figure 2.1.

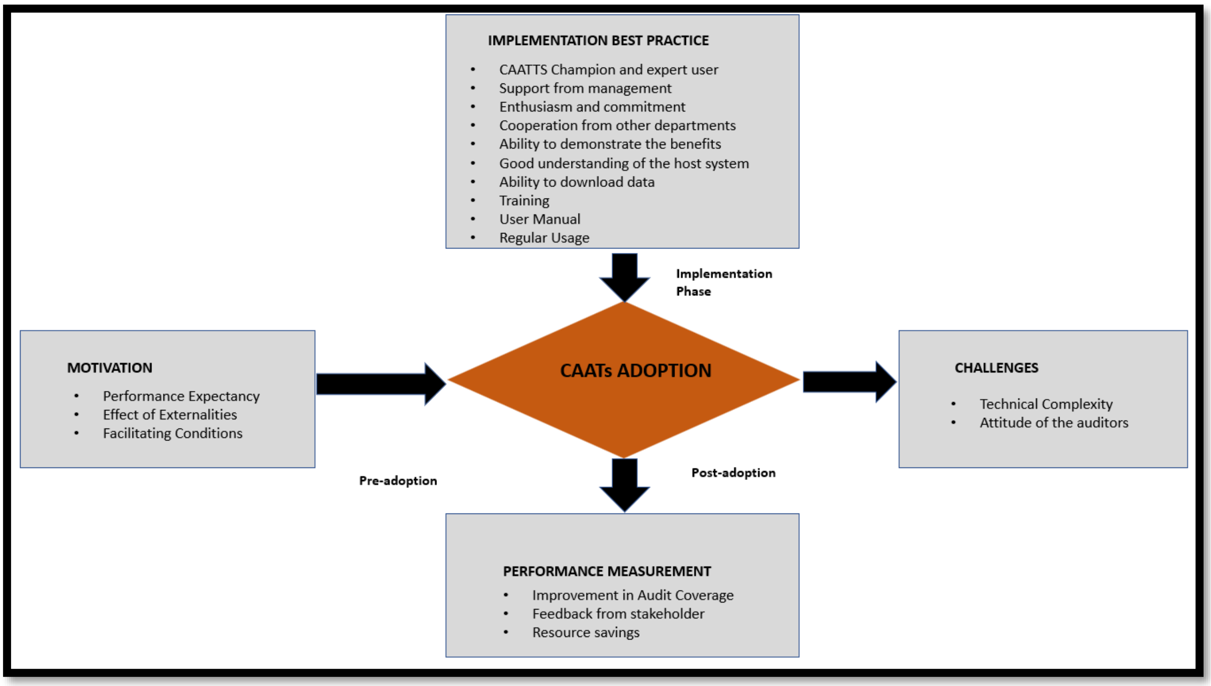


Figure 2.1 *Framework for CAAT Adoption* ***Source:*** *Lymer, et al. (2018)*

The model in Figure 2.1 has formed the basis of most auditors' GAS adoption. This model consists of four dimensions that address issues of factors influencing motivation, best practices of implementation, performance measurement criteria and challenges that can become barriers to successful implementation. At the time of this study, the finding was that there was only a limited number of academic studies that focused on understanding the issues concerned with GAS adoption, more so with respect to internal auditors. Lymer *et al.* (2008) identified three top factors that influence the decision to continue or discontinue usage of GAS as the ability to train employees on the software usage, compatibility of the software with other organisational systems, and the ability of software to meet the data manipulation needs of the user department. From the study sample, it was found that approximately 60% of the respondents were utilising less than 10% of their billable time (time counted in budgeted hours worked) on using GAS. Their research model presented three post-adoption considerations under the dimension of performance measurement:

- ✓ Adopters can measure the success of the adoption by looking at the improved audit coverage;
- ✓ Performance can also be evaluated through the feedback received from stakeholders; and
- ✓ Specific resource savings may be quantified by looking at the financial savings due to the reports generated by using GAS. For example, reports on duplicate unpaid invoices can avoid double payments of the same invoice.

In this study, these factors will be considered to understand the perceived usefulness (PU) of GAS in the view of the GAS users who will participate in the interviews at the data collection phase.

A study by Lin & Wang (2011) identified data processing, technical support and service of the software company, and cost as important factors for the selection of auditing software. The researcher is interested to identify how these factors impact the continued usage of GAS post the adoption phase from an FC perspective. The factors from this study of interest are summarised in Table 2.2.

CRITERIA	FACTOR
Technical support and service of the software company	• Technical support • Education and training • Operating manual
Cost	• Purchase cost

CRITERIA	FACTOR
	• Maintenance cost • Employee training cost
System function	• System requirements • Operating interface • Data storage • System stability • System security
Data processing	• Processing speed • File support • Data accuracy • Auditing trail • Complex transaction • Processing capabilities

Table 2.2 *Factors that should be considered for selecting auditing software* ***Source:*** *Lin & Wang (2011)*

The researcher believes the factors listed in Table 2.2 contribute to the facilitating conditions necessary for the continued usage of GAS. Without the budget, support and access to the data sources, GAS technology cannot be used effectively or efficiently.

Consequently, the following content propositions were constructed:

- PROPOSITION PC16: Technical support from the GAS providers is important for the continued usage of GAS.
- PROPOSITION PC17: Sufficient budget provision for the ongoing maintenance and support of GAS is required for the successful, continued usage of GAS.

According to Vasile-Daniel (2010), the factors that may influence the use of CAATs are computer knowledge expertise and experience of the auditor, the efficiency and effectiveness of using CAATs over manual techniques, time constraints, and level of audit risk. They found that Romanian financial auditors were not using CAATs to the expected level. Widuri *et al.* (2016) used the technology, organisation, and environment (TOE) framework to identify key factors driving auditors' adoption of GAS. This framework looks beyond the individual perspective to that of the organisation. The findings of this study identify several new GAS adoption factors as being influential, namely language compatibility and regulatorprofessional body support, yet these factors are not emphasised in prior research. While the TOE framework assumes that the influence of technological, organisational, and environmental factors on technology adoption is relatively even, the findings indicated that environmental factors had a greater influence than other factors. This study will focus on the individual perspective as opposed to the organisational perspective that the TOE focuses on; hence, the UTAUT model will be a key theoretical model underpinning this study. This study will look at professional body support from the perspective of SI on individual auditors' acceptance and usage of GAS.

According to Vasile-Daniel (2010), a few research papers describe describing the extent of CAATs use in the audit practice, which is the motivation for this study. Alali *et al.* (2011), in their study on financial institutions, identified that there were different levels of usage of GAS with the technology mostly used for special investigations rather than for the routine audit procedure. In support of this, Bierstaker *et al.* (2014) and Kim *et al.* (2016) found that recent research suggests that CAAT use is low.

Ahmi & Kent (2013) explored the current usage of GAS to understand factors that influence the use of GAS as well as the perception and expectations of using GAS amongst audit firms in the UK. They found that almost 73% of external auditors do not use GAS at all and they attributed this to the low perceived benefit of using GAS for auditing small clients. High implementation costs, the significant learning curve and adoption process, and lack of ease of use of GAS also contributed to the low adoption. They also report that the auditor's' perception also influenced the use of GAS and provided an example of how auditors who attended an audit software course were more likely to use GAS.

Henderson *et al.* (2016) investigated the enablers and inhibitors of GAS usage using the dual-factor theory model. The results of the study suggest that even after controlling of mandatory usage, inhibitors can still negatively affect GAS usage and negatively influence enablers. Inhibitors are factors that discourage system usage when present but do not necessarily encourage usage when absent, for example, system problems and perceived threat. The study concluded that overcoming inhibitors may be necessary for enablers to substantially affect usage, and mandating usage may not be enough to obtain complete and continued usage.

In a study by Kim *et al.* (2016), they comment that despite widely adopted IT systems in today's businesses, the envisaged benefits of GAS and the support given by audit standards to employ GAS, it is surprising its adoption remains low. Their paper explored the actual usage of GAS among Egyptian external auditors using the TAM. They found that Egyptian external auditors had a different usage behaviour compared to internal auditors. They concluded that the external auditors were more influenced by perceived ease of use (PEOU) and not by perceived usefulness (PU), while both PU and PEOU are important in the context of internal auditors. The ECM-IS post-adoption model the researcher intends to adopt for the research framework does not consider PEOU as a construct that contributes to the continued usage of IS. However, as highlighted in this literature, PEOU is important in the context of internal auditors' usage of GAS; hence, the researcher intends to incorporate this construct into the proposed conceptual framework.

2.10 Challenges with GAS Adoption

Adoption of GAS has been associated with several challenges, which either affect its initial adoption, full utilisation at adoption, or threaten its continued usage at the post-adoption phase. Sayana (2003) suggests that when audit software is deployed initially in an organisation, it will not be without challenges. It is important that these pains are identified, and from understanding them, best practice strategies are developed to address them. This study sets out to understand the challenges GAS users are encountering post-adoption, and from there, propose a conceptual framework that addresses these concerns and supports the sustainable usage of GAS technology for internal auditors. The challenges identified in the literature can be categorised as follow:

2.10.1 Access to production Data

A study by Sayana (2003) and Debreceny *et al.* (2005) highlight the reluctance of IS staff to accept GAS usage as a challenge because of their concerns that systems and data may be compromised by its use. Such fears and resistance result in the internal audit team being denied direct access to the production data. When internal auditors are unable to access data directly from the data source, the benefits of independence and data integrity provided by GAS fall away, which is likely to impact the perceived usefulness of the technology, which in turn may affect user satisfaction and, therefore, its continued use. Concerns of IS staff can be addressed by educating them that most GAS tools are read-only; they do not have the capability to interfere or manipulate other systems. The researcher's view is that their concern is more of a perceived risk rather than factual.

Singleton (2006) also found that the compatibility of GAS software with the other departments' systems was a factor influencing its adoption. In addition, technical issues, such as the preparation of data for interrogation and analysis, proved to be barriers to the adoption of GAS software.

The previous discussion led to the following content proposition:

- PROPOSITION PC18: It is crucial that the IAU are provided direct access to production data by IT personnel for the envisaged GAS benefits to be realised.

2.10.2 High Cost

According to Debreceny *et al.* (2005), concerns over high costs of GAS from both the initial and ongoing maintenance and support cost provide a challenge for its initial adoption as well as sustainability in respect to continued usage. This is supported by Razi & Madani (2013), who found that internal auditors may not perceive the benefit of audit software significantly enough to justify the cost. The cost challenge can become an even bigger barrier when top-level management is not ready or willing to commit to new systems due to budgetary and other resource restrictions. If the GAS user does not perceive GAS as useful because of a lack of realisation of expected benefits that can be showcased to other stakeholders, they will not be able to motivate for the provision of an ongoing budget to maintain the software.

This discussion led to the development of the following association proposition:

- PROPOSITION PA5: Failure by the IAU to showcase the value derived from GAS makes it difficult to secure future support resources, which in turn further negatively impacts the continued value that can be derived from its usage.

2.10.3 Complexity

According to Debreceny *et al.* (2005), GAS has been associated with being too technical and complex for non-IT auditors. When internal auditors perceive GAS as difficult and complex to use, their intention to adopt and use the technology is affected. However, only once an internal auditor adopts and uses GAS technology will they truly be able to assess its perceived ease of use based on experience. Before adoption, EE is informed by other user experiences as well as information provided by GAS vendors and professional and academic research.

Lymer *et al.* (2008) found that “the biggest barrier to CAATTs implementation is to resolve technical issues such as the preparation of data for interrogation and analysis.” Their view was that a typical auditor with an accountancy background was unlikely to have sufficient knowledge, skills, and experience to extract data from the data source system. However, in contrast to this, Singleton (2006) had earlier identified GAS tools, such as ACL, to be user-friendly with its commands compatible with an average IT auditor’s understanding, experience, training, and education.

Razi & Madani (2013) identified that there is a perception that IT audit software is complex, and this is one of the reasons why companies may resist adopting the technology. There is a perception that adoption of GAS will require business process reengineering as well as significant institutional transformation. Brahim (2021) found the lack of auditor’s proficiency on CAATs and the complexity of computerised information systems as the main adoption challenges for CAATs.

This study identified what the GAS user experience has been concerning ease of use. It was interesting to establish if the user experiences differed between an IT Auditor and a general auditor.

The discussion regarding complexity led to the following content proposition:

- PROPOSITION PC19: When internal auditors find the use of GAS complex, they are discouraged from continually using the technology.

2.10.4 Attitude of user

Debreceny *et al.* (2005) found that the need for internal auditors to shift from the traditional way of working once they have adopted GAS was a challenge. Internal auditors will need to shift from the manual and physical way of auditing that they are used to, for example, using Microsoft Excel for sampling, to now apply GAS as part of their audit procedures. Singleton (2006) identified the attitude of the potential users, in this case, the internal auditor, as key for successful adoption.

According to Lymer *et al.* (2008), the other successful adoption challenge identified was the attitude of the potential users, i.e., the internal auditors. They found that in some cases, management was supportive of GAS adoption, therefore implementation resources and best practices were made available for GAS projects, but internal auditors may be the ones not willing to change the way audits are performed. They are complacent with the manual auditing technique and not willing to explore GAS usage, which presents a significant challenge to GAS adoption in practice.

The previous discussion led to the following content proposition:

- Proposition PC20: Internal auditors ought to embrace a new way of working to effectively adopt GAS.

2.10.5 Training and Expertise - Application

According to Paukowits & Paukowits (2000), "The full potential of GAS is often not realised due to insufficient pre-implementation planning." They refer to how the Metropolitan Transportation Authority Audit Services utilises GAS in a more efficient and targeted manner by using GAS as part of risk assessments during the audit planning phase. As a result, the usage of GAS is linked directly to risk and potential for significant financial losses. The success of using GAS is therefore dependent on the ability of the auditor to design tests that address audit objectives and high-risk concerns. The technology itself is dependent on the user expertise and adequate planning of where to apply GAS as part of the audit procedure for it to be useful.

Without this, GAS technology cannot contribute any benefit to the internal auditor's work.

The preceding discussion led to the following association proposition:

- Proposition PC21: The successful and sustainable continued usage of GAS is dependent on the user's expertise to develop analytic tests or scripts on the platform.

2.10.6 Lack of Regulation

According to Razi & Madani (2013), companies and internal auditors may not realise the importance of adopting audit software due to a lack of external pressure (pressure from government agencies or pressure from competitors). Lymer *et al.* (2008) comment that previous studies have found that the impact of social influence on IT adoption was not significant in voluntary contexts but had a significant influence on adoption decisions within mandatory settings. Based on this, they recommended that greater regulatory enforcement of CAATs usage for internal auditors would improve the adoption of the technology. They note that existing standards by the IIA, IAASB, and ISACA provide recommendations and guidance on the use of CAATTs; thus, the decision to use CAATs in practice is subject to the prerogative of the auditors.

This discussion led to the following content proposition:

- Proposition PC22 – Standards on the use of GAS by internal auditors ought to be mandatory to achieve sustainable and continued usage of GAS.

Ahmi & Kent (2013) summarise the challenges and limitations of GAS as in Table 2.3.

Type of Limitation/Disadvantages of GAS	Source
1. GAS is too technical and complex for non-IT auditors even if training is provided.	Coderre (2006)
2. Difficult to prepare the client's data for the first use and requires IT specialists to access it.	Braun and Davis (2003); Singleton (2006)
3. The cost of acquiring GAS software licensing and maintenance are expensive.	Coderre (1996); Davies (2000); Shaikh (2005); Singleton (2006)
4. Requires extensive training to use the software.	Singleton (2006)
5. Only operates when a large volume of data is going to be analysed.	Davies (2000)
6. Some GAS do not apply to the auditor's client.	Hollander, Denna and Cherrinton (2000)

Type of Limitation/Disadvantages of GAS	Source
7. Lack of common interface with IT systems, such as file formats, operating systems, and application programs.	Shaikh (2005)
8. Lack of understanding of GAS usage by auditors and clients.	Lovata (1988)
9. Auditors may feel that they must conduct reviews manually, physically touching files and reports.	Debreceny et.al. (2005)
10. Clients are worried that their systems and data might be compromised with the use of GAS.	Debreceny et.al. (2005)

Table 2.3 *Summary of challenges and limitations of GAS* ***Source****: Ahmi & Kent (2013)*

The summary of challenges and limitations of GAS by Ahmi & Kent (2013) in Table 2.3 captures and aligns with the challenges the researcher has identified from reviewing literature. The researcher believes it is reasonable to conclude that the above challenges encompass the common challenges internal auditors are frequently encountering pre- and post-adoption.

2.11 Theoretical Framework - Technology Adoption Theories (Pre- and Post-Adoption)

Several models and frameworks have been developed to explain user adoption of new technologies, such as the Technology Acceptance Model, Theory of Planned Behaviour, the Diffusion of Innovation Theory, Theory of Reasoned Action, Unified Theory of Acceptance and Use of Technology and Social Cognitive Theory.

Thong *et al*. (2006) found that existing literature on IT adoption studies has focused on initial adoption decisions and paid less attention to the post-adoption decision in relation to continued or discontinued usage of IT. They reason that it is premature to classify any IT adoption as successful until the intention to continue usage of the IT can be confirmed. The researcher shares the same school of thought with a view that it is critical to understand the drivers and factors that impact users' continued usage of GAS technology once adopted. Adoption of GAS can only be deemed a success if users continue using the technology in a consistent and sustainable manner.

Kim & Crowston (2011) found that most initial post-adoption studies adopted similar theories used in the adoption studies such as TAM, TRA and UTAUT. However, more recent post-adoption studies have applied new theoretical frameworks, such as the

Expectation Confirmation Model (ECM), to address the changes in perceptions on technologies after adoption and use. The ECM of IT continuance by Bhattacherjee (2001) is a statistically validated model for evaluating information system continuance and will be adopted to develop a conceptual framework for the continued use of GAS. According to Gupta *et al*. (2020), “the UTAUT remains a pre-adoption framework with limited examination on post-adoption attitudes/behaviours.” They found that despite some studies endeavouring to use such a pre-adoption model in a post-adoption domain through adjusting the intention-to-use or behavioural intention to continuance intention, the outcome has remained ambiguous. They note that these studies have little identification of the intervening factors that associate the pre-adoption expectations to post-adoption continual engagement. They concluded that “there is limited convergence towards a concrete post-adoption engagement model, with limited efforts to integrate the pre- and post-adoption paradigm.”

According to Liao *et al.* (2009), ECM focuses on factors that influence retention and loyalty, as the long-term viability of an IS and success depends on continued use rather than first-time use alone. ECM hypothesises that IS continuance is primarily affected by user satisfaction. According to Venkatesh *et al.* (2011), “the long-term viability of a new IS hinges more on users’ continuance behaviour than their initial adoption decisions.”

According to Hasan *et al.* (2021), “a technology adoption lifecycle generally consists of four different phases – pre-adoption, initial adoption, post-adoption and termination.” Initial adoption refers to when a technology is utilised or purchased for the first time, while post-adoption focuses on its usage after this initial adoption. Following the post-adoption, the usage of software is the decision to terminate or to continue using the technology given the overall experience at the post-adoption phase. This is illustrated by Hasan *et al.* (2021) in Figure 2.2.

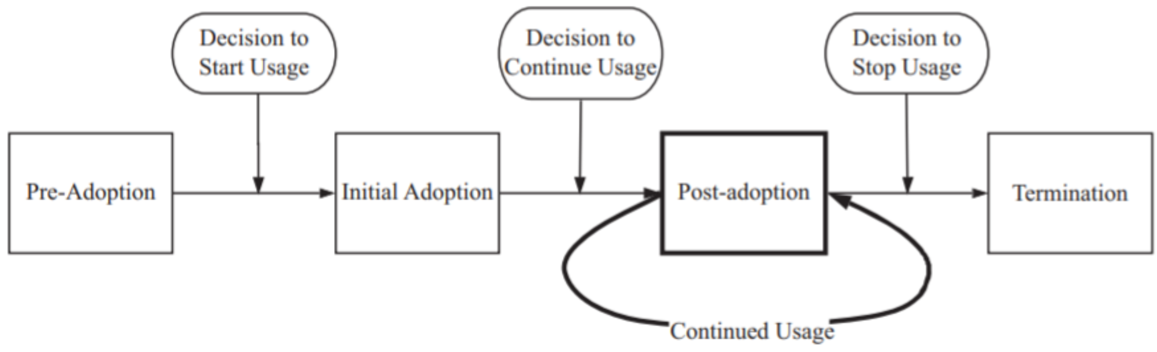


Figure 2.2 *Technology adoption lifecycle* **Source:** *Hasan et al. (2021)*

The technology adoption lifecycle represents, similarly to the ECM-IS, the adoption process up to the point when users decide to continue or discontinue the usage of technology. This study focused on the post-adoption phase of the technology adoption cycle illustrated in the diagram above. This study adopted a post-adoption theory as well as an adoption theory with the belief that some pre-adoption constructs may still have a significant impact on post-adoption intention of continued usage. The learnings and findings from the study resulted in the development of a post-adoption conceptual framework for GAS.

In the next section, the researcher explored the Expectation-Confirmation Model of IS Continuance (ECM-IS) and The Unified Theory of Acceptance and Use of Technology (UTAUT) in more detail and its significance to this study.

2.11.1 The Expectation-Confirmation Model of IS Continuance

An important theoretical model for this study is the Expectation-Confirmation Model of IS continuance (ECM-IS), which is based on the expectation confirmation model (ECM). The ECM-IS will be adopted to develop the conceptual framework for the continued usage of GAS. According to Oguma *et al.* (2016), this model has gained acceptance in explaining user satisfaction and continuance intention in respect of IS. According to Zain & Hussin (2019), earlier research has investigated the concept of continuance intention by adopting the ECM as a model for investigating IS continuance.

The ECM model is based on Expectation Confirmation Theory (ECT), which has been applied extensively in the marketing domain to understand and assess consumer satisfaction and post-purchase behaviour. ECM was founded by Oliver in 1980 as a conceptual framework to explain repurchases. The four main constructs in the model are expectations, perceived performance, disconfirmation, and satisfaction. According to Bhattacherjee (2001), IS users' continuance decision is similar to consumers' repurchase decision from the perspective that these decisions firstly involve making an acceptance or purchase decision, followed by a decision to continue or discontinue usage of the product or solution based on the use or consumption experience.

Pre-adoptions or pre-purchase expectations form the basis against which a service, product or technology is evaluated at the pre-adoption phase. It is, therefore, important to understand the expectations that internal auditors have of GAS, as this forms the basis from which GAS will be evaluated. According to the ECT, expectations have a direct influence on both the perception of performance and the disconfirmation of beliefs.

Perceived performance refers to the expectations of the actual performance of a product, service, or technology. In the case of GAS, perceived performance is likely to be aligned to the envisaged benefits that GAS should provide, such as independent direct access to data, 100% analysis of data population, increased speed of performing an audit, maintenance of an audit trail, etc., which have been identified in the literature review. Lymer *et al.* (2008) identified improved audit coverage, feedback received from stakeholders and specific resource savings as important post-adoption considerations under the performance measurement dimension. The researcher intends to explore these considerations to ascertain if GAS technology is meeting this performance expectancy from a user's perspective.

According to ECT, perceptions of performance are directly influenced by pre-purchase or pre-adoption expectations, and in turn, directly influence disconfirmation of beliefs and post-purchase or post-adoption satisfaction. When the perceived performance of GAS matches or exceeds GAS users' expectations, it is expected that there will be continued usage of GAS, and the opposite holds. For example, if an internal auditor uses GAS expecting to have a hundred per cent (100%) increase in audit coverage and they are able to achieve this, they are likely to continue using GAS technology as it would have satisfied the perceived performance expectation. According to the ECT, when GAS outperforms the user's original expectations, the disconfirmation is positive, which is expected to increase post-purchase or post-adoption satisfaction. The opposite holds.

Bhattacherjee (2001) developed and empirically tested ECM-IS, which is an extension of the ECM by underlying significant differences between initial acceptance and continuance in the context of IS. Hadji & Degoulet (2016) found that the ECM-IS model is one of the earliest efforts to conceptualise and test a model that provides a distinction between acceptance and continuance behaviour. The model communicates that the viability of an IS depends on its continued use. According to Halilovic & Cicic (2013), Bhattacherjee (2001) suggests that perceived usefulness can be adjusted based on confirmation experience. It is possible for users to have a low initial usefulness perception of a new IS at the pre-adoption phase because they may be unsure what to expect from its usage. These perceptions can be adjusted higher when users realise higher benefits. The researcher intends to explore if this could be the case with GAS expectations by comparing pre- and post-adoption expectations.

According to Kim & Crowston (2011), in both ECT and IS continuance models, satisfaction is a key concept in post-adoption behaviour. They define user satisfaction in the IS field as, "the affective attitude towards a particular computer application by an end-user who interacts with the application direction." In this study, satisfaction will be looked at from the view of the GAS users and how it is impacting them directly in the execution of the internal audit objectives.

According to Oguma *et al.* (2016), the level at which the pre-adoption expectations meet the post-adoption perceived performance will determine their level of satisfaction, with satisfied customers, therefore, formulating a decision to repurchase or continue usage of the service or product while dissatisfied customers discontinue subsequent usage.

This ECM-IS model consists of four variables as shown in Figure 2.3.

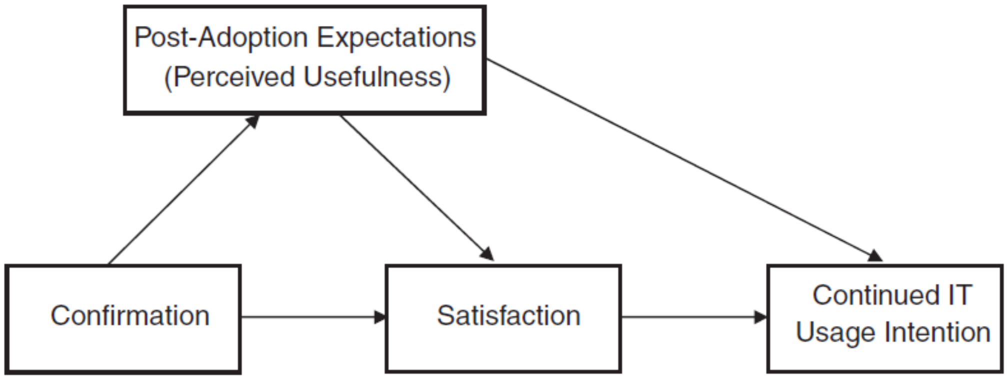


Figure 2.3 *The ECM-IS Model* ***Source****: Oguma et al. (2016)*

Construct	Definition
IS continuance intention	Users' intention to continue using IS
Satisfaction	Users' effect with (feelings about) prior IS use
Perceived usefulness	Users' perception of the expected benefits of IS use
Confirmation	Users' perception of the congruence between the expectation of IS use and its actual performance

Table 2.4 *ECM-IS Construct Definitions* ***Source:*** *Bhattacherjee (2001)*

Oguma *et al.* (2016) put forward the following three principles that the ECM-IS model is built on:

1) The effects of any pre-acceptance variables are already captured within the confirmation and satisfaction constructs; therefore, the ECM focuses only on post-acceptance variables.
2) Since IS use expectation changes over time, the ECM measures post-consumption (adoption) expectation rather than pre-consumption expectation.
3) Post-adoption expectation is represented by (ex-post) perceived usefulness.

In the review of literature, which was in the context of online services, instant messaging and software services, Oguma *et al.* (2016) found that the choice of independent variables depended on each researcher's context and objective. ECM will be referred to in this study in the context of GAS technology for internal auditors.

The results of Bhattacharjee’s (2001) study support ECT's contention that satisfaction with IS use is the strongest predictor of users' continuance intention, followed by perceived usefulness as a significant but weaker predictor. When results of this study are compared with prior TAM, it was found that perceived usefulness was a stronger predictor of acceptance intention in TAM than attitude (Davis *et al.* 1989; Taylor & Todd 1995), while satisfaction was the stronger predictor of continuance intention than perceived usefulness. Users' pre-acceptance attitudes were found to be based exclusively on cognitive beliefs, such as usefulness and ease of use, possibly emanating from second-hand information from referent others, popular media, or other sources. If the influence sources are biased, user attitudes are likely to be inaccurate, unrealistic, and uncertain. In contrast, post-acceptance satisfaction is grounded in users' first-hand experience with the IS. It is, therefore, more realistic, unbiased, and less susceptible to change. Dissatisfaction, and not perceived usefulness, was found therefore, the necessary condition for IS discontinuance. In other words, a user who has had a bad experience or an unsatisfactory experience with GAS will discontinue its usage even though their cognitive belief of perceived usefulness is positive.

The researcher finds the ECM-IS model relevant to this study mainly because of its focus on post-adoption constructs and relations to the continued or discontinued decision of IT. According to Halilovic & Cicic (2013), previous studies have paid more attention to the assessment of factors affecting users in the initial stage of new IT acceptance than to factors affecting continued usage of IT once the technology has been accepted. IS continuance by users plays a crucial role in the survival of many companies that deal with design and software development. In the case of GAS providers, most of their business models require users to pay annual fees in the form of subscriptions or support, which makes their business models sustainable. In the absence of continued usage, their businesses will not be profitable and, therefore, be unlikely to continue the delivery and development of GAS technology which needs to keep in sync with technological developments to provide tangible and relevant value. The importance of focusing on post-adoption factors is further supported by Halilovic & Cicic (2013), who points out the fact that the enrolment of new customers may cost up to five times more than keeping existing ones who tend to be profitable as their loyalty grows.

Lai *et al.* (2016) note that "The ECT is often used for assessing and measuring consumer satisfaction of products or services and post-purchase behaviour." They support those previous studies that have proven the ECT model's maturity and applicability in investigating users' continuance behaviour regarding information systems. Given the model's maturity and its continued relevance in studies that explore users' continuance behaviour, the researcher believes this model will be a valuable theoretical framework for this study. The researcher will leverage off its reliability to extend the theory to develop a conceptual framework that will serve as a guide for successful post-adoption continued usage of GAS.

The extensive discussion of the ECM-IS model led to the following association propositions:

- Proposition PA6: GAS users' continuance usage decision is influenced by their satisfaction confirmation, emanating from their perception of its usefulness post-adoption.
- Proposition PA7: The level at which the pre-adoption expectations meet the post-adoption perceived performance will determine the extent of satisfaction.

2.11.2 Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT is a unified model of IT acceptance by individuals that was developed by Venkatesh *et al*. (2003) after reviewing, comparing, and testing eight (8) competing theories that sought to identify general factors that influenced users when making technology adoption decisions. According to Bierstaker *et al.* (2014), UTAUT integrates several previously accepted theoretical models to assess the probability of success for new technology adoptions. The eight models that were reviewed and consolidated to develop the UTAUT are the theory of reasoned action (TRA), technology acceptance model (TAM), motivational model, theory of planned behaviour (TPB), a combined theory TPB/TAM, model of personal computer use, diffusion of innovations theory and social cognitive theory (SCT). The UTAUT has been empirically validated using data from four organisations over a six-month period and was found to outperform the eight (8) individual models in explaining adoption activity for various technologies.

Paukowits & Paukowits (2000) report that the UTAUT focuses on the individual level of acceptance of technology as opposed to looking at adoption at an organisational level. Konthong *et al.* (2016) refer to UTAUT as a model that describes user acceptance of IT and explains the factors influencing intention to use an IT and consequent usage behaviour. This study explores the post-adoption of GAS from a user perspective, although in an organisational setting in the context of SOE. Based on this rationale, the researcher views the UTAUT as a relevant theoretical framework together with the ECM-IS theory for this study.

The UTAUT focuses on four constructs, which are performance expectancy (PE), effort expectancy (EE), facilitating conditions (FC), and social influence (SI). According to Venkatesh *et al.* (2003) and Bierstaker *et al.* (2014), the UTAUT proposes that the three factors, PE, EE, and SI, predict behavioural intention. Furthermore, FC and behavioural intention may influence IT acceptance. According to Konthong *et al.* (2016), PE, EE, and SI directly impact usage intention and behaviour, whilst FC directly affects behaviour. These four factors are defined by Lymer *et al.* (2008) as follow:

Performance expectancy (PE*)* is the degree to which an individual believes that using the system they are considering adopting will help him or her to attain gains in task performance. Venkatesh *et al.* (2011) note that this construct essentially captures the user's cognitive expectations about the performance of the system.

The PE factor in the UTAUT model is synonymous with the perceived usefulness factor (PU) in the ECM-IS model. PE is used at pre-adoption of the technology in the UTAUT model whilst PU is used at the post-adoption phase in the ECM-IS model.

Effort expectancy (EE) refers to the degree of ease the adopter associates with the use of the system they are considering using.

Social influence (SI) refers to the degree to which the individual perceives that important others believe he or she should use the new technology they are considering.

Kim & Crowston (2011) found in post-adoption UTAUT research, SI impact on continuance intention was inconsistent, with some studies reporting a significant relationship but other studies reporting non-significant relationships. This study intends to explore the impact of SI on the continued usage of GAS.

Facilitating conditions (FC) refers to the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the technology they are considering adopting.

According to Lymer *et al.* (2008), in the context of GAS adoption for internal auditors, the FC that can impact their motivations to adopt CAATTs are the adequacy of information on what CAATTs can do, support from vendors or software providers, as well as support from top management in their organisations.

According to Bierstaker *et al.* (2014), in contrast with other early auditing studies based on UTAUT, which examined behavioural intention, they examined actual GAS usage. Their modified model predicted that PE, EE, SI, and FC would influence GAS usage. They did not find SI or EE as significant. They concluded that this possibly reflected the fact that in an audit context, auditors have a responsibility to gather sufficient competent evidence; personal preferences regarding effort or social variables may have less weight than in an individual technology choice decision. These results suggest that auditors place priority on audit effectiveness when making technology usage decisions. Based on these results, they concluded that in an audit context, FC and PE were more important than personal or social variables. Zainol *et al.* (2017) also found that PE, SI, and FC had a significant influence on behavioural intention towards the adoption of CAATs. Of all the factors, PE was identified as having the most significant impact on the adoption decision, which was consistent with findings from previous similar studies. They also found EE to have an insignificant relationship with behavioural intention to adopt CAATs.

The researcher is cognisant of this finding but will explore how the SI and EE constructs can be integrated into the preliminary proposed conceptual framework for further validation after the analysis of interview data. The researcher is of the view that both EE and SI should influence the continued use of GAS. From the review of literature, the complexity of GAS was identified as a significant hindrance to the utilisation of GAS technology.

Venkatesh *et al.* (2011) highlight that the UTAUT is lacking as it does not cater for situations where disconfirmation of expectations may occur and, as a result, influences outcomes such as behavioural intention and use. Their view was that the inclusion of the three additional predictors from UTAUT into the ECM-IS model will provide a broader understanding of IS usage. Therefore, this study will explore how key constructs from the UTAUT model and ECM interact to determine the continued or discontinued decision of GAS technology post-adoption.

Zain & Hussin (2019) conducted a study to develop an instrument for assessing information systems of continuance use. Following an extensive review of literature on previous studies of IS continuance and technology adoption theories, they proposed an IS Continuance Model which integrated five (5) new constructs with the ECM Model. The five (5) constructs believed to have a positive impact on the users' decision to continue the use of IS were prior experience (UTAUT), self-efficacy (SCT), utilisation (Task-Technology Fit Model - TTF), task technology fit (TTF), and perceived support (Social Cognitive Theory - SST). The proposed model is shown in Figure 2.4.

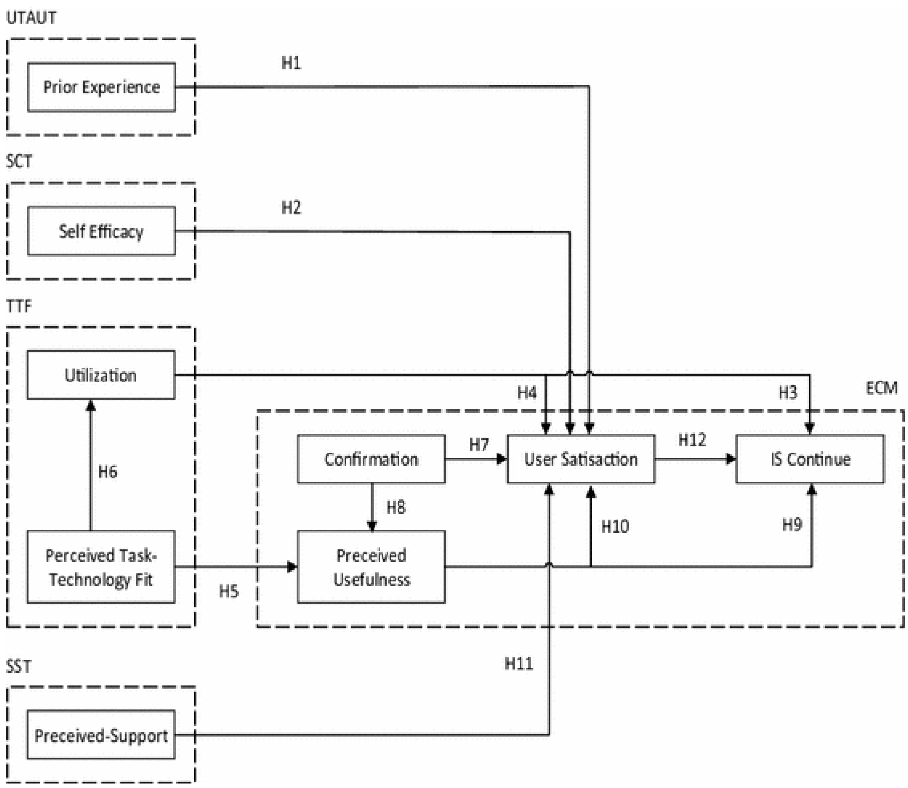


***Figure 2.4** The proposed IS Continuance Model* **Source:** *Zain & Hussin (2019)*

This study follows a similar approach of integrating new constructs to the ECM model that the researcher views as having a positive impact on the continued usage of GAS technology.

The discussion on the UTAUT model led to the following association propositions:

- Proposition PA8: Facilitating conditions play a significant role in enabling the sustainable continued usage of GAS.
- Proposition PA9: The perceived ease of use (effort expectancy) of GAS by internal auditors drives the continued usage of GAS.
- Proposition PA10: The perceived social influence of GAS adoption drives the continued usage decision by internal auditors.

The formulated propositions will be adopted to propose the preliminary conceptual framework to understand the factors that contribute to the sustainable and continued usage of GAS for internal auditors' post-adoption. A total of twenty-two (22) content-driven propositions and a total of ten (10) association propositions were identified during the literature review process.

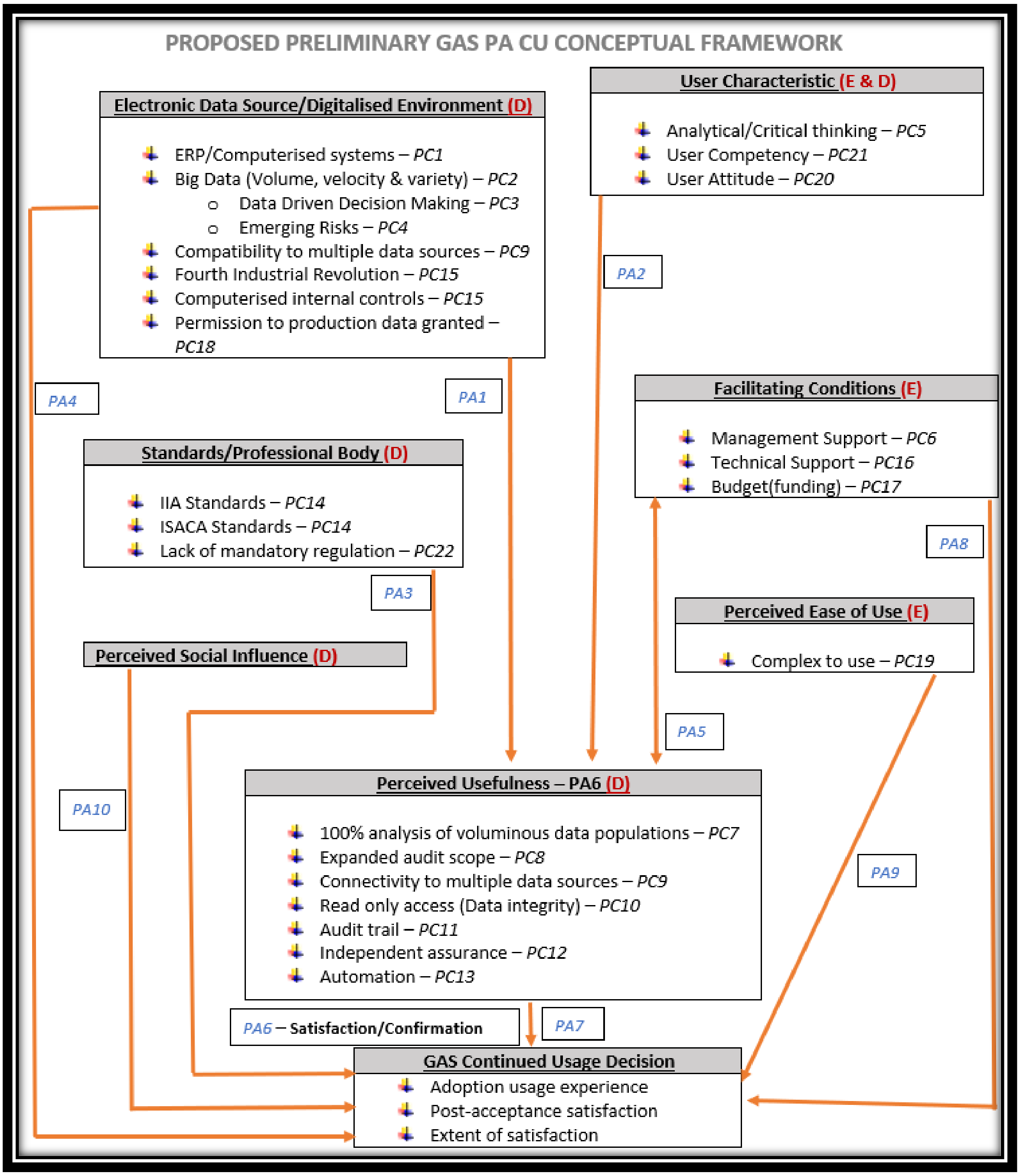
2.12 Discussion of the Proposed Generalised Audit Software Post-Adoption Continued Usage Conceptual Framework (GAS PA CU Framework)

Based on the literature reviewed in this chapter and the researcher's experience in the data analytic audit software space, the researcher came up with twenty-two (22) content propositions and ten (10) association propositions highlighted in the previous section. Through a synthesis of these propositions, the preliminary conceptual framework for the continued usage of GAS at post-adoption is proposed. The proposed conceptual framework in Figure 5 has been named the Generalised Audit Software Post-Adoption Continued Usage Conceptual (GAS PA CU) Framework by the researcher.

According to Jabareen (2009), "a conceptual framework is a network of interlinked concepts that together provide a comprehensive understanding of a phenomenon or phenomena." Their view was that a conceptual framework does not provide a causal or analytical setting but, instead, an interpretative approach to social reality. This study adopted a qualitative research approach that generated a descriptive conceptual model to provide an in-depth understanding of the post-adoption factors driving the continued usage of GAS. Lindgreen *et al.* (2021) state that "conceptual frameworks also can be developed through an abductive process where researchers move between theory and empirical data to develop a framework." This is the approach that was implemented by the researcher.

In line with the overarching objective of the study, it is envisaged that the proposed conceptual framework will provide insight into the fundamental factors that need to be considered as drivers and enablers for the sustainable and continued usage of GAS by internal auditors, post-initial adoption of the technology. The conceptual framework was further refined after participant interview data was collected and analysed.

The preliminary framework presented in Figure 5 demonstrates eight (8) key constructs, namely: digitalised environment, user characteristics, professional body, facilitating conditions, perceived social influence, perceived ease of use, perceived usefulness, satisfaction-confirmation, and GAS continued-usage decision. Factors characterising each of the constructs emanating from the content propositions are reflected in the proposed preliminary conceptual model to provide more context. These constructs are related, based on the identified association propositions, and depicted in the visual representation of the GAS PA CU framework in Figure 2.5.



Legend:

→	: Direction flow of association
PC	: Proposition Content
PA	: Proposition Association
GAS	: Generalised Audit Software
ERP	: Enterprise Resource Planning
IIA	: Institute of Internal Auditors

ISACA	: Information Systems Audit and Control Association
D	: Driver
E	: Enabler

Figure 2.5 *The Proposed Generalised Audit Software Post-Adoption Continued Usage (GAS PA CU) Conceptual Framework*

Both the ECM-IS and UTAUT models formed the theoretical basis of the proposed GAS PA CU conceptual framework, together with the researcher's view gained from professional experience in the data analytic software space and findings from the extensive review of literature. Furthermore, the researcher grounded the IS continuance model in the context of GAS adoption and usage in an SOE context. A similar study by Venkatesh *et al.* (2011), which expanded the ECM-IS model with three constructs from UTAUT in the context of transactional systems, found that this approach provided an in-depth understanding of the changes in the pre-usage beliefs and attitudes through the emergent constructs of disconfirmation and satisfaction, ultimately influencing IS continuance intention.

Constructs in the proposed preliminary conceptual framework are further categorised as either drivers or enablers of GAS usage. Enablers of GAS technology are factors that make it possible for GAS technology to be adopted and used, whilst drivers encourage and motivate users to adopt and use GAS technology. Drivers and enablers are at play, motivating or discouraging users to either utilise or discontinue the usage of GAS post-adoption. When internal auditors, GAS developers and providers, and other organisational stakeholders are aware of these factors, they can play a role in influencing and contributing to the complex interaction of the factors to support the internal audit profession to deliver more value through GAS. More context of the constructs in relation to the proposed GAS PA CU conceptual framework is provided below.

The *digitalised environment* internal auditors of today work in is characterised by organisations leveraging off automation to deliver value and effectively achieve objectives. These environments typically entail organisations using computerised systems and ERPs, which gives rise to large volumes of data that are generated at a fast pace. This is further augmented by the Fourth Industrial Revolution, enabling organisations to deliver greater productivity through greater automation and artificial intelligence (AI). Multiple data sources, large volumes of data, new risks, and computerised internal controls become driving forces for internal auditors to adopt GAS for relevance and effectiveness.

According to Sayana (2003), despite audit software being provided with many features and capabilities, the technology arguably cannot perform the audit on its own as it depends on the auditor to design the procedures and tests that meet the audit objective. In alignment with this, Paukowits & Paukowits (2000) highlighted that although GAS facilitates the process of highlighting potential high-risk areas, auditors need to be aware that the successful adoption of the software depends largely on the creative input and critical thinking abilities of the user. It can therefore be argued that the success of GAS is dependent on the individual *user's characteristics and abilities*. Lack of the necessary analytic thinking ability, skills (competency), the right attitude, and know-how of using GAS by internal auditors can threaten its continued usage. The researcher is of the view that analytic reasoning is a critical component that gives an internal auditor the ability to have a methodical step-by-step approach when thinking of analytical tests that can be developed to address the audit objective.

Audit standards encourage the adoption and usage of GAS technology by internal auditors. However, it is noteworthy that standards by professional bodies, such as ISACA and IIA, are currently recommendations to internal auditors, therefore not mandatory like a regulation would be. Future research can be considered to explore the potential impact of making the use of GAS mandatory. When audit leadership and professionals adopt GAS in alignment with the recommendation of standards, it is likely to be a driver for other internal audit professionals to follow suit.

Without a supportive environment that enables the use of GAS, its sustainable continued usage would not be possible. Lymer *et al.* (2008) demonstrate that the two constructs from UTAUT that have the most influence on internal auditors' motivation to adopt CAATs were performance expectancy (PE) and *facilitating conditions* (FC). Several studies following this research, such as Janvrin *et al.* (2008), Mahzan & Lymer (2014), and Zainol *et al.* (2017), also support that PE and FC are the biggest influencers for the adoption of CAATs and GAS (used the UTAUT). Facilitating conditions, such as management support, technical support by GAS providers and developers, and the availability of budgets (funding), enable the continued usage of GAS.

Ahmi (2012) found that despite auditors recognising the advantages of GAS, the low adoption or usage could be explained by what they believed to be the significant learning curve and lack of ease of use which influence the *perceived ease of use* construct. According to Shamsuddin *et al.* (2015), effort expectancy (EE) is the most influencing factor that affects the usage level of CAATs by internal auditors in Malaysia compared to other factors. According to Ahmi & Kent (2013), IT auditors were likely to realise the advanced benefits of GAS through using the advanced features of GAS, like the programming of tests (scripts) to perform repetitive analysis, ultimately enhancing audit speeds and efficiencies. They attributed this to IT Auditors having more familiarity with IT when compared to the financial auditor who does not have an IT background. They believed it was easier for IT Auditors to be trained in the use of GAS because of their technical background. They also found that almost 73% of external auditors do not use GAS because of the significant learning curve and adoption process and lack of ease of use of GAS. Despite GAS being a technology for all auditors, the researcher reasons that without the technical know-how to navigate the software and to access data from the various data sources, such as ERPs, GAS technology will unlikely provide any tangible value.

According to Venkatesh *et al.* (2003), *social influence* refers to the degree to which the individual perceives that important others believe he or she should use the new technology they are considering. In the context of this study, internal auditors may be motivated to adopt and use GAS if they are of the view that other internal audit professionals and organisational executives expect them to do so and are driven to get social recognition. In the hype of digitalisation, automation, and the internal profession endeavour to deliver increased value, social influence is expected to drive the continued usage decision of GAS. Studies by Lu *et al.* (2009), Yang *et al.* (2012), Atique *et al.* (2021), Razak *et al.* (2017), Younghwa & Kozar (2008), Patel & Patel (2018), and Zhang *et al.* (2020) found social influence to significantly influence the intention to adopt technology. The researcher is, therefore, of the view that it is a noteworthy construct at play, contributing to the continued usage of GAS. That may be an opportunity for CAEs, GAS providers, internal audit professional bodies and organisational executives to leverage off this construct to drive better utilisation of GAS amongst internal auditors.

The ECM-IS model depicts that IS continuance is determined by *confirmation of expectations and perceived usefulness*. Therefore, the preliminary conceptual framework considers the expected benefits of GAS, identified at pre-adoption, to be the basis of evaluating perceived usefulness as well as the level of satisfaction which are key for users' decisions to continue or discontinue the usage of GAS technology. The user experience at post-adoption plays a significant role in determining whether the user recognises the technology as useful and, at the same time, makes it possible to realise the benefits that were envisaged at pre-adoption. Users may also realise benefits they never envisaged at pre-adoption. A positive user experience at post-adoption is likely to result in the continued usage of GAS.

The results of Bhattacharjee's (2001) study supports ECT's contention that satisfaction with IS use is the strongest predictor of users' *continuance intention*, followed by perceived usefulness as a significant but weaker predictor. Venkatesh *et al.* (2011) conclude that pre-usage beliefs may serve as anchors for post-usage beliefs as people tend to rely on their initial beliefs and early impressions in the formation of future beliefs. It is possible for these pre-usage beliefs to be disconfirmed, with such disconfirmation ultimately influencing future behaviour.

From the review of literature, the following propositions emerged and are summarised in Table 2.5 and Table 2.6.

Table 2.5 below summarises the content propositons:

Content Propositions #	**Proposition**
PC1	As organisations adopt ERPs and computerized software packages to process their transactional information, internal auditor's ought to use technology to audit the computerised internal control environment effectively and efficiently.

Content Propositions #	Proposition
PC2	To cope with the increased volume of electronic transactional data, internal auditors ought to use GAS to audit the complex systems.
PC3	Data analytic technology with data visualisation capabilities provide a better understanding of voluminous data for better decision-making.
PC4	Digitisation of accounting processes reduce human oversight, giving rise to emerging and increased business risks.
PC5	Successful adoption of GAS depends on the critical thinking abilities of the internal auditor.
PC6	Management support ought to be provided to drive and support the usage of GAS.
PC7	The ability of GAS to achieve a hundred per cent (100%) analysis of large data populations contributes to the perceived usefulness of GAS by internal auditors.
PC8	Adoption of GAS by internal audit units (IAU) increases the speed of performing analytic work enabling them to achieve an expanded audit scope in a given period.
PC9	The ability of GAS to connect to multiple data sources increases its perceived usefulness by IAU.
PC10	The read-only access capability of GAS increases the perceived usefulness of GAS to IAU.
PC11	The capability of GAS to maintain an audit trail increases the perceived usefulness of GAS to IAU.
PC12	IAU should adopt GAS to enhance its independent assurance role.
PC13	IAU should adopt GAS to automate repetitive data analytic work for increased value delivery in a digitalised environment.

Content Propositions #	Proposition
PC14	Audit standards recommend that auditors should use GAS for testing data and evaluating risks.
PC15	The evolution of technology and analytics in the Fourth Industrial Revolution is driving the need for IAU to use GAS for better insights into risks and the internal control environment.
PC16	Technical support from the GAS providers is important for the continued usage of GAS.
PC17	Sufficient budget provision for the ongoing maintenance and support of GAS is required for the successful, continued usage of GAS.
PC18	It is crucial that the IAU are provided direct access to production data by IT personnel for the envisaged GAS benefits to be realised.
PC19	When internal auditors find the use of GAS complex, they are discouraged from continually using the technology.
PC20	Internal auditors ought to embrace a new way of working to effectively adopt GAS.
PC21	The successful and sustainable continued usage of GAS is dependent on the user's expertise to develop analytic tests or scripts on the platform.
PC22	Standards on the use of GAS by internal auditors ought to be mandatory to achieve sustainable and continued usage of GAS.

***Table 2.5** List of content propositions*

Table 2.6 below summarises the association propositions identified in the literature review:

Association Propositions #	Proposition
PA1	The usefulness of GAS is dependent on the automated and digitalised environment of an organisation, i.e., GAS cannot be used to analyse a manual process.
PA2	GAS users' characteristics and capabilities impact the extent of benefits derived from GAS usage.
PA3	Audit standards by internal audit professional bodies ought to play a role in driving the adoption of GAS by the profession.
PA4	The digitalisation of the internal and external environment is driving the need for internal auditors to adopt GAS to be effective and relevant.
PA5	Failure by the IAU to showcase the value derived from GAS makes it difficult to secure future support resources, which in turn further negatively impacts the continued value that can be derived from its usage.
PA6	GAS users' continuance usage decision is influenced by their satisfaction confirmation, emanating from their perception of its usefulness post-adoption.
PA7	The level at which the pre-adoption expectations meet the post-adoption perceived performance will determine the extent of satisfaction.
PA8	Facilitating conditions play a significant role in enabling the sustainable continued usage of GAS.
PA9	The perceived ease of use (effort expectancy) of GAS by internal auditors drives the continued usage of GAS.
PA10	The perceived social influence of GAS adoption drives the continued usage decision by internal auditors.

Table 2.6 *List of association propositions*

2.13 Conclusion

This chapter provided an in-depth review of existing literature to provide more context for this study and made an in-depth analysis of the theoretical frameworks underpinning the study. This analysis allowed the researcher to develop both content and association propositions, which led to the development of the proposed conceptual framework.

The importance of audit automation and the utilisation of technology in recent audits has grown significantly due to both the evolving technological landscape and changing regulatory environment. Data and information are no longer in manual records but accessible and processed in electronic format in ERPs and other systems organisations have adopted. With the increased rate of information flows in electronic format, the internal audit profession is faced with voluminous data that they need to analyse. The traditional audit methods can no longer accomplish this effectively. The rapid change in the technological environment is not only presenting opportunities to organisations but also transforming the risk landscape characterising organisations. The risks emanating from transactional data, which is in electronic format, can be identified by the use of GAS technology, which can be adopted to test internal controls.

With the increased expectation of internal auditors by stakeholders to focus on governance and risk issues, the adoption of GAS can assist them to be more effective and efficient in the execution of its mandate and therefore remain relevant. However, notably, recent studies have found that the adoption and utilisation of GAS are lagging and not at expected levels, despite internal auditors being increasingly aware of the value and benefits of audit analytics. It was, however, found that many of the studies on GAS focused mostly on the preadoption factors of GAS; hence, this study sets out to fill out the gap by focusing on the utilisation of GAS post-adoption.

The literature further identifies and discusses two theories on adoption and post-adoption of technology found to be relevant to this study. The two theories are the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Expectation Confirmation Theory of Information Systems (ECM-IS). The UTAUT focuses mostly on the pre-adoption behavioural intentions of users, whilst the ECM-IS focuses on the continuance intention decision of users at post-adoption based on the perceived usefulness of a technology. Constructs from the two theories are adopted to develop the preliminary GAS post-adoption conceptual framework.

Eight (8) key constructs were found to be important factors for consideration to support higher utilisation and continued usage of GAS. The constructs were digitalised environment, user characteristics, professional body, facilitating conditions, perceived social influence, perceived ease of use, perceived usefulness, satisfaction-confirmation, and GAS continued usage decision. These factors were categorised into drivers and enablers and were also adopted to develop the preliminary conceptual framework, named by the researcher as the GAS PA CU framework.

The perceived usefulness of GAS by internal auditors was found to be momentous in informing the decision to continue or discontinue the usage of GAS. Several benefits of GAS were identified in the study as major drivers for internal auditors to adopt GAS, which set the benchmark of the expected performance outputs by GAS adopters. It was reasoned that these benefits became the basis by which internal auditors evaluated the perceived usefulness of GAS and determined the level of satisfaction, which was key for the user’s decision to continue or discontinue the usage of GAS technology.

User competency was also found to play a significant role in how GAS would be utilised. GAS tools are provided with the inherent capability to access and analyse data. However, for the tool to deliver on this capability, the licensed user of the tool requires the skills and knowledge to navigate the software and develop the data analytic tests. When users are incompetent, it can be expected that the value and benefits of GAS will not be achievable, and, in turn, users are likely to discontinue using the technology.

Lastly, this chapter identified the associations between the identified constructs and their link to either the perceived usefulness construct or the continued usage decision or both. The visual representation of these links is shown in the preliminary conceptual framework in Figure 2.5.

The following chapter details the qualitative research methodology that was adopted to address the research questions and objectives. The measures which were taken to ensure the trustworthiness of the study are also explored.

Chapter 3 - Research Methodology

An extensive review of literature was conducted in Chapter 2. The researcher developed a preliminary framework from the findings, identifying factors necessary for the continued usage of GAS technology. The preliminary conceptual framework has been called the Generalised Audit Software Post-Adoption Continued Usage Framework (GAS PA CU). The purpose of this framework is to support the continued usage of GAS.

This chapter describes the research methodology that was adopted for this study. The objective of the study was to make a critical assessment of how internal auditors in SOEs in Southern Africa have adopted and are using GAS technology post-adoption. From this assessment, critical factors necessary for the continued usage of GAS were identified and a post-adoption continued usage framework developed.

The study is exploratory and evaluative in nature and aims to develop a conceptual framework. The preliminary conceptual framework developed in Chapter 2 was refined and enhanced on completion of data collection and analysis. There is currently limited knowledge with respect to post-adoption and continued usage of GAS for internal auditors; therefore, this study generated new insights, which can be a basis for future CAATs and GAS research.

This chapter outlines the research philosophy, approach, strategy, data collection and analysis methods, ethical considerations, and research limitations. The research onion by Saunders *et al.* (2015), shown below in Figure 3.1, will be adopted to illustrate the research design for this study.

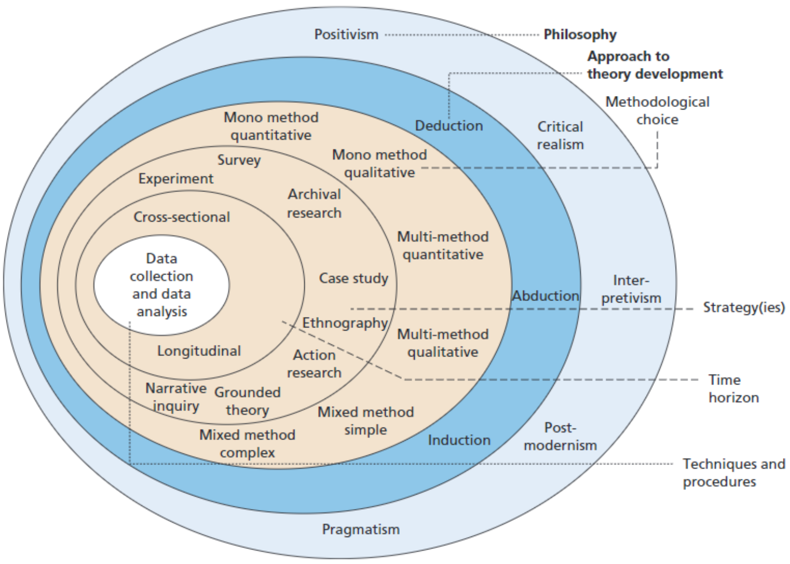


***Figure 3.1** The research onion* **Source:** *Saunders et al., (2015)*

The five layers of the research onion have been adopted in this study as per Table 3.1.

Research Onion Layer	Adopted Approach
Research philosophy	Interpretivist
Research approaches	Inductive and deductive
Research/Methodological Choice	Qualitative
Research strategies	Multiple case studies
Time horizons	Cross-sectional
Data collection methods	Interviews

***Table 3.1** Research Onion Table* **Source:** *Adopted from Saunders (2012)*

3.1 Research Philosophy

Saunders *et al.* (2015) define research philosophy as "a system of beliefs and assumptions about the development of knowledge." The philosophical approach adopted for this study was interpretivist.

According to Saunders *et al.* (2015), interpretivism notes that humans are different from physical phenomena because they create meanings. The advantage of this philosophical positioning is that it provides rich insights, interpretations and understandings of the social worlds and contexts. The task of the interpretivist is to take on an empathetic stance as they will need to enter the world of the research participants and appreciate their point of view. Since this study is exploratory, it was important for the researcher to get as much insight as possible from the users' experiences and perceptions; therefore, an interpretivist approach was most suitable for this research.

Data was collected through interviews, which was analysed based on an interpretivist philosophical approach. Interview questions were open-ended to enable the participants to fully express their experiences and perceptions, with no guidance from the interviewer. It is from these responses that the researcher identified emerging insights, constructs, and meanings. From understanding these, the researcher identified the factors driving the adoption and continued usage of GAS. This qualitative approach to research is associated with the interpretivist philosophy approach. The researcher relied on the participants' views of their GAS experience to finalise the preliminary conceptual model developed from the review of literature.

3.2 Research Approach

The inductive approach was used in this study. According to Saunders *et al.* (2015), if research is characterised by data collection at the beginning in order to explore a phenomenon, which will then be followed by the generating or building of a theory (often in the form of a conceptual framework), then an inductive approach has been adopted. Interpretivist approaches to research are typically associated with the inductive approach to the development of theory, as in this case.

The research approach in this study was to gather data, which was then be used to develop a conceptual approach. Therefore, an inductive approach was used to collect and analyse data through literature review and interviews that explored the research phenomenon, identified themes, and explained patterns, which were used to enhance the conceptual framework, the researcher named the GAS PA CU framework. The preliminary framework was developed after the extensive review of literature in Chapter 2.

Table 3.2, extracted from Saunders *et al.* (2015), distinguishes between a deductive and inductive research approach.

	Deduction	Induction
Logic	In deductive inference, when the premises are true, the conclusion must also be true.	In inductive inference, known premises are used to generate untested conclusions.
Generalisability	Generalising from the general to the specific.	Generalising from the specific to the general.
Use of data	Data collection is used to evaluate propositions or hypotheses related to an existing theory.	Data collection is used to explore a phenomenon, identify themes and patterns, and create a conceptual framework.
Theory	Theory falsification or verification.	Theory generation and building.

Table 3.2 *Distinguishing between deductive and inductive research approach* ***Source:*** *Saunders et al. (2015)*

Therefore, the inductive research approach is valuable for building theory, whilst the deductive research approach plays a role to test the validity of a theory. In this study, the developed conceptual framework was not only tested but also enhanced, which means some elements of the research were deductive. Further testing of the enhanced framework can be a consideration for future research.

3.3 Research Strategy

Saunders *et al.* (2015) define a research strategy as a road map of how a researcher will go about addressing the research question. Denzin & Yvonna (2011) describe a research strategy as a methodological link between the research philosophy and choice of methods adopted to collect and analyse data. The study used multiple case studies to obtain data about GAS adoption and continued usage through interviews. Prior this, a comprehensive literature survey had been undertaken.

3.4 Research Choice

Qualitative research will be employed. According to Etikan *et al.* (2016), qualitative methods are, for the most part, intended to achieve a depth of understanding and quantitative methods are intended to achieve a breadth of understanding. In this study, a qualitative method was adopted to refine and improve the preliminary framework developed from the extensive literature review.

According to Saunders *et al.* (2015), qualitative research investigates meanings and relationships based on a variety of data collection techniques and analytical methods to develop a conceptual framework and theoretical contribution. This study was primarily qualitative. Qualitative research methodology was be used for data collection, using interviews. It was expected that the information derived from the qualitative analysis will be useful in providing background and context to enhance the preliminary framework for continued usage of GAS. The understanding of experiences and perceptions of internal auditors in relation to GAS usage was the basis of enhancing the preliminary framework. The use of the qualitative design was valuable in providing the contextual background and a better understanding of the research problem. Findings from this were utilised to finalise the initially proposed preliminary GAS PA CU framework.

3.5 Research Strategy – Multiple Case Study

The research strategy that was adopted was a multiple case study approach. According to Gustafsson (2017), "a case study can be defined as an intensive study about a person, a group of people or a unit, which is aimed to generalise over several units". This study is characterised by more than a single case; therefore, a multiple case study approach was adopted. The multiple case approach enabled comparative analysis, unlike a single case approach. The understanding and appreciation of the differences and similarities from the different cases provided more insight into post-adoption usage of GAS which informed the development of the conceptual framework that can be considered for application and adaption across different sectors.

The benefit of adopting a case study approach for this study is that it enabled the collection of a lot more detail, which was richer and of greater depth than could have been established through other experimental designs. In addition, in the absence of a sampling frame, this approach was more practical. According to Rose *et al.* (2015), multiple case findings may be considered more compelling and robust when compared to a single case study. Their view is that multiple cases allow theory to be better grounded in more varied evidence, as they allow for cross-case comparison.

According to Eisenhardt & Graebner (2007), the benefit of the multiple cases approach is that they enable a broader exploration of research questions and theoretical evolution. They point out that theory is better grounded, more accurate, and more generalisable when based on a multiple case study in comparison to a one case study. In addition, multiple case studies enable confirmation on whether an emergent theme or finding is unique or common across different cases.

Gustafsson (2017) states that a limitation of a multiple case study approach is that they can be enormously expensive and time-consuming to implement and that in contrast, a single case study approach can produce extra and better theory because the researcher has more time to focus on the single case to get a deeper understanding of the subject.

Although multiple case studies were selected from different sectors and organisations, it is important to point out that the unit of analysis in all cases remained the same, being the internal audit department. The SOEs that were selected by the researcher fell into three sectors, which were financial, power utility and agriculture.

3.6 Time Horizon

The time horizon for this study is cross-sectional in nature. A cross-sectional study is characterised by the studying of a phenomenon as a “snapshot” of a particular time. Data was collected from different internal auditors from different SOE organisations in Southern Africa, within a short period. The data was collected as a once off exercise before it was analysed and interpreted. The data collection process through interviews was completed within a six months’ time span.

The limitation of the cross-sectional time horizon is that the change and development of constructs and their impact cannot be studied over time. However, given the limited time frame and resources for this study, the adoption of a cross-sectional study was more feasible.

3.7 Data Collection

The overall objective of the study was to develop a conceptual framework for the continued usage of GAS technology at the post-adoption phase. The data collection methodology was as per the following steps:

- ***Step 1*** - Literature review was conducted pertaining to pre- and post-adoption of GAS by internal auditors. The output of this extensive literature review was the development of a preliminary framework for the continued usage of GAS – GAS PA CU framework.

- ***Step 2*** – Face-to-face interviews were conducted with participants from three different SOE case sectors, namely financial, power utility and agricultural sectors. A total of sixteen (16) participants from the total cases were interviewed to get more context on GAS adoption and usage by internal auditors. It was expected after fifteen (15) interviews data saturation would have been reached. According to Fusch & Ness (2015), "data saturation is reached when there is enough information to replicate the study, when the ability to obtain additional new information has been attained, and when further coding is no longer feasible." The researcher is of the view that saturation point was reached after the sixteen (16) interviews as no new insights, themes and experiences were emerging from the participants at this point.
- ***Step 3*** - A final conceptual framework was enhanced from refining the preliminary framework based on the findings from the primary data collected.

The researcher enforced a uniform approach to data collection and recording in the different case studies to assist with both analysis and reliability.

3.8 Target and study population

The unit of analysis for this study were individual internal auditors. The Head of Internal Audit, IT Auditors and internal auditors in general who use GAS technology at SOEs in Southern Africa were the target population.

The sample population was divided into three sectors in support of the multiple case study approach. The three sectors of focus were the financial sector, agricultural sector, and the power utility sector. The three sectors identified represent the three main sectors in the economy which are primary, secondary/manufacturing and tertiary/service sectors. The four case organisations that agreed to participate in the study are shown in Table 3.3.

Financial Sector (Tertiary/services)	Agricultural Sector (Primary)	Power Utility Sector (Secondary/manufacturing)
A bank in Zambia	An agricultural company in Botswana	A power utility company in Botswana
A bank in Malawi		

***Table 3.3** Case SOE's participating in the study*

Heads of Internal Audit have different titles such as Internal Audit Director, Chief Audit Executive, or Internal Audit Manager. It was important to collect information from the Head of the Internal Audit department because they are responsible for the overall vision to adopt CAATs and GAS technology for the department and lobby for the budget from other stakeholders to make it feasible to adopt these technologies. They set the tone at the top for the importance or non-importance of GAS in the departments.

IT Auditors are usually the team members in an Internal Audit Unit who are tasked with the use of GAS since they understand information systems. As the users of GAS, it was crucial to gather information from them, which represented the actual usage of GAS in the work environment. In the absence of IT Auditors, the internal auditor responsible for use of CAATs was identified to participate in the study.

3.9 Sampling Methods

A non-random sampling technique was adopted to select the sample case studies. According to Sharma (2017), the "non-probability sampling technique is totally based on judgement." Eisenhardt & Graebner (2007) point out that some researchers make faulty assumptions that case selection should use random sampling to be representative of the population. They argue that the purpose of a case research can be to develop a theory, not to test it, therefore non-random sampling techniques can be enough. The researcher agrees with this thinking and therefore viewed the non-random sampling technique as sufficient to develop the post-adoption conceptual framework for GAS technology.

The non-random sampling technique that was adopted was the purposive sampling technique. Sharma (2017) acknowledges that purposive sampling is also referred to as judgement, selective or subjective sampling and defines it as an aggregate of techniques that depend on the judgement of the researcher when identifying the units to be studied. The purposive sampling technique that was used was the criterion sampling strategy, with sample selection meeting the following predetermined criteria, which were judged by the researcher as important and likely to be information-rich, therefore, providing greater insights and perspectives on the usage of GAS:

1. Internal audit departments that have adopted GAS software;
2. Organisations that are state-owned enterprises;
3. Organisations that deal with large volumes of transactional data; and
4. Organisations that fall within the financial, power utility and agricultural sectors.

The researcher expected the selected cases to be suitable for highlighting and providing deeper insight into GAS user experiences, perceptions, and challenges. The sample population was divided into three sectors in support of the multiple case study approach. The three sectors of focus were the financial sector, agricultural sector, and power utility sector. The three sectors identified represented the three main sectors in the economy which are primary, secondary/manufacturing and tertiary/service sectors.

3.9.1 Purposive Sampling Technique – Multiple Case Studies

Step 2 of the data collection was achieved through semi-structured individual interviews. The convenience non-random sampling technique was adopted to select interview participants until data saturation was reached. Etikan *et al.* (2016) define non-probability sampling as an approach where samples are selected with a methodology that does not give all participants in the population the same opportunity of being included. Non-probability sampling was adopted because the researcher did not have access to a complete population database of all internal auditors who are employed by SOEs across Southern Africa. The absence of a sampling frame, which is the complete list of the target population, meant probability sampling could not be applied. In addition, the researcher believed that a selection of rich cases was more likely to provide useful insight than a random selection of cases. Information-rich cases in multiple sectors were more valuable to the development of the conceptual framework.

The type of sampling that was used for the identification of the cases was purposive sampling. Purposive sampling was used to select internal auditors from SOEs in Sothern Africa, that were readily accessible to the researcher and were willing to participate in the study. Due to the nature of the professional work of the researcher of business development for governance, risk, and compliance (GRC) software solutions provided by their organisation of employment, the researcher had access to a network of internal auditors. Given the confidential nature of internal audit work, internal auditors may not wish to share in-depth information on their use of GAS without establishing complete trust and a relationship with the researcher and for fear of being seen as inefficient or ineffective in executing their role. In addition, professional scepticism is a critical component of an internal auditor's duty of care which requires them to have a questioning mind. This attitude may result in internal auditors taking longer to be comfortable to participate in in-depth interviews until total trust is built between themselves and the interviewer. Participants from the researcher’s professional network were likely to have a trust relationship with the researcher built from previous interactions or associations and were therefore more likely to be willing to share in-depth information and unlikely to provide false information driven by a need to achieve social desirability.

The in-depth interviews were done for sixteen (16) internal auditors. According to Saunders & Lewis (2012), a minimum sample size of five (5) to twenty-five (25) should be enough to achieve saturation. The researcher targeted the Head of Internal Audit, the IT Auditor, and a financial auditor from each organisation to participate in the interviews.

The researcher managed to interview sixteen (16) internal auditor participants. The participants were from four (4) SOE’s in Southern Africa which were distributed as follows. Four (4) of the participants were from a bank in Zambia, three (3) participants were from a bank in Malawi, five (5) participants were from a power utility company in Botswana and four (4) participants were from an agricultural company in Botswana. In all four (4) SOEs, at least one (1) IT Auditor and one (1) financial auditor participated in the study. In the case of heads of internal audit, only one organisation did not have a participant at that level. However, in place of the head of internal audit, a senior member of the internal audit department participated in the study, which meant for all the participating organisations a view at a senior level was catered for. The researcher was of the opinion that saturation point was reached after the sixteen (16) interviews as no new information emerged from the last interview.

The limitation of the purposive sampling technique is the generalisability of the findings to the study population as it does not promote external validity. The use of multiple cases across SOEs in the financial, agriculture and power utility sectors enabled the development of a conceptual framework that is applicable in different sectors. The similarities and differences from each case will enable the researcher and readers to conclude its applicability in different sectors.

3.10 Data Collection Instruments

The two research instruments that were used for collecting both primary and secondary data were the review of secondary data and interviews. Integration of various data collection instruments is expected to increase the scope and depth of analysis.

3.10.1 Secondary Data

Secondary data was collected and reviewed from scholarly articles, peer-reviewed conference proceedings and journals from the internet (Google Scholar), the UNISA online and physical library, and textbooks. The analysis of secondary data played a critical role in providing the researcher with relevant background information on the study around the key constructs as well as provision of insight into previous similar work on GAS.

3.10.2 Interviews

Krishnaswami & Satyaprasad (2010) define interviews as a two-way organised conversation between an interviewer and an interviewee that intends to provide information pertinent to a specific objective. Semi-structured interviews were adopted for sixteen participants across four SOEs in three sectors. The interviews were done one-on-one; only the participant and interviewer participated in the interview. Since the study spanned several geographical locations across Southern Africa, where in-person interviews were difficult and expensive, electronic interview web conferencing platforms, such as Skype or ZOOM, were adopted to conduct interviews when face-to-face was not possible. The onset of the Covid-19 global pandemic and related travel bans also impacted the possibility of travel and face-to-face in person interviews, therefore the researcher leveraged off electronic web conferencing technologies to overcome this challenge.

Since the importance of the interviews was to provide background context and an in-depth appreciation of experiences and perceptions for the study, interviews facilitated the gathering of as much relevant information as possible. According to DiCicco-Bloom & Crabtree (2006), interviews are an effective qualitative method for getting rich and in-depth information about the experiences of individuals. Semi-structured interviews will enable the conversation to be focused on the key themes and constructs being studied, but at the same time, they are not structured to lead the interviewee toward preconceived choices. Therefore, the questions on the interview guide were broad and open-ended in nature to allow for new themes and constructs to emerge. An adaptive approach was used to make changes to the interview guide when new insights or constructs emerged after each interview. The objective was to improve the data collection process at each phase.

Silverman (2016) suggests that interviews provide evidence of the nature of the phenomena under study, which incorporates the context and situations in which these surface and provides insights into the cultural frames people use to make sense of these experiences and their social worlds. The semi-structured interviews enabled the researcher to probe deeply to get a thorough appreciation of the emerging data and phenomena.

According to Silverman (2016), qualitative interviews are ideal for understanding others' experiences and perceptions, as it provides a platform for exploring the points of view of the research subjects while granting the points of view the culturally honoured status of reality. He notes that a strength of qualitative interviewing is its ability to access self-reflexivity among interview subjects, "leading to the telling of stories that allow us to understand and theorise the social world." This study is exploratory in nature; hence the interviews were semi-structured. The benefit of semi-structured interviews was that it was flexible and adaptable when a change was necessary to improve the research.

A skeleton interview schedule was developed to guide the interviews. The interview schedule encompassed the key themes that emerged from the preliminary conceptual framework and theoretical background. The questions were open-ended in nature. The interview schedule served as a guideline rather than be cast in stone, as a dynamic approach was used in the actual interviews. The researcher had the flexibility to vary the order of the questions in the schedule depending on the flow of the conversation and, at times, change or adjust the interview schedule as the researcher adopted learnings from each previous interview. This interview schedule was tested with an industry expert with many years of experience using GAS technology to check if the questions addressed the research objectives. The interview schedule also included a list of comments and prompts to open or expand on a discussion. The adopted interview schedule is in the annexure of this document. The interviews were recorded to enhance the quality and completeness of the data collected.

3.11 Data analysis and interpretation

Data collected was primarily qualitative in nature; therefore, qualitative data analysis method was employed. A small amount of quantitative analysis was done to achieve descriptive statistics. Descriptive statistics were done to classify sex of participants, education level, managerial level, years of using GAS, IT or non-IT background, etc. Triangulation analysis enabled a combination of literature review, quantitative and qualitative analysis to provide comprehensive insight into the constructs under study.

Interpretive techniques were used to analyse and make sense of the qualitative data collected during interviews. The analysis of the qualitative data was inductive in nature, with the objective to identify important constructs in the data, as well as possible patterns and relationships through a process of discovery. The analysis focused on both the meaning of the data and an analysis of emerging themes that informed the development of the preliminary conceptual framework. Semi-structured interviews were recorded; therefore, making it essential to undergo a process of transcribing the recorded interview data for a comprehensive analysis of data. The process of data analysis resulted in the enhancement and refinement of the preliminary conceptual research framework.

3.12 Limitations of Study

This study is focused on internal auditors working for SOE's based in Southern Africa. The potential limitation is the generalisability of findings and the proposed model to other sectors as well as other geographical settings outside Southern Africa. The replication of the study at different sectors and geographical locations would enable better generalisability of the findings of the study.

This study is cross-sectional in nature and therefore does not study the post-adoption factors over a lengthy period, but instead is a snapshot of a single point in time. As a result, useful insights on how usage of GAS may evolve over time and its maturity usage cannot be observed. It is possible that the constructs under investigation can fluctuate over time depending on factors such as experience, age, training, change in technology etc. Time and budget limitations did not make it possible for a longitudinal study to be conducted.

The study will rely largely on the qualitative methodology of data collection with a limited amount of quantitative methodology used at the beginning. More quantitative methodology of data collection should be undertaken in future to provide a wider perspective to the present study. The use of case studies or content analysis to provide a holistic picture of actual experiences has the potential to provide more insight into the constructs under investigation.

The researcher leveraged off his network of internal auditors to identify participants who were likely to provide more comprehensive information to the research based on their experience with GAS and the SOEs in which they were employed. Participants were selected from three (3) Southern African countries: Zambia, Botswana, and Malawi. The absence of participants from South Africa, which is a major economic player in Southern Africa can be viewed as a limitation to the study.

A range of different research methods such as observations and document analysis can be applied to case studies to provide greater in-depth insight into the phenomenon under study. However, in this research, only interviews will be used because of the sensitive nature of the work done by internal auditors. It is the researcher's view that it will be very difficult or in some cases impossible to get access to the documents and reports that are produced by internal auditors as they may, in most cases, contain company sensitive and confidential information.

3.13 Ensuring Trustworthiness

The researcher adopted several measures to ensure the trustworthiness of this study by considering credibility, dependability, conformability, transferability, and authenticity. This was important as the study is primarily qualitative in nature. Gunawan (2015) notes that a study is trustworthy if, and only if, the reader of the research report judges it to be so. Therefore, it is important for the researcher's qualitative methodology and approach to be transparent and, hence, auditable to achieve trustworthiness. For the quantitative portion of the study, the researcher endevoured to maintain the reliability and validity of the study. Saunders *et al.* (2015) refer to reliability as "replication and consistency" and validity as "the appropriateness of the measures used, accuracy of analysis of the results and generalisability of the findings."

3.13.1 Credibility

To encourage honesty from the interview participants, all participants were given the opportunity to accept or refuse freely to participate in the study. This was done to ensure that the data collection phase involved only those participants who were genuinely willing to take part in the study; therefore, prepared to offer data and information freely. It was important for the researcher to establish a rapport right from the onset of each interview session to make the participants comfortable in a "non-judgmental" atmosphere. Participants were also advised that there was no right or wrong answer to put them at ease and encourage honesty.

To avoid participant bias, the face-to-face interviews were conducted in private meeting rooms so that the participants were comfortable with the set-up and that their confidentiality was guaranteed. Likewise, for the web-based interviews, privacy was still be maintained by ensuring that only the participant and interviewer were present for the interview. This increased the likelihood that the information the participants provided was reliable, avoiding false positive answers, which can occur when one feels there is an audience listening to the interview. The one-on-one session were expected to encourage the participant to be honest without fear of being judged by colleagues or other observers. This was also to likely to convince the participants that their participation in the interview, in terms of reporting, will remain anonymous.

The researcher also used member checking (respondent validation) from interview participants relating to the accuracy of data interpretation by asking the participants to read and review the transcripts of the interview session they participated in. The objective was to involve the participant to review and confirm that their words as transcribed match what they intended and ensure that the researcher's interpretation of the interview is accurate.

Triangulation was used by the researcher to control internal validity. Multiple sources of data, both primary and secondary, were collected to support the study. A review of existing literature and interviews was used. The different methods of data collection provided better assurance in interpreting the consistency of the concepts emerging from the data. The quantitative part of the study provided more context and background of the interview participants and the different organisational settings. This triangulation approach also increased the depth, breadth, and complexity of the study.

Peer debriefing (analytic debriefing) was another strategy employed by the researcher to achieve the dependability of the study. The researcher discussed the research methodology, data analysis and interpretations on an ongoing basis throughout the research process with his research supervisor from UNISA. The objective was for the supervisor to meaningfully question the researcher's interpretations, perspectives, and conclusions to enhance credibility and trustworthiness. Meaningful and critical conversation between the researcher and his supervisor provided a platform to ensure emerging themes and the conceptual framework were sensible and derived from the collected data.

3.13.2 Transferability

To make the results of the study applicable to a wider population, the researcher provides detailed contextual information about the fieldwork to enable readers to make such a transfer. The information on the issues below will be provided:

- The number and nature of organisations taking part in the study and where they are based;
- A description of the research population and sampling technique;
- The number of participants involved in the fieldwork;
- The data collection methods that were employed;
- The number and length of the data collection sessions;
- The time period over which the data was collected; and
- The interview schedule used.

3.13.3 Dependability

To address the issue of reliability, the researcher provided as much detail as possible about the research design and methodology to show that if the work was repeated in the same context, with the same methods and with the same participants, similar results would be obtained.

To ensure that the qualitative aspects of this study (interviews) are dependable, any changes that revised the proposed methodology and research strategies were recorded to produce a reliable account of the emerging research focus. Recording of the interviews also ensured the researcher could listen to the interviews multiple times to ensure they are interpreting and capturing the views, experiences, and perceptions of the participants accurately. This also provided better assurance and accuracy at the data analysis phase of the study.

Before engaging in the actual data collection, a pilot study was done of the interviews to identify any flaws in the research instrument to avoid mistakes that might have been overlooked. This process contributed to the identification of errors, unclear terminology, ambiguity, and unclear wording of the research instruments.

3.13.4 Confirmability

The researcher took the necessary steps to ensure that the research findings were derived from the independent experiences, perceptions, views, and ideas of the participants rather than the views and preferences of the researcher. Bracketing was adopted to establish the researcher's independent and neutral mind frame to avoid any biases or personal preferences when analysing the data. The detailed research methodology description should enable the reader to determine how far the data and constructs emerging from it may be accepted.

The researcher's neutrality of research interpretations was crucial to achieving confirmability. This was achieved through maintaining an audit and decision trail of raw data, personal notes, and analysis notes, as well as preliminary developmental information.

3.14 Ethical considerations

This section will look at the ethical principles that guided the implementation of this study. According to Mack *et al.* (2011), research ethics essentially deals with the interaction between researchers and the people they study. The researcher was guided by the ethical standards set out by UNISA's Ethical Committee that required the researcher to consider the needs and concerns of the research population.

3.14.1 Protection from Harm

All participants in the study were treated in a courteous and respectful manner. The researcher ensured participants were not inconvenienced by ensuring interviews were arranged at a convenient time. Suitable and convenient venues were selected in the case of face-to-face interviews.

3.14.2 Voluntary and Informed Participation

All participants were given the freedom of choice to participate in the interviews with no negative consequences if they decided not to participate. Participants were also advised on the nature of the research so that they were sufficiently informed to make a reasonable judgment whether they wanted to participate. Participants were made aware of the option to withdraw their participation from the study at any time, if desired, with no requirement to provide any explanation to the researcher. Each participant provided written consent of their voluntary willingness to participate in the study by signing a consent form provided by the researcher.

3.14.3 Right to privacy

Participants were assured that their responses would remain confidential and anonymous. A statement to that effect was also be included in the written consent that was signed by all participants.

3.15 Conclusion

In this research methodology chapter, the research philosophy, approach, strategy, and choice are explained, and their selection justified. The time horizon, data collection approach, target population, sampling methods, data collection instruments and limitations of the study were defined. Strategies to ensure trustworthiness and ethical considerations were also described.

The adopted qualitative research methodology provided rich insights and understanding of the factors influencing the utilisation and continued usage of GAS post-adoption. The open-ended interview questions enabled participants to be expressive of their experiences and perceptions which provided greater meaning, understanding and context to the constructs and themes employed to develop the conceptual framework. In the researcher’s view, saturation point was reached after sixteen (16) interviews. The purposive sampling technique of the criterion sampling strategy facilitated the selection of relevant and ideal cases, which provided deeper insight into understanding GAS user experiences, perceptions, and challenges. Strategies employed to ensure the trustworthiness of the study were credibility, dependability, conformability, transferability, and authenticity.

The following chapter presents an analysis of the organisations and interview participants that engaged in the study, to provide more context and profile of the targeted study population.

Chapter 4 - Data Analysis & Interpretation

The Research Methodology was developed in Chapter 3, and following that, Research Ethical Clearance was granted by the SBL Research Ethics Review Committee on 5 September 2019. The research design and methodology set out to collect data from the participants was qualitative in nature, using semi-structured interviews. The data collection process characterised by one-on-one interviews spanned a period of five months.

The focus of this data analysis and interpretation chapter will be to describe how the data was collected and provide a background of the organisations and internal auditors who participated in the study. The interview schedule, attached in the annexure, was utilised to provide structure to the interview process for effective data collection in alignment with the research questions. It is expected that this information will provide deeper insight into and context of the interview participants, which is necessary for further analysis of the interview responses to address the research questions. Data were collected from sixteen (16) face-to-face interviews across the financial, agricultural, and utility sectors of SOEs across the following three Southern African countries, Zambia, Botswana, and Malawi.

The participants' real names will not be revealed in the study; instead, they will be referred to as participants to keep the identity of the interview participants completely anonymous. A combination of tables, pie charts, and verbal descriptions of the data will be used to present and analyse the data, as necessary. Finally, conclusions are drawn from the findings, and the initially proposed conceptual framework will be enhanced based on any new findings.

4.1 Background of participating parastatals and sectors

The objective of this study is to propose a conceptual post-adoption framework for continued use of GAS by internal auditors in Southern African SOEs. Therefore, internal auditors using GAS employed by SOEs in Southern Africa were the target participants for this study. The purposive non-random sampling technique adopting a criterion sampling strategy was used to select the SOEs that participated in the study. The researcher is of the view that the selected cases were suitable for highlighting and providing deeper insight into GAS user experiences, perceptions, and challenges. The following sections will provide a detailed overview of the selected SOEs and their respective sectors, as well as the profiles of the participants who were interviewed.

4.1.1 Countries

The participating SOEs were spread across three countries in Southern Africa, as shown in Figure 4.1:

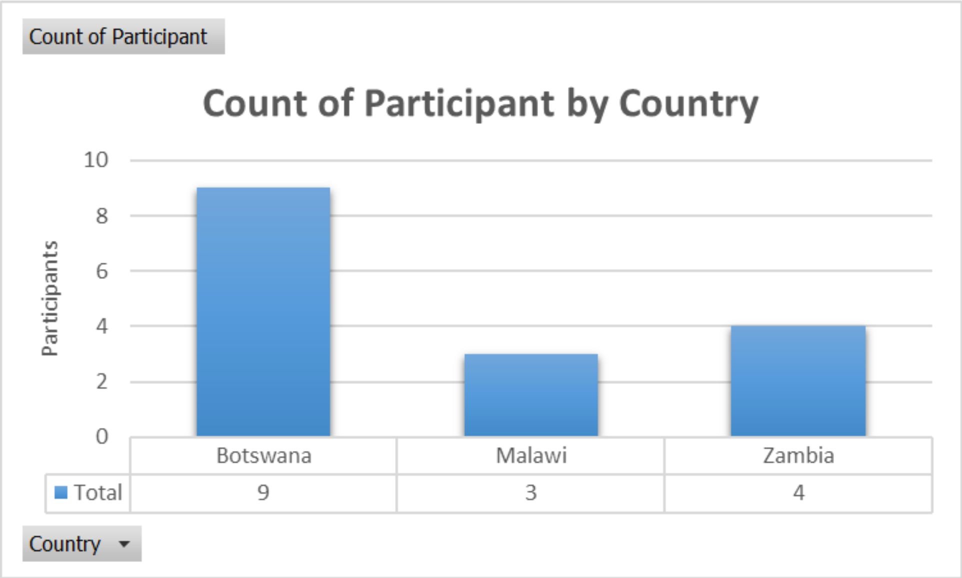


Figure 4.1 *Participant Count by Country*

The highest number of participants were from Botswana, totalling nine (9), followed by Zambia totalling four (4), and then Malawi with a total of three (3) participants. The participants from Botswana were spread across two (2) SOEs whilst for both Malawi and Zambia, the participants were employed by one (1) SOE, respectively. Participants from these countries were more accessible to the researcher because of the nature of his work, which is largely focused on these countries, therefore no participants from South Africa participated in this study.

Owing to the nature of the professional work of the researcher, who was employed in the field of business development across Southern Africa at an organisation licensed to distribute governance, risk, and compliance (GRC) software at the time of the study, he had access to a network of internal auditors with whom he or his work colleagues have interacted. The researcher therefore targeted countries and SOEs where he had established professional relationships and was of the view the nature of the SOEs would provide the greatest wealth of information and an in-depth view of GAS users experiences. In addition, participants from the researcher's professional network were likely to have developed trust based on the relationship established with the researcher from previous interactions or associations and therefore were likely to be more willing to share in-depth information and unlikely to share false information to achieve social desirability.

According to the African Development Bank Group (2020), Southern Africa's Gross Domestic Product (GDP) growth had the lowest growth rates in 2018 and 2019 compared to other parts of the world. This was a reduction in comparison with 2011 to 2017 when this region had a higher GDP than other developed economies globally. Factors attributed to the decline in economic growth in 2019 included depressed global demand, supply-side constraints, weak commodity prices that undermined export growth and constrained fiscal space. In addition, extreme weather patterns such as droughts and cyclones impacted economic growth in this region.

The African Development Bank Group (2020) reported that Botswana and Zambia were ranked in the top four of the largest economies in the Southern African region. A report by the International Monetary Fund (2019) on the Sub-Saharan Africa Regional Outlook aggregated countries into the following groups: other resource-intensive countries, non-resource-intensive countries, middle-income and low-income countries. Other resource-intensive countries were those where non-renewable natural resources represented 25 per cent or more of total exports, whilst non-resource-intensive countries are not classified in the preceding nor are they oil exporters. The middle-income countries had more than US$995.00 per capita, whilst those with less than that per capita were classified as low-income countries. The GDP was averaging the per capita gross national income for countries in Africa in the years 2015–17, as per the World Bank reports. Botswana and Zambia both fell into the other resource-intensive countries and middle-income countries. Malawi was categorised as a non-resource-intensive and low-income country.

Based on the above-mentioned background and analysis concerning the countries participating in this study, Botswana and Zambia can be viewed as amongst the top-performing economies in the Southern African region, whilst Malawi is amongst the least performing countries. Interview participants were consequently representative of different country economic performance levels. The researcher did not observe any significant differences from the interview participant's GAS experiences, which could be attributed to the differences in countries or the countries' economic performances.

It is noteworthy that the African Development Bank Group (2020) report on Southern Africa recognised the impact of the Fourth Industrial Revolution (4IR), along with connectivity and innovation, to not only be disruptive to many jobs but also present an opportunity for the creation of a wide range of new jobs in fields such as science, technology, engineering, and mathematics (STEM), data analysis and computer science. The researcher found this prediction captivating as it places much importance on the future of GAS as a tool that can be leveraged to enhance the function of data analytics and, therefore, the relevance of this study.

4.1.2 Sector

The sample population was representative of three sectors. The three sectors that participants were categorised under were the financial, agricultural, and power utility sectors, as shown in Figure 4.2.

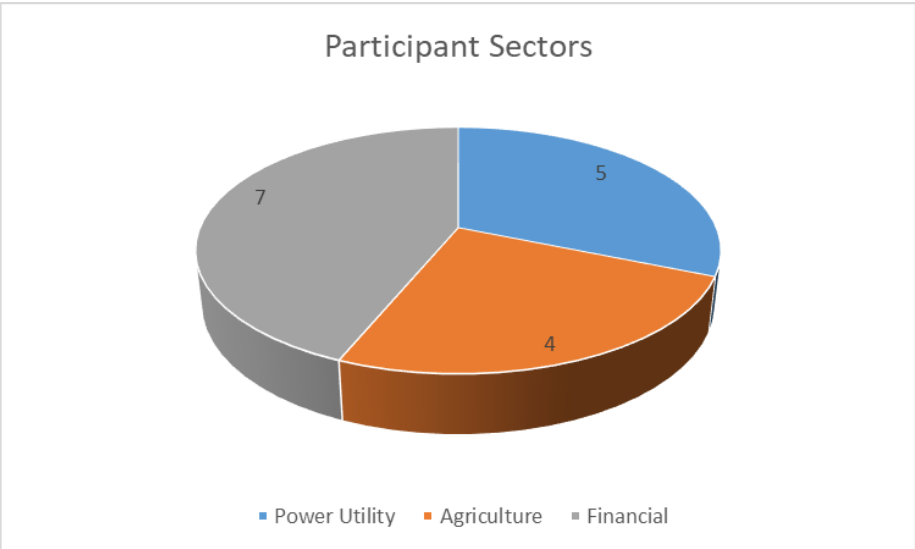


Figure 4.2 *Participant Sectors*

Most participants were from the financial sector, making up 43,75 per cent of the total participants, followed by the power utility sector which made up 31,25 per cent of the participants. The least number of participants were from the agriculture sector which contributed 25 per cent of the total participants. The agriculture, power utility and financial sectors represent the three main sectors in the economy which are primary, secondary/manufacturing, and tertiary/service sectors. The four case organisations that participated in the study are categorised as per sector Table 4.1.

Country	**Sector**		
	Financial Sector *(Tertiary/services*	**Agricultural Sector** *(Primary)*	**Power Utility Sector** *(Secondary/manufacturing)*
Botswana		1	
Malawi	1		1
Zambia	1		
Total	**2**	**1**	**1**

Table 4.1 *Participating SOEs by country and sector*

Wiseman & Wolhuter (2019) found that most countries in Africa are still heavily commodity-driven, and most farmers in the agricultural sector are subsistence farmers, with the implementation of commercial farming facing challenges to expand. They observed that secondary (manufacturing industries) and tertiary (service sector) economies are however gaining momentum. In alignment with this, the African Development Bank Group (2020) reported that the service sector accounts for over 50 per cent of the GDP of most of the Southern African regional economies, however, a decline is anticipated in 2020 in the face of the Covid-19 pandemic. In terms of GDP contribution, the service sector has the highest contribution, followed by the manufacturing sector and lastly agriculture in the Southern African region. In this study, most of the participants were from the service sector, with almost equal representation between the agricultural and power sector.

According to Biekpe & Banya (2017), “Banking in Africa has witnessed significant reforms over the last three decades following a long period of poor performance.” They noted that reforms in the sector have resulted in the liberalisation of interest rates and credit markets on the continent amongst other things. Due to transparent financial regimes and where financial sector reforms have been implemented in developing countries, it has been observed that competition in the banking industry has generally improved. With almost half of the interview participants coming from the financial sector, the researcher is of the view that this captures the significance of the banking sector in the Southern African economies.

The service (financial), industry (power utility) and agriculture sectors all remain significant and important contributors to the economies in the Southern African region. Despite the declining GDP contribution of agriculture in the region, according to Adom *et al.* (2018), this sector employs 60 per cent of the total labour force in the region. It is therefore valuable that the SOEs participating in this study are representative of all these three sectors.

4.1.3 Organisation

Interview participants were selected from the following four SOEs:

1. A bank in Zambia
2. A bank in Malawi
3. A power utility in Botswana
4. An agricultural organisation in Botswana

Although selected participants were employed at these SOEs during the data collection period, several of them had also previously worked in other SOEs in their respective countries where they had also used GAS technology. As a result, the perspective from these participants incorporated their cumulative experience with GAS; therefore, it was expected their views were representative of a broader number of organisations and a wealth of experience from other organisations that were not necessarily participating in this study. The researcher found that it was common for the internal auditors to have worked for more than one organisation, and it was highly likely that they had worked previously for another SOE or government entity. That being so, the wealth of experience from the participants was expected to be valuable and rich in insight as far as GAS user experience is concerned.

4.1.3.1 The bank from Zambia

The bank in Zambia is an SOE with its head office located in the capital, Lusaka. The bank has thirty-eight branches throughout the country. It administers funds on behalf of any person or agency, accepts deposits, operates saving schemes, provides loans and conducts any form of banking business. Its products/services are categorised into fixed deposits, commercial SME accounts, collection accounts and overdrafts. The bank endeavours to provide innovative, convenient, and affordable financial services to its customers.

Like many financial institutions, this bank generates huge volumes of transactional data that its internal audit team needs to analyse to provide comprehensive assurance. At the time of the study, the core banking application for the bank was Flexcube. According to Oracle (2020), "Oracle FLEXCUBE Universal Banking is designed to modernise a bank's core systems efficiently and transform the bank to a digital, agile, connected and efficient bank of tomorrow." The bank adopted GAS in the year 2012.

4.1.3.2 The bank from Malawi

The core values of this bank are transparency, integrity, professionalism, innovation, teamwork, and efficiency. The ERP used by the bank to manage day-to-day business activities across all business processes is the Oracle E-Business Suite Applications (EBS).

4.1.3.3 A power utility organisation in Botswana

The power utility company is an SOE based in Botswana with its head office in Gaborone. The mission of the organisation is to provide safe, competitive and reliable electricity services.

According to the annual report of this organisation, the internal audit department has adopted a dynamic risk-based audit methodology to develop its Internal Audit annual plan. The report further explains that this methodology recognises the dynamic nature of the risk faced by the organisation, and therefore plans to respond accordingly.

The organisation uses SAP ERP to manage its business processes. SAP ERP is enterprise resource planning software developed by the German company SAP SE which incorporates the key business functions of an organisation. As a power utility, it generates a huge volume of transactional data that the internal audit team needs to analyse to deliver on its mandate and provide assurance.

4.1.3.4 An agriculture organisation in Botswana

The agriculture organisation is a parastatal based in Botswana. The organisation provides a wide range of products, ranging from frozen meat, canned meat and by-products.

At the time of the study, the internal audit department was made up of four (4) internal audit team members. The organisation uses Oracle ERP to manage its business processes. The organisation adopted GAS tools in 2016.

4.2 The data collection process (interviews)

The data collection process spanned a period of five months, with the first interview being conducted on the 23rd of October 2019 and the last one being completed on the 18th of March 2020. The interviews were done face to face where in-country visits were possible, but the majority was done remotely using Microsoft Teams video conferencing software. According to Microsoft (2020), Microsoft Teams is one of the apps available on Microsoft 365, which serves as a unified communication and collaboration platform for chat, video meetings and conferencing, and includes audio, video, and screen sharing to enhance team collaboration. It also has secure file storage capabilities, which made it possible to record the interviews and securely store them. Participant consensus was always achieved before the video recording was initiated. All participants were agreeable to the interview sessions being recorded, which had enhanced the quality of the data analysis process.

Microsoft Teams proved to be very effective with only one interview facing disruptions due to unstable internet connectivity challenges. The disruption was so severe that the interview had to be cancelled and rescheduled to be done face to face. In all cases of using Microsoft Teams, the camera of both the participant and interviewer were switched on to enable observations of non-verbal communication cues, which would have only been possible in a face-to-face environment in the past. The use of a video camera was also important to achieve the authenticity of the participant.

The researcher had initially aimed to conduct fifteen (15) interviews with the expectation that at this point the interviews would have reached saturation point. Sixteen (16) interviews were conducted from four (4) SOE's. The researcher is of the view that on completion of the last interview, saturation point had been reached and did not believe that conducting additional interviews was going to add any value to the study. Interview sessions averaged thirty-six minutes and fifty seconds, which was in line with the expected estimation of forty minutes per session that the researcher had budgeted for. However, some participants interviews were more than forty minutes, with the longest interview lasting one hour and three minutes. It was typical of the participants with the most years of experience with GAS or those who held the "Data Analytic" champion positions to have the longest interviews as they had much more information to share and contribute in terms of their personal views, experiences, and perceptions.

In all cases, the researcher was satisfied that the participants made themselves available for sufficient, uninterrupted time to focus on the interview and contribute as much as possible without disruption due to other commitments or responsibilities. The researcher's approach to setting interview times that were convenient for the participants could have possibly contributed to the focused interview sessions. It was only in a few cases where interviews were rescheduled because participants had to attend to other urgent commitments, which gave the researcher the overall sense that participants willingly participated in the interviews and showed interest in the study, thus giving their participation some level of importance and commitment. This also gave the researcher a strong sense that the study was relevant to the profession, and the findings will further knowledge of how GAS can be effectively adopted.

Of the five (5) SOE's that the researcher had initially targeted to participate in the study, only one (1) did not provide the authority to participate. When the participants were approached to participate in the study, they showed their willingness. Unfortunately, due to the lengthy, bureaucratic processes that the participants had to go through to get authorisation to participate, this clearance was not received in the timeframes that the researcher sought approval from the university ethical clearance committee to enable the data collection process to commence. As a result, participants from four (4) SOE's participated in this study.

The structure of the interviews was guided by the interview schedule, which the researcher had prepared prior to the data collection phase. Few changes had to be made to the interview schedule as the interviews progressed, as it adequately guided the interviewer and interviewees to have relevant discussions for the study. A few questions were tweaked to make them clearer and more understandable for the participants. The researcher felt each of the questions were relevant and enabled the participants to provide contributions in line with the purpose of the study and, therefore, provide the researcher with a good understanding of their different views, perceptions, and experiences with GAS technology. The interview schedule is attached as an annexure of this thesis.

4.3 Profile of interview participants

The researcher managed to conduct interviews with a total of sixteen (16) participants from the four (4) different SOEs. This is in line with the number of participants that the researcher had set out to interview during the planning process. The interviewer expected to interview fifteen (15) participants but ended up interviewing an additional person. It is the interviewer's opinion that with the sixteen (16) participants, a point of saturation had been reached; no new information would have arisen from additional interviews. Table 4.2 provides an overview of the interview participants' profiles.

Participant	Unique Identifier	Age	Gender	Qualification Level	Job level	Position	Years of experience in Internal Audit	Years Using GAS	Name of GAS Used	Undertaken Formal Trainng in GAS	IT Expertise	Country	Sector
1	R1	38	Male	Undergraduate Degree	Middle	Internal Auditor	14	10	IDEA; ACL	Yes	Intermediate	Botswana	Utility
2	R2	28	Female	Postgraduate Certificate	Junior	Information Systems Auditor	4	3	ACL	Yes	Intermediate	Botswana	Agriculture
3	R3	45	Male	Masters Degree	Senior	Manager Information Systems	19	19	ACL	Yes	Expert	Malawi	Financial
4	R4	42	Male	Masters Degree	Senior	Principal Internal Auditor Information Systems	19	15	ACL; Microsoft Access	Yes	Expert	Malawi	Financial
5	R5	39	Male	Undergraduate Degree	Middle	Internal Auditor	11	7	ACL	Yes	Intermediate	Botswana	Agriculture
6	R6	31	Female	Professional Qualification	Junior	Internal Auditor	10	2	ACL	Yes	Expert	Botswana	Utility
7	R7	33	Male	Masters Degree	Senior	Chief Risk Officer	8	10	ACL; SPSS; Megastats; Minitab	Yes	Basic	Zambia	Financial
8	R8	42	Male	Masters Degree	Middle	Principal Information Systems Auditor	10	5	ACL	Yes	Expert	Malawi	Financial
9	R9	46	Male	Masters Degree	Senior	ICT Audit Manager	16	13	ACL; IDEA	Yes	Expert	Zambia	Financial
10	R10	29	Female	Undergraduate Degree	Junior	Internal Audit Officer	4	3	ACL	Yes	Basic	Botswana	Agriculture
11	R11	36	Male	Postgraduate Certification	Senior	Acting Chief Audit Executive	10	3	ACL	Yes	Basic	Botswana	Agriculture
12	R12	50	Male	Postgraduate Certification	Senior	Chief Audit Executive	22	14	ACL	Yes	Basic	Botswana	Utility
13	R13	42	Male	Masters Degree	Middle	Internal Audit Manager	8	4	ACL; MyClient	Yes	Basic	Botswana	Utility
14	R14	32	Female	Professional Qualification	Middle	Senior Internal Auditor – Systems & Operations	8	4	TeamMate Analytics; ACL	Yes	Expert	Botswana	Utility
15	R15	39	Male	Undergraduate Degree	Middle	Internal Controls Analyst	10	4	ACL	Yes	Intermediate	Zambia	Financial
16	R16	58	Male	Masters Degree	Senior	Internal Audit Director	17	8	ACL	Yes	Basic	Zambia	Financial

Table 4.2 *Profile of interview participants*

Research participants were profiled according to age, gender, educational qualifications, job level, designation, years of experience in the internal audit profession, years of experience using GAS technology, types (names) of GAS technology used, level of IT expertise, country, and sector in which their SOE of employment was categorised. It was of interest for the researcher to explore if any of the listed profile attributes influenced the adoption and user experience of GAS technology. In the following sections, a detailed analysis of the research participants will be provided.

A unique identifier was assigned to each of the interview respondents, to make for easier identification of the participant e.g., R1, R2, etc. The unique identifier is included in Table 4.2. During the analysis of data, the unique identifier is used after each verbatim quote for easier referencing and identification of the respondent.

4.3.1 Gender

The gender of the participants in the interviews is shown in Figure 4.3.

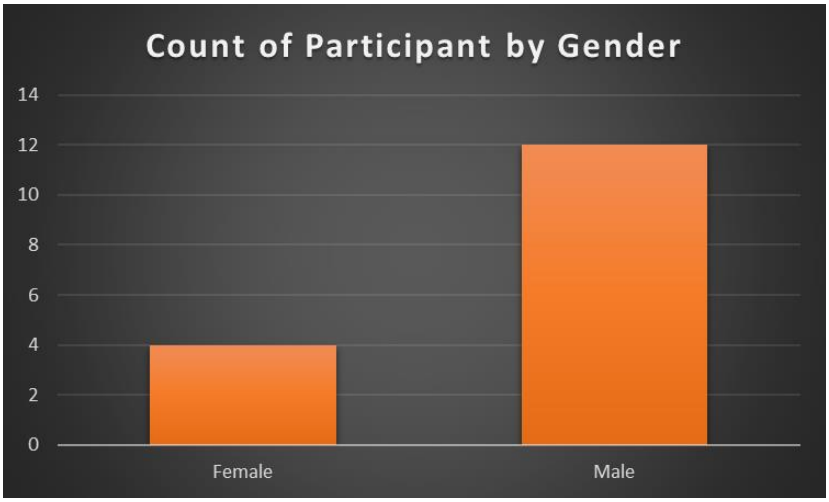


Figure 4.3 *Number of Participant by gender*

Out of the sixteen (16) participants, four (4) of them were female, and twelve (12) were male. Gender was not used as a criterion to select participants and was not expected to have an impact on the perceptions, views, and experiences of GAS for participants. The reality that 75 per cent of the participants were male may be reflective of the dominance of males in formal employment in the internal audit profession. Through general observation by the researcher during the time of the study and his professional employment engagement, this seems to be the case in the Southern African region, excluding Botswana. In fact, from this study, all four (4) female participants from the study were from Botswana, with no representation in the other countries. Female participants were represented in both the power utility and agricultural sectors.

The researcher did not observe any distinct traits or GAS user experiences that were influenced by the gender of the participants.

4.3.2 Age

The age of the interview participants is reflected in Table 4.3 and Figure 4.4.

Participant	Age
1	38
2	28
3	45
4	42
5	39
6	31
7	33
8	42
9	46
10	29
11	36
12	50
13	42
14	32
15	39
16	58

Table 4.3 *Interview participant age*

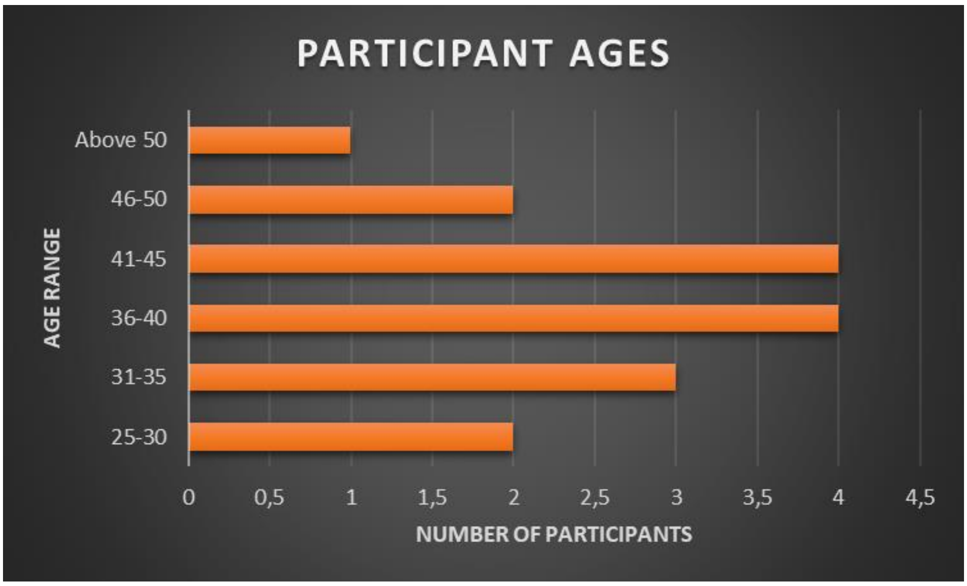


Figure 4.4 *Interview participant ages*

The average age of the participants was 39,38. The age of the participants ranged from twenty-eight (28) years to fifty-eight (58) years. The wide distribution of age provided the researcher with an opportunity to observe whether age contributed to any patent differences between participants in terms of their perceptions, experiences, attitudes, and views towards GAS. Most of the participants were in the thirty-six (36) years to forty (40) years range and the forty-one (41) years to forty-five (45) years range, each of these ranges was represented by four (4) participants each. Therefore, 50 per cent of the participants fell into the thirty-six (36) year range to forty-five (45) year range.

Several of the research participants regarded age as a factor that contributed to the slow or non-adoption of GAS technology. They felt that the older generation that was used to traditional ways of auditing was resistant to change mainly due to fear of the unknown and preferred to continue auditing in the manner they had been doing for many years. This is in line with the prevailing mindset that younger people value and more readily adopt technology, as noted by Harris *et al.* (2016). They found that older consumers see more value in traditional, physical-based banking whilst all ages were equally interested in currently emerging technologies (online), with the younger users more interested in the newest technologies.

However, it was noteworthy to find that the eldest participant, who was fifty-eight (58) years of age, was one of the top adopters of the GAS software amongst the participants and played a data analytic champion role in their respective organisations. The researcher also found that participant 12, who was the second oldest, at the age of fifty (50), also displayed a strong passion, drive and understanding of GAS and played a significant role in advocating for the adoption of GAS technology in their respective organisation.

Participant 2 was the youngest interview participant at the age of twenty-eight (28). She displayed a strong passion, perception, view and understanding of GAS technology as well. However, she was limited in the experience of optimum use of the platform, given that she had used GAS technology for only three (3) years. Similarly, Participant 10, who was the second youngest at the age of twenty-nine (29), showed a good understanding and positive perception of GAS technology; however, she was not utilising it optimally due to her limited years of experience in using GAS and working in the internal audit profession.

In terms of the impact of age on usage and perception of GAS technology, the researcher did not observe consistent feedback and, therefore, could not conclusively attribute age as a factor that influenced the adoption of GAS technology. This finding is in alignment with a study on e-learning by Fleming *et al.* (2017), which found that, despite the often-accepted stereotype, age was not a significant factor impacting either future use intentions or satisfaction with e-learning.

4.3.3 Years of Experience in Internal Audit

The total number of years of experience in internal audit of interview participants was captured and is reflected in Figure 4.5.

Figure 4.5 *Participants' total number of years in the internal audit profession*

The years of experience of interview participants ranged from four (4) to twenty-two (22) years in the internal auditing field. The participants' average number of years' work experience in the internal audit profession was an average of 11,88 years.

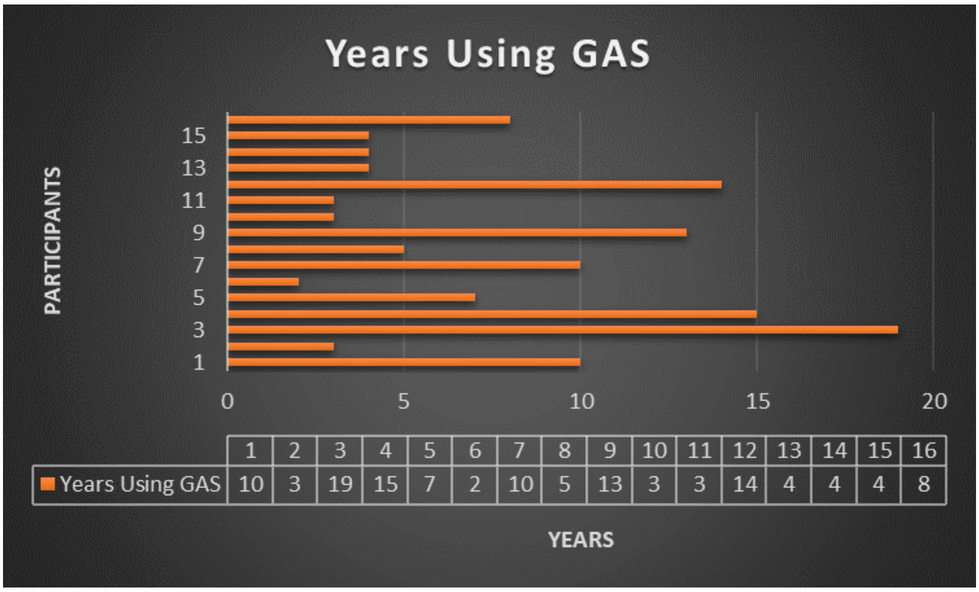
The researcher was of the view that capturing the years of experience of interview participants was significant in providing an appreciation of their exposure and experience in the field of study. Software tools are designed to make the work of users more effective and efficient to enhance their likelihood of achieving their objectives in an easier, more timely and accurate manner. Therefore, a user who does not have any experience or know-how to do their core job will not be able to benefit from software tools, and as a result, the likelihood of adoption and utilisation of the tools can be expected to be low. In this case, the average of 11,88 years implies participants had a good knowledge of their jobs and their role in the organisation, as most participants were close to or above ten (10) years of experience working in the internal auditing field. The researcher was also of the view that he could get a wide and diverse view on the area of study from these participants who held a wealth of experience.

As was expected, the younger participants had the least number of years of working experience in the internal audit field and the older participants had the most. The least number of years of experience in the internal audit field was four (4) years, whilst the highest was twenty-two (22) years. Most participants who had higher years of experience within the internal audit space had also been exposed to the use of GAS in more than one organisation, and for some, in more than one SOE. This meant they could reach out to prior experiences of GAS usage in other SOEs and contribute a more comprehensive view of the area of study.

As per the earlier observation on the impact of age on the views, perception, and adoption of GAS in respect to age, the researcher did not observe any significant differences in views, perceptions, and adoption of GAS in relation to the total number of years of experience working within the internal audit space.

4.3.4 Years Using Generalised Audit Software

Data was collected to appreciate the total number of cumulative years the research participants had used GAS technology. The cumulative number of years considered were from the actual user's first introduction or allocation of the GAS software license. The researcher felt it was important to collect information on this to understand its impact on the view, perception, and usage of GAS by the participants. The researcher intended to establish if there was going to be progressively better utilisation of GAS technology as the maturity in relation to the number of years of usage increased. The years of experience of interview participants using GAS is reflected in Figure 4.6.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Years Using GAS	10	3	19	15	7	2	10	5	13	3	3	14	4	4	4	8

Figure 4.6 *Participant number of years using GAS*

The average number of years participants had used GAS technology was 7,75 years of experience. The largest number of cumulative years of a participant using GAS was nineteen (19), with the least number of years of experience being three (3), and this was the case with three (3) of the participants. Based on the average and the least number of cumulative years of experience of participants using GAS technology, the researcher was confident he would be able to get a comprehensive and diverse view from participants in relation to the research questions.

The researcher found from the interviews that the view, perception and overall adoption and utilisation of GAS technology by participants did not show any relation to the number of years of one using GAS technology. A general belief would be that a participant who has been using a certain technology or software the longest would be more proficient in the use of the tool and would have been more likely to have experienced the benefits and efficiencies of the tool over the prolonged years of usage. However, from the research participants, this was not the case with some participants with a smaller number of years using GAS appearing to be more proficient and knowledgeable of GAS technology. Some of the participants with a lower number of years of GAS usage showed more passion and belief in GAS technology. However, this was not always the case, with some participants who had adopted GAS technology for the longest number of years displaying more maturity and appreciation of GAS technology, especially those who held leadership positions in the various

SOEs and had taken ownership to drive the technology for the rest of the team members.

It was unexpected to find that participants with over five (5) years of using GAS technology found it easier to use the software, but this was not consistently the case with several participants finding GAS still very complex to use, despite having had user licenses to explore and practice for that long. This observation suggested that GAS tools had a lengthened learning curve.

4.3.5 Job Level

Participant job levels were categorised into the following three layers: junior, middle, and senior. Junior level represented employees who did not have any supervisory, management and leadership positions in their organisation of employment. The middle level represented employees with supervisory and junior management roles. Whilst senior levels were for employees with senior management and directorship positions in their organisations of employment. The representation of participants in terms of the job levels was captured, as shown in Figure 4.7.

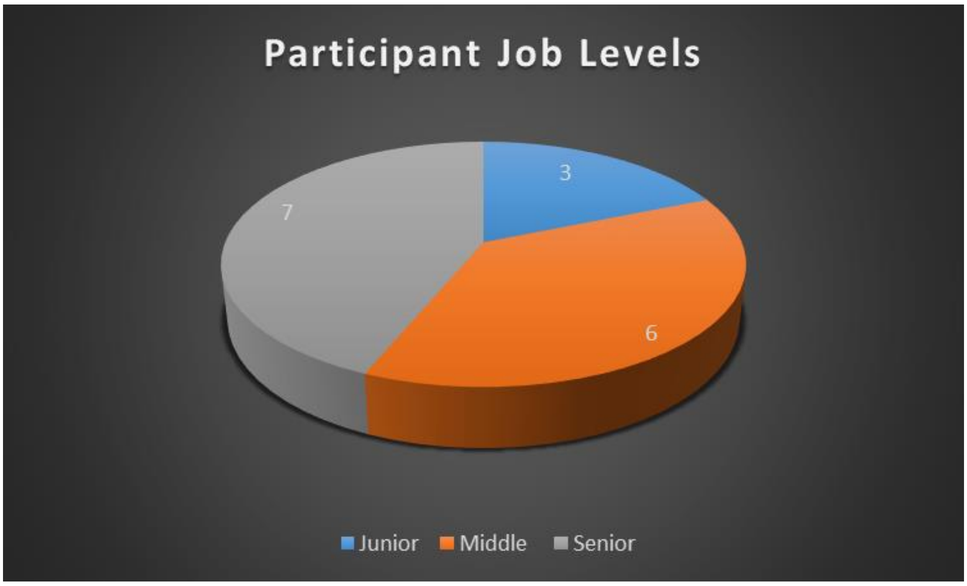


Figure 4.7 *Number of participants per job level*

Most of the participants were in the senior job levels which accounted for 43.75 per cent of the total participant population. This was followed by participants in the middle job level which represented 37.5 per cent of the population and the least represented job level was the junior level which accounted for 18.75 per cent. This was in line with the way the participants were represented in terms of years of experience with many of the participants having more than ten (10) years of working experience. It is likely that with more years of experience participants began to assume greater responsibility within their various roles.

The reality that the different job levels were represented by the interview participants meant that GAS perceptions, views and experiences were captured from different job level perspectives, and as a result, the contribution to the conceptual GAS framework would apply to employees of all job levels. The researcher also expected that the usage levels and focus of GAS by different levels would differ because of different job specifications; hence, he felt representation by the different job levels would enable these different job aspects to be captured.

4.3.6 Job Title

The different job titles of the interview participants were captured and represented in Figure 4.8.

Participant	Position
1	Internal Auditor
2	Information Systems Auditor
3	Manager Information Systems
4	Principal Internal Auditor Information Systems
5	Internal Auditor
6	Internal Auditor
7	Chief Risk Officer
8	Principal Information Systems Auditor
9	ICT Audit Manager
10	Internal Audit Officer
11	Acting Chief Audit Executive
12	Chief Audit Executive
13	Internal Audit Manager
14	Senior Internal Auditor – Systems & Operations
15	Internal Controls Analyst
16	Internal Audit Director

***Figure 4.8** Interview participants job titles*

The target participants of the study were internal auditors who worked within the target SOE organisations in Southern Africa. The participants had varying job titles but were all members of the internal audit department in their various organisations. One outlier in terms of the job titles was the title Chief Risk Officer of Participant 7, who the researcher managed to confirm was part of the internal audit department.

The table above has been colour coded to reflect titles that were categorised into financial internal auditor, IT Auditor and Chief Audit Executive (CAE). It was intriguing to the researcher that the CAEs, who are the Heads of Internal Audit departments at the executive level, managed to participate from all the targeted SOEs. Not only did this provide great insights about the adoption and usage of GAS from their senior position, but also implied the level of importance that GAS has been given in the different organisations. As the most senior position in the department, the CAE is ultimately responsible for driving the vision of GAS in the internal audit departments; hence, their participation was valuable.

The feedback from all the participants as per the interview responses, was aligned and consistent when it came to the view of what role on the internal audit team the CAE needs to play to achieve the successful and continued use of GAS. The view was that the CAE needs to take ownership and drive the adoption of GAS to ensure it is optimally and sustainably utilised in the various organisations. The level of passion and genuine belief in the value of GAS of a CAE filter down to the other internal audit team members, and this greatly affects the level of adoption and support of GAS in the organisation. The fact that CAEs from all the target SOEs participated in the study gave the researcher confidence that their valuable input towards the development of the conceptual GAS model would likely make it effective and valuable in the internal audit space.

It was noteworthy to the researcher that five (5) of the participants were IT Auditors. IT/IS Auditors normally carry the responsibility for IT and IT-related audit projects within their organisations. IT audits are important for evaluating internal control and processes to ensure the organisation's data are secure from external or internal threats. Their work is characterised by collecting and reviewing data from databases, software programs and information management systems. They normally have an IT related background or are Certified Information Systems Auditors (CISA). Because of their role and qualifications, the researcher has observed that these auditors mostly play the "data-analytic champion" role in their various organisations, which assumes the technical expertise role of using GAS technology and providing internal support to the rest of the team members. This was the case for the IT Auditors from the research participants, and it was observed that they tended to be the ones who had the greatest usage and appreciation of GAS technology within their various organisations. It was observed that when the "Data Analytic Champion" role was clearly demarcated in the organisation, internal audit teams tended to benefit more from the use of GAS and the adoption and utilisation tended to be higher. IT Auditors who took on this role seemed to be more motivated to ensure successful utilisation and tangible ROI of GAS in their organisations.

4.3.7 Participant Qualifications

The participant qualifications were captured as shown in Figure 4.9.

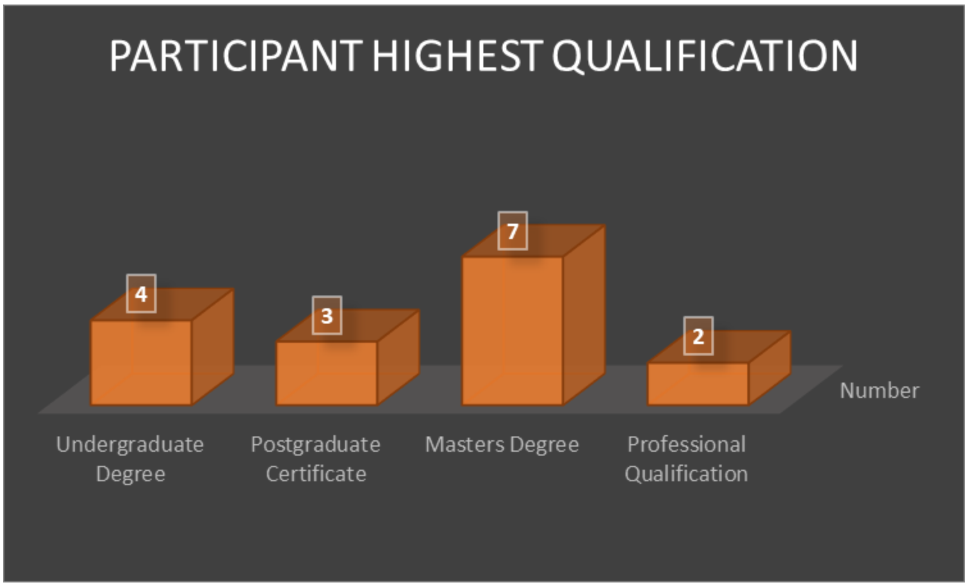


Figure 4.9 *Highest academic qualification of interview participants*

Most participants held a master's degree at 43,75 per cent of the participant population. The second-highest number of participants held an undergraduate degree at 25 per cent of the interview participant population. The least number of participant qualifications were holders of the postgraduate certificate and professional qualification at 18,75 per cent and 12,5 per cent respectively. The participant population can be referred to as highly academic, as they have proved to be able to complete academic qualifications successfully, with most of them being degreed. As a result of this, the researcher had confidence they could go through a learning process to acquire a new set of skills and knowledge and, therefore, would expect that on completion of training on how to use GAS, they would be able to grasp the concepts to adopt the technology effectively and efficiently.

However, contrary to this view, basing on the participant interview responses, most of the participants experienced difficulty with the application of GAS in the work environment after the completion of training recommended by the service providers. The participants felt that the training was inadequate in terms of the timeframe as they felt they required more time in training to fully grasp the concepts before actual application in the work environment. A few other participants felt the training was adequate but, the main challenge was that they did not utilise GAS tools frequently in their work environment. Therefore, it was easy to forget concepts covered in the training, as they did not get sufficient practice working on the tool to sharpen their skill set. In addition, a few other participants felt GAS was not user-friendly and more suitable for IT Auditors who had a more technical background.

The researcher found that the feedback on the effectiveness of GAS training was inconsistent and would recommend service providers to critically analyse training participants' feedback during and after the training to identify areas that need improvement to make it more impactful and effective for a higher adoption of GAS tools. Further research to understand and provide further insight into this area will be valuable.

4.3.8 IT Expertise Level

It was of interest to the researcher to get an appreciation of the level of IT expertise the participants in the interview had. This was due to a general belief and, perhaps an unanswered question in the professional world of internal auditing, on whether GAS technology were tools that could only be effectively used by people with an IT background like IT Auditors.

In terms of IT Expertise, the participants rated themselves in three levels, basic, intermediate, or expert. The levels were meant to establish if a participant had undertaken any formal general IT training or had been exposed to interacting with IT to an extent that they were now knowledgeable about databases and ERPs. Participants rated themselves, as reflected in Figure 4.10.

Figure 4.10 *Interview participants IT expertise level*

37,5 percent of the participants rated themselves as experts, and equally so, 37,5 percent of them rated themselves at basic IT level. 25 percent of the participants rated themselves at an intermediate level of IT expertise. Although most of the participants (expert and intermediate) showed a significant level of comfort with IT, the participants at the basic level of IT were significant, and they did not find this as a limitation to using GAS. All the participants recognised the benefit of having IT exposure and knowledge about databases and ERPS but merely saw this as an advantage to grasp concepts faster and not as a limitation to using GAS technology.

The organisations that were deriving great value from GAS tended to leverage off the technical and IT Auditors to be their Data Analyst Champions. The role of the Data Analyst Champions was to be technically competent to develop tests or scripts that the rest of the team could leverage off and to play the first line of support role for the other team members within the organisation. It was captivating for the researcher to observe how the Data Analyst Champions were so passionate about this role within their various organisations, and it appeared it gave them a sense of relevance and social influence within their spaces. They received a significant amount of recognition from their team colleagues as well as other stakeholders' outside internal audit. Two (2) of the participants attributed their career development and progress to their knowledge of GAS and how they have leveraged off this knowledge and skills to benefit their teams, department, and the organisation at large.

4.3.9 Generalised Audit Software Training

As part of the background of the participants, the research also established how many of the participants had attended formal GAS training.

It was established that all the interview participants had attended formal training for the GAS tools that they were using in their organisations. This implied that all the SOE organisations had invested in GAS training for the internal audit departments to ensure they are skilled and competent enough to use the tool. Over 90 percent of the interview participants emphasised the importance of user training in GAS to enable users to be competent enough to use the tool. However, a significant percentage of the participants felt that the training they received was inadequate and were of the view that it should have been provided over a longer period.

Contrary to this, the participants who were the most comfortable using GAS, with some having the Data Analyst Champions designation in their organisations, felt that the training was adequate to equip the user with the foundation knowledge to enable them to utilise the tool. It was interesting to observe how the opinions of this view were in extreme contrast, that a few participants in a training class were able to successfully adopt GAS tools just from a single training. Several of the participants had attended GAS training several times but still felt GAS technology was complex to use and felt they still required more extensive training.

Based on the participants' views, the researcher believes that training is an important element to establish the foundational knowledge of GAS but was not a significant factor that resulted in continued and optimum usage of GAS. It is important for all GAS users to undergo training on GAS to get started but it does not seem to explain the varied level of usage, experiences and GAS perception of users who have undergone the same training.

4.3.10 Types of Data-Analytic Software Used by Participants

The names of the data-analytic software used by participants were captured in Figure 4.11.

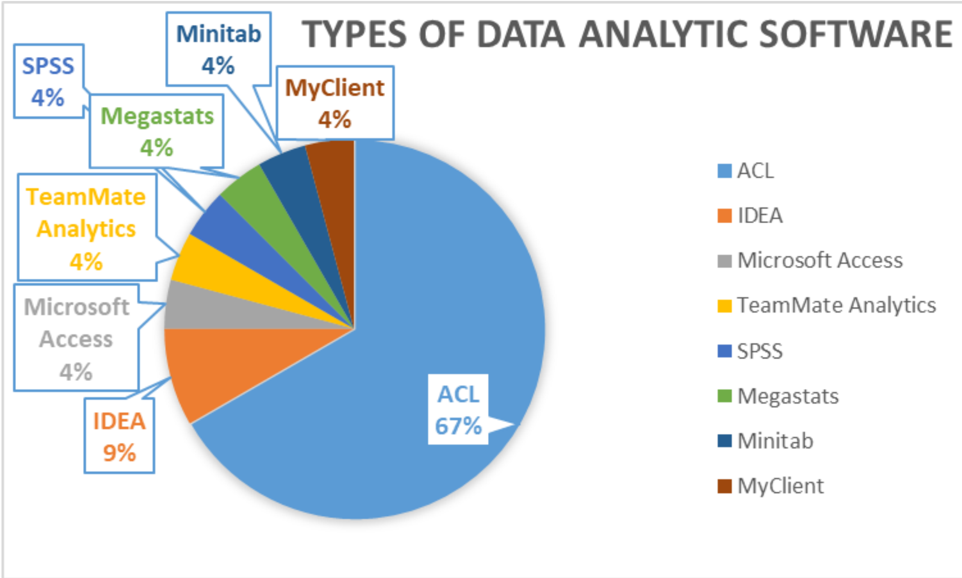


Figure 4.11 *Type of data analytic (GAS) software*

The most used data analytic software from the sample of participants was ACL, with a representation of 67 percent of participants. IDEA software was the second most commonly used software amongst the interview participants and was utilised by 9 percent of them. The rest of the data analytic tools, which were not so commonly used, each represented 4 percent of adoption were TeamMate Analytics, My Client, Minitab, Megastats, SPSS, and Microsoft Access.

Further analysis of the type of data analytic software used by internal auditors per country is provided. Figure 4.12 reflects the type of data analytic software used by interview participants from Botswana.

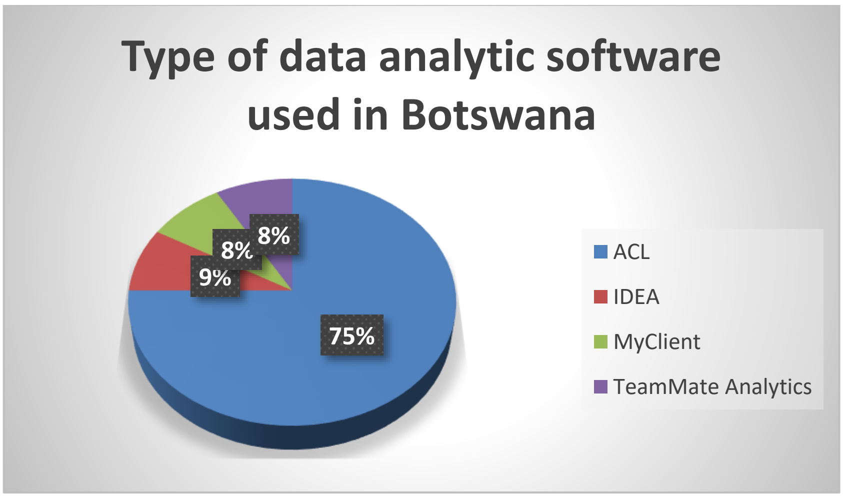


Figure 4.12 *Type of data analytic software used in Botswana*

A total of nine (9) participants in the study were based in Botswana. According to the participants, seventy-five per cent (75%) of them used ACL, followed by nine per cent (9%) using IDEA, and eight percent (8%) using MyClient and TeamMate Analytics. A study on a larger population from Botswana is expected to represent the adoption percentage of the types of software more accurately.

Figure 4.13 reflects the type of data analytic software adopted in Zambia by the participants from Zambia in this study.

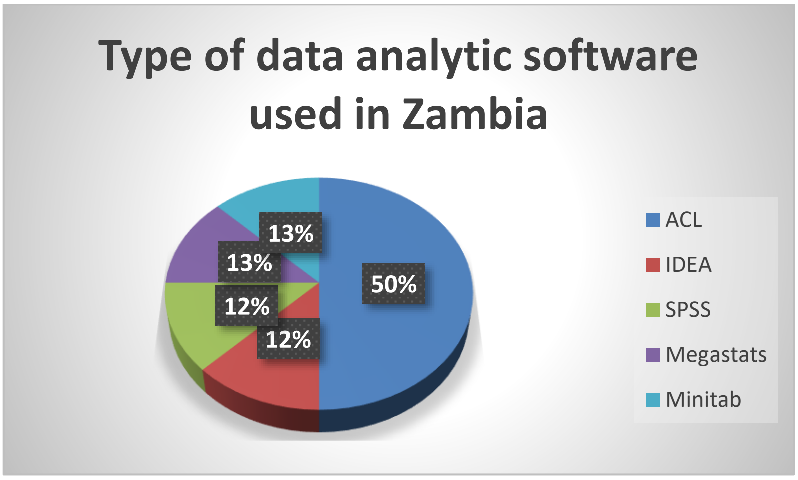


Figure 4.13 *Type of data analytic software used in Zambia*

A total of four (4) participants were based in Zambia. Fifty per cent (50%) of the participants were using ACL, thirteen per cent (13%) were using Minitab, thirteen per cent (13%) were using Megastats, twelve per cent (12%) were using SPSS, and twelve per cent (12%) were using IDEA.

Figure 4.14 illustrates the type of data analytic software used by participants from Malawi.

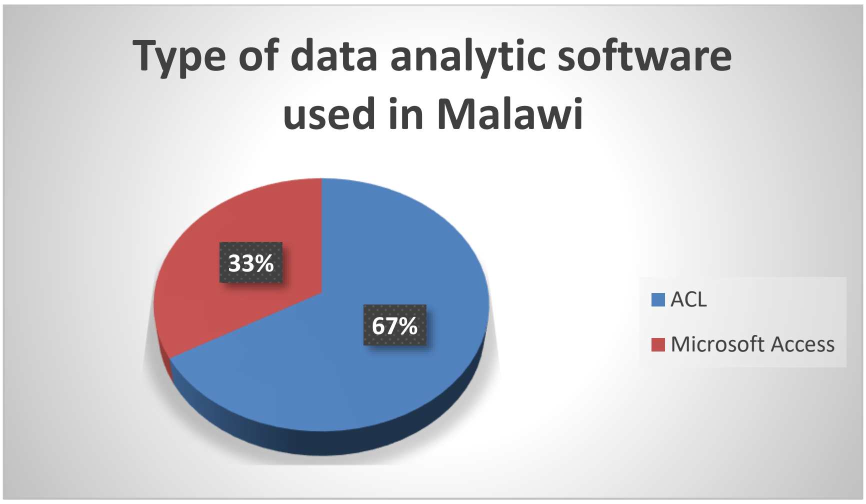


Figure 4.14 *Type of data analytic software used in Malawi*

Of the two (2) participants from Malawi, sixty-seven per cent (67%) used ACL for data analytics as reflected in Figure 4.14. Thirty-three per cent (33%) of the participants were using Microsoft Access. In comparison to the other countries, based on the interview participants, the least number of types of GAS has been used in Malawi. Future research on a larger population is recommended to provide further insight into the types of data analytic software used in the country.

According to a report by AuditNet (2012) based on a survey done to assess internal auditors' experience with data analytics software, the most used data analytic software was ACL. According to AuditNet (2021), they are "a global resource for auditors serving as the primary communications resource with an online digital network where auditors and compliance professionals share resources, tools, and experiences including audit work programs and other audit documentation." Five hundred and fifty (550) auditors participated in this survey from a cross-section of industry sectors. Fifty-seven per cent (57%) of the auditors used ACL, with IDEA being the second most used data analytic software at a percentage of twenty-four per cent (24%), as shown in Table 4.4. This finding is similar to the findings of this study, where most of the participants used ACL, and IDEA was the second most used data analytic software. Table 4.4 reflects the findings from the survey, including other data analytic software used at the time of the study.

Type of Data Analytic Software used by auditors	Response Percentage from Survey
ACL	57.6%
Caseware IDEA	24.1%
ActiveData	3.5%
ActiveAudit	0.6%
TopCAATs	0.6%
Microsoft Access	46.5%
Monarch Standard	1.2%
Monarch Professional	3.5%
Other	16.5%

Table 4.4 *Type of Data Analytic Software Used* ***Source:*** *Extracted from an AuditNet (2012) survey*

Ahmi & Kent (2013) found IDEA to be the most popular type of GAS adopted by external auditors. Lin & Wang (2011) concluded from their study that the GAS software preference was ACL, IDEA, and Focaudit based on these factors. According to Alali & Pan (2011), the most prominent GAS tools are ACL, IDEA and Panaudit Plus. ACL and IDEA GAS software were found to be consistently the most commonly used GAS software according to both the review of literature and findings from this study.

The data analytic software in Table 4.4 that was purpose-built for auditors and, therefore, termed GAS are ACL, IDEA and TeamMate Analytics. The rest of the software mentioned are general-purpose data analytic tools used across different professions and different user cases, like Microsoft Excel. The fact that most of the participants used ACL in this study did not necessarily mean most internal auditors use ACL but could be explained by the fact that the sample used by the researcher was mainly from his network of business relationships, which fell in the line of ACL software. Future research will need to be done in this area to identify which GAS tools are commonly used in this market with an aim to understand why and the competitive advantage of each of these tools.

4.4 Conclusion

This chapter discussed the data collection process through interviews and provided a background of the four (4) SOE's and sixteen (16) internal auditors that participated in the study. This information formed a great foundation for further analysis of the interview responses to address the research questions and the refinement of the proposed GAS PA CU framework. The interview participant background information that was analysed related to age, gender, highest academic level, job level, position, years of experience in internal audit, the cumulative number of years using GAS, names of GAS used, GAS training, IT expertise, country of SOE location, and the SOE sector classification.

The researcher did not observe any significant differences from the interview participants' GAS experiences, perceptions and views that could be attributed to the differences in country of location or the country's economic performances. This suggested that the proposed conceptual post-adoption framework for GAS can apply to a larger scope of countries.

Most of the research participants regarded age as a factor that contributed to the slow or non-adoption of GAS technology. They felt that the older generation, who was used to traditional ways of auditing, was resistant to change mainly due to fear of the unknown and preferred to continue auditing in the manner they had been doing for many years.

It was noteworthy that interview participants were from different job levels. The findings were, therefore, representative of internal auditors across different job levels, which increased the likelihood of their GAS perceptions, views, and experiences to be representative of the broader profession of internal auditors.

The researcher observed that IT auditors mostly play the "data-analytic champion" role in their various organisations, which assumes the technical expertise role of using GAS technology and providing internal support to the rest of the team members. This was the case for the IT Auditors from the research participants and it was observed that they tended to be the ones who had the greatest usage and appreciation of GAS technology within their various organisations.

Based on the participants' views, the researcher is of the strong opinion that training is an important element to establish the foundational knowledge of GAS but was not a significant factor that resulted in continued and optimum usage of GAS. It is important for all GAS users to undergo training on GAS to get started, but it does not seem to explain the varied level of usage, experiences and GAS perception of users who have undergone the same training.

The following chapter analyses the participant interviews to identify factors that contribute to the continued usage of GAS based on the participants' experiences, perceptions, and views. The chapter will conclude with enhancing the proposed conceptual framework of GAS for post-adoption continued usage, basing it on the findings from the analysis of participant interviews.

Chapter 5 - Refinement of the GAS PA CU conceptual framework

The previous chapter presented the interview approach, the organisation and participant characteristics, and how the data was collected. It showed how the interviews were conducted as well as the organisations and participants who contributed to the study. Details of the background context of the participating organisations (cases) and the individual interview participants were presented. The chapter provided insight into how the interview guide was utilised and how the interview process was executed.

The objective of this chapter is to describe how the data collected from the interviews were analysed and how it contributed to the refinement of the preliminary conceptual GAS PA CU framework, developed after the detailed review of literature. In addition, this chapter discusses how thematic analysis was used to consolidate the findings from the study and inform the enhancement and finalisation of the conceptual GAS PA CU framework.

5.1 Analysing the interviews

All participant interviews were recorded. The researcher transcribed all the interviews, which resulted in one hundred and ninety (190) pages of textual transcripts. Self-transcribing the data was, in itself, a process of data analysis as the researcher was beginning to gather and appreciate important and common insights emerging from the interview data. The researcher dedicated a significant amount of time to the process of transcribing all the interviews. This process provided the opportunity for the researcher to immerse and familiarise themselves with the interview data and therefore get an in-depth view of the experiences and perceptions of participants, and in the process, also begun to identify emerging themes. The data transcription process at this stage was a process to merely translate the recordings into words for further studying and coding.

In addition, the researcher had field notes he generated per participant during each interview. Notes were captured on an interview schedule to capture key responses, emerging themes, and visible emotions. The researcher also documented the passion displayed by participants as they interacted in the interview, together with any noteworthy non-verbal cues. As part of the analysis of the data, these field notes will also be referenced, in addition to the transcribed interviews, to gather comprehensive insights and perceptions of research participants, therefore providing for a comprehensive analysis of the data.

Following the transcription of the data, the thematic analysis of the interviews was necessary for the process to begin to answer the research questions as well as the process to enhance the conceptual GAS framework. According to Nowell *et al.* (2017), thematic analysis "is a method for identifying, analysing, organising, describing, and reporting themes found within a data set." Braun & Clarke (2006) argued that thematic analysis is a valuable method for examining the perspectives of different research participants through highlighting similarities and differences and generating unanticipated insights.

The first step was, therefore, for the researcher to become immersed in the data by repeatedly listening to the recorded interviews and reviewing field notes. The objective of this exercise was to find emerging meaning, patterns, and themes, which were later to be analysed in terms of the initially developed conceptual GAS PA CU framework. However, the approach was to get into the in-depth analysis of the interview data initially without reference to the preliminary conceptual GAS PA CU framework to avoid missing out on new concepts or themes that may emerge from the interview data. The analysis against the already developed preliminary conceptual GAS framework was only to be considered at a later stage once the independent analysis of this interview data was achieved.

The next step of the data analysis process was done using a qualitative data analysis software called ATLAS.ti. ATLAS.ti (2020) is a powerful software for qualitative data analysis of large bodies of textual, graphical, audio and video data. License access was made available to the researcher by UNISA for the purpose of conducting this study. Participant interview documents were uploaded into the software to enable capturing notes, coding of data and grouping codes into common themes. From this, further analysis was done on the platform to capture relationships, identify patterns and key emerging themes.

Once the transcribed participant interviews were in the ATLAS.ti software, the interviewer began the process of coding the data and highlighting text or quotes that supported the codes for future reference. According to Linneberg & Korsgaard (2019), coding is "an important tool in the process of turning the raw qualitative data into a communicative and trustworthy story." They note that coding reduces large amounts of empirical material to make it data that is readily accessible for analysis, which ultimately increases the quality of the analysis and findings. Saldana (2015) defines coding as "the simple operation of identifying segments of meaning in your data and labelling them with a code, which can be defined as a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data." The coding process followed is highlighted in Figure 5.1.

Figure 5.1 *Coding process followed by the researcher* ***Source:*** *Saldana (2015)*

The process entailed re-reading through the transcribed interview data several times to get familiar with the content as well as reviewing the field notes captured during the actual interview process to identify the key issues and themes emerging from the data. The researcher also used the word cloud feature in the software to identify common recurring words to help provide a "bird's eye-view" of the data, which would then later assist with the coding and identification of themes in the analysis process. Word clouds provide a quick visual view of the words that are more frequently used in a document, which provides a foundation for further analysis of key themes.

The next step entailed re-reading the text to acquire deep, comprehensive, and thorough insights into the data, to begin the process of coding the data. According to Williams & Moses (2019), "coding is a key structural operation in qualitative research, enabling data analysis and successive steps to serve the purpose of the study." As the researcher read through the document, he highlighted texts (quotes) of interest in the document and labelled a code related to that text for further analysis. The researcher observed that during the coding process, as he was coding the last three interviews, points and codes identified earlier started to be repetitive, providing evidence that the point of saturation had been reached, with no new information emerging. This reinforced the researcher's confidence that no further interviewing was required as it was unlikely that new factors and themes would be identified by any additional effort.

The next phase was to group the identified codes into common issues and themes. The objective of this process was to identify and reduce redundancy by grouping similar characteristics and constructs into themes. Nowell *et al.* (2017) define themes as "an abstract entity that brings meaning and identity to a recurrent experience and its variant manifestations. As such, a theme captures and unifies the nature or basis of the experience into a meaningful whole." The grouping of codes also meant that the amount of data was reduced to manageable groupings to allow for further analysis and refinement of the preliminary conceptual GAS framework.

The following research questions formed the basis of sorting the transcribed unstructured data into codes and themes:

1. What are the factors driving the continued usage of GAS technology by internal auditors at the post-adoption phase for SOEs in Southern Africa?

2. What challenges have been encountered with GAS usage in SOEs by internal auditors?

3. What is the extend of the internal auditor's confirmation of GAS achievement of performance expectations (expected usefulness vs perceived usefulness)?

4. Why are internal auditors slow to adopt or decide not to adopt GAS?

5. What is the state of adoption of GAS by internal auditors in SOEs in Southern Africa?

The following sections will provide a more detailed view of the actual findings of the data analysis steps described above.

5.2 Content Analysis of the word cloud

The researcher generated the word cloud from ATLAS.ti to identify the words that appeared frequently in the participant interviews. As a way of triangulation, it was expected that these words would reenforce the process of identification of emerging themes that the researcher had commenced through the coding process of the interview participant data.

The word cloud was filtered to remove common English language terms that would ordinarily be used frequently to construct a sentence but were of no significant contribution towards meaningful words or themes in line with this study. Examples of such words are reflected in the software default setting shown in Figure 5.2, a screenshot from the software settings screen:

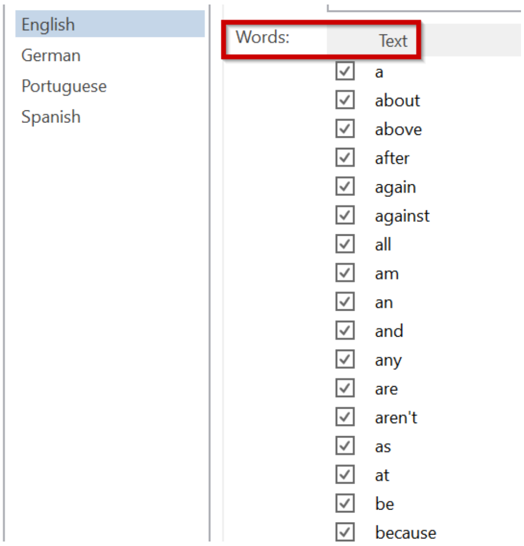


Figure 5.2 *Example of words filtered from the world cloud* ***Source:*** *Screenshot from ATLAS.ti software*

In addition, words pertaining to headings, such as participant and interviewer, were also removed from the word cloud as these were frequently used to identify the speaker whilst documenting the interviews; hence, they would certainly appear amongst the most frequently used wording. Words that were mainly used by the researcher to articulate a question and to raise a point or confirm understanding of a response, which were commonly used to encourage responses from participants, were also removed. Examples of such words are software, tool, data, really, think, can, internal, audit, yeah, yes, actually, study, rate, GAS, perception, framework, and so forth.

On completion of the process of filtering out the words described above, the word cloud in Figure 5.3 was generated from ATLAS.ti.

Figure 5.3 *Word cloud of frequent words from participant interviews*

Table 5.1, is a summary of the top ten frequent words and emerging themes from the word cloud analysis:

Word	Frequency Count
Able	181
People	180
Training	161
Experience	144
Time	140
System	128
Work	121
Information	119
Business	101
Value	99

Table 5.1 *Summary of top ten frequent words from the word cloud*

With the insight of the most frequently used words, the researcher considered them when he was developing codes in the ATLAS.ti software, which was a process of grouping interesting, noteworthy, relevant, and related concepts and ideas that were relevant in the context of the study to formulate themes. Table 5.2 reflects the mapping of the common words to emerging themes established by the researcher. The emerging themes will be explained in greater detail in the following sections.

Word	Frequency Count	Themes
Able	181	• Competency
People	180	• User Characteristics, • Leadership • Social Influence
Training	161	• Competency
Experience	144	• Competency • Perceived Ease of Use
Time	140	• Competency • Challenges
System	128	• Facilitating Conditions • Pre-adoption
Work	121	• Clear objectives
Information	119	• Facilitating Conditions • Leadership
Business	101	• Benefits • Facilitating Conditions
Value	99	• Perceived Usefulness • Benefits

Table 5.2 *Frequent words mapped to emerging themes (codes)*

Table 5.2 shows how the most common words identified by the word cloud, relate to the emerging themes that the researcher had identified through the process of coding and analysing the participant interviews. This triangulation approach reenforced to the researcher that he had identified the relevant and common themes emerging from the information as all the common words identified from the word cloud could be matched and related to the ten (10) themes that the researcher had identified. For example, the word “Able” which was the most common word visualised in the Word Cloud, was related to the emerging theme of “Competency”. Competency can be defined as the “ability” to do something proficiently and efficiently.

5.3 Summary of results from data coding - emerging themes

Following the completion of the analysis of the word cloud, the researcher began the process of reading through the transcribed interview data and coding interesting and relevant themes with ATLAS.ti software. This process was characterised by coding interview phrases into themes, that were relevant in the context of the study and were therefore expected to provide more qualitative and deeper insight to understanding the phenomenon of continued usage of GAS.

After completion of the first round of coding, the researcher came up with one hundred and three (103) codes, which were linked to quoted phrases raised by interview participants that the researcher believed were either of interest towards the development of the framework or relevant to the research questions posed by the study. The next step the researcher took, was to review these one hundred and three (103) codes to find those that could be merged because they referred to the same theme or concept and would have been duplicated in the process of coding. On completion of this exercise of merging duplicated or overlapping codes and themes, the codes were reduced to seventy-two (85) codes.

To reduce the codes into manageable numbers for further analysis and reporting, the researcher, as a next step, underwent the exercise of grouping the codes into common themes in the perspective of the research questions and continued usage factors. The result was that the codes were grouped into ten emerging themes. Table 5.3 is a summary of the emerging themes from the grouped codes.

No.	Theme	Number of individual codes grouped in the theme	Total frequency of codes in a theme being quoted (referenced) from interview data
1	Benefits	21	130

No.	Theme	Number of individual codes grouped in the theme	Total frequency of codes in a theme being quoted (referenced) from interview data
2	Challenges	12	75
3	Pre-adoption	4	19
4	Perceived usefulness	8	88
5	Perceived ease of use	4	7
6	User Competency	5	86
7	Facilitating Conditions	8	123
8	Leadership	3	34
9	User Characteristics	5	95
10	Social Influence	2	16
Total		**72**	**673**

Table 5.3 *Summary of the emerging themes from the grouped codes*

The emerging themes were benefits, challenges, pre-adoption, perceived usefulness, perceived ease of use, competency, facilitating conditions, leadership, user characteristics, and social influence. From Table 5.3, it can be noted that the theme on "Benefits" had the most individual codes that were grouped into this theme, as well as the highest frequency of individual codes referenced by the researcher in the interview data, which represented 29,16% of all codes. The second most frequently referenced theme was that of "facilitating conditions", with the least referenced theme being "perceived ease of use".

This analysis suggests that the respondents gave more weighting to factors relating to benefits derived from GAS as the biggest driver for the continued usage of GAS, whilst the factors related to the perceived ease of use seemed to have had the least significance. This finding is aligned with the finding by Bierstaker *et al.* (2014) in a study that examined actual GAS usage. They did not find effort expectancy to have a significant impact on actual GAS usage.

Facilitating conditions, user characteristics, perceived usefulness, and user competency themes also appeared to have a significant influence on determining the continued usage of GAS, with an expectation of deriving value in alignment with their organisational roles. Figure 5.4 is a pie chart showing a view from the interview data of the frequency of codes referenced under each theme:

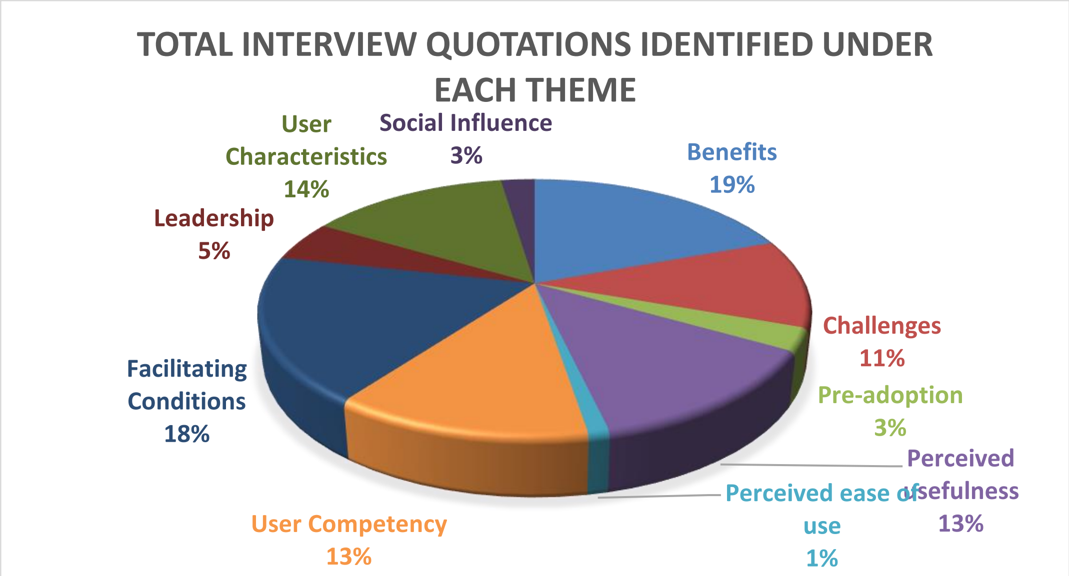


Figure 5.4 *Total frequency of codes referenced under each theme*

Further qualitative analysis on the content of the actual individual codes and quoted interview phrases will be done in the next section to provide an in-depth appreciation of the importance of each of the themes and codes on the continued usage of GAS.

The theme that had the most individual codes was that of benefits, followed by challenges, whilst the theme with the least individual codes was that of social influence and leadership. The number of individual codes in each theme and contribution to the total number of individual codes is visualised in Figure 5.5.

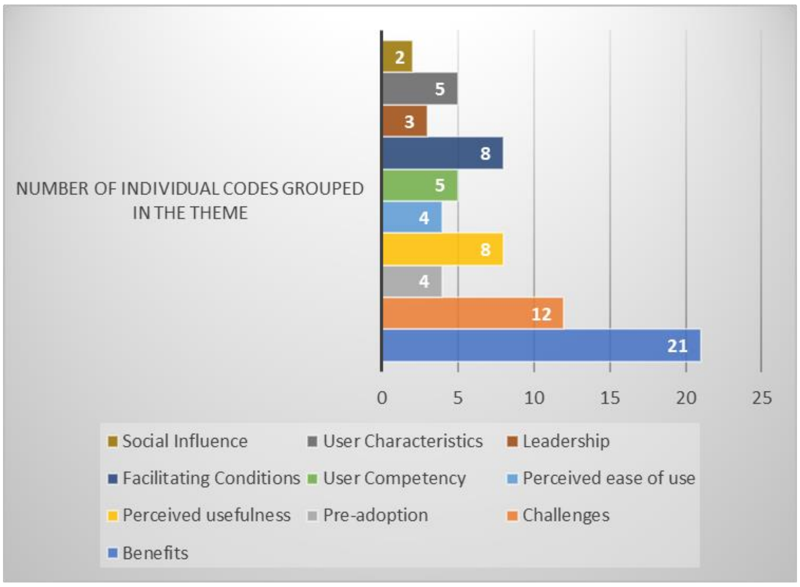


Figure 5.5 *Total number of codes per theme*

As was expected, it was observed that the benefits, challenges, facilitating conditions and perceived usefulness themes, which had the most frequently referred references in the interview, were the ones that had the most individual codes making up the themes. Although this represented the most frequently referred to codes, the researcher will perform further in-depth qualitative analysis in this chapter, of each of the themes and codes, to assess the significance of each of them towards the continued usage of GAS post-adoption.

The researcher also observed that all the themes and factors captured in the preliminary GAS PA CU conceptual framework were addressed by the themes and codes that emerged from the interviews. However, additional themes, such as leadership, user characteristics, user competency, challenges, and pre-adoption factors, emerged. A wide array of constructs and factors presented by codes also emerged, which had not been identified by the researcher in the literature review. These emerging factors will be explored in greater detail in the next section and, dependent on their significance, may be incorporated in the refinement of the preliminary GAS PA CU conceptual framework.

5.4 In-depth analysis of emerging themes from participant interviews

5.4.1 Theme One - Benefits

The benefit theme was represented by the greatest number of individual codes (benefits), which totalled twenty-one (21). Likewise, this theme also had the greatest number of interview phrases quoted and referenced relating to the benefit theme. The quoted interview phrases contributed nineteen per cent (19%) of all quotes referenced from the interview analysis.

The benefit theme focused on the enhancements, efficiencies, and effectiveness that users realised and gained from the adoption of GAS, which had an influence on the job of the user and added value to the SOEs. Under this theme, it was of great interest for the researcher to establish the benefits that were mostly derived from GAS technology, which would motivate and incentivise users to continue its usage. The researcher was of the view that these benefits influenced the perception of users on the usefulness of GAS. Appreciating the benefits users of GAS experience provides a realistic understanding of benefits that current and future adopters of GAS can expect to realise. This information is also expected to be of great benefit to software providers, who can leverage off this information to have more focused efforts in the development and enhancement of GAS software to align with the most important requirements of the users.

Twenty-one (21) benefits were identified from the interview participants. These benefits are listed in Figure 5.6, and their weight of importance is also reflected, based on the number of times the benefit was referred to or quoted by the researcher from the participant interviews.

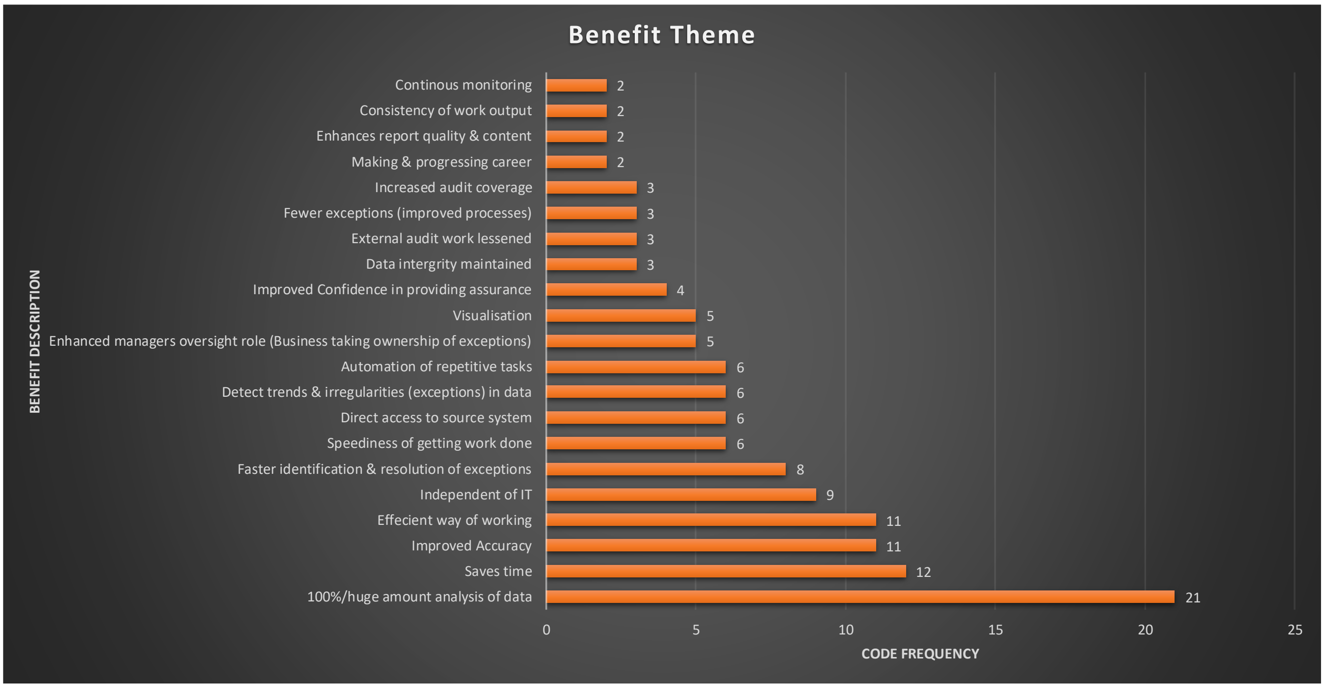


Figure 5.6 *Benefits realised by interview participants from use of GAS*

Insight onto the benefits is as follow:

5.4.1.1 Hundred per cent analysis of large data population

GAS enables internal auditors to analyse a hundred per cent (100%) of the data population. This capability of GAS means internal auditors can increase their audit coverage and confidence in providing assurance. In some cases, organisations, like SOEs, deal with large volumes of data, and without the relevant data analytical tools, it will be very difficult or impossible for internal auditors to analyse the full data population. The inability to analyse a hundred per cent (100%) of the data population means internal auditors can only analyse small samples of the data sets due to the lack of resources and time to achieve a hundred per cent analysis using manual methods.

Interview participants referred to the benefit of a hundred per cent (100%) population analysis twenty-one (21) times in the interviews. This was the most mentioned benefit of GAS, which suggests how significant this benefit is to the internal audit profession. An interview participant from the financial institution mentioned,

> "*Basically, in the bank where transactions can get to thousands or millions, with GAS, it's very easy to run through 100% of the data. And when you are*

> *looking for exceptions, it is also very easy, GAS can run through all the data on time and give you the results."* (R3)

Most of the participants agreed that it was valuable for them to analyse a hundred per cent (100%) of the large volumes of transactional data. The participants experienced and realised this benefit because of adopting GAS. Participants also shared the frustrations they encountered before the adoption of GAS when they were attempting to analyse data through manual ways. The participants also consistently acknowledged the powerful capability of GAS to handle large volumes of data and analyse it in a short period of time.

Participants also mentioned that the value of being able to analyse a hundred per cent (100%) of the data population in a reduced timeframe meant they could focus their efforts on solving other challenges where human intervention was crucial. One of the participants illustrates this benefit by stating,

> *"You can use GAS to analyse the huge volume of data, which produces red flags that enable you to narrow down on the area where you should investigate further in your audit."* (R11)

GAS outputs helped to direct internal auditors to the areas that needed further investigation, as opposed to them working on the data blindly and possibly focusing on areas where controls were working effectively.

Most of the participants strongly related to this benefit and passionately expressed how GAS was the source of this benefit. This showed how relevant and tangible this benefit was for internal auditors, and it, therefore, seems reasonable to conclude it is a strong motivator for them to use GAS. One such passionate expression from one of the participants:

> *"I for one have used GAS for some time now, and it's given me a lot of leverage in terms of data analytics in the sense of bulky computations and all those things that would actually be difficult to achieve the results without the aid of GAS because it has given me a point where we have been able to do all the complex analysis and combine them, write scripts that would have otherwise taken a long time to compute without GAS".* (R15)

5.4.1.2 Saves Time

Adoption of GAS technology can result in efficiencies that save time due to the automation of the data analytic process that the technology provides. This is in line with the benefit of being able to do more with less. GAS users can analyse large data populations in a fraction of the time it would take to achieve manually.

This was the second (2nd) most frequently referred to benefit in the interview data, with it being referred to twelve (12) times. Participants believed that if they could save time when performing a data analytic task, they would be able to report on findings in a much shorter period and, in turn, initiate the remediation process of exceptions sooner, ultimately minimising the potential negative impact of fraud, waste, and abuse. In addition, saving time meant that internal auditors could focus their time and energy on other tasks. This finding is supported by one of the participants who is quoted to have said,

> *"GAS makes it more efficient in the sense that you take less time, and you also have more time to focus on other areas that you know can't be done by the tool."* (R6)

Users could relate to the period before they had invested in GAS technology, and how much time it would take them to achieve the data analytic tasks. The participants had similar sentiments that it now took them a shorter time to conduct tests and, therefore, this had greatly contributed to making their jobs more efficient.

5.4.1.3 Improved Accuracy

Improving accuracy was the next most frequently referred to benefit by interview participants. The role of internal auditors requires them to be accurate and precise. The provision of a wrong opinion by the internal auditor can be damaging to the organisation and have negative impacts if false positives (incorrect exceptions) are communicated to management and other stakeholders. This will likely tarnish their desired image of being a strategic partner to the business.

This benefit was referred to eleven (11) times in the interview data. The capability of GAS to have direct access to the data source system gave the users confidence that the data that they were working with had not been tampered with. The confidence in the accuracy of data analytic work that is generated through GAS is demonstrated by one of the interview participants:

> *"GAS also maintains the integrity of information that we are processing. You can communicate that we used GAS, and the data integrity was maintained because it is read-only. And the chances that you can introduce errors in the system are almost zero. So, anything that is going to be like an investigation or something that can end up in court, it is quite important to mention that you used a software that is meant for that."* (R4)

According to the interview participants, GAS did not only improve the accuracy of internal audit work but also indirectly improved the quality of work of auditees as they were aware that internal auditors had the capability to analyse a hundred per cent (100%) of their work. This awareness resulted in a change in behaviour by auditees, who now diligently and accurately do their work with the fear of being exposed when their work is analysed. In support of this, one of the participants mentioned that when the auditees began to realise the data analytic capability of GAS, they became more careful in doing their work to the extent that the participant witnessed a reduction in the occurrence of erroneous transactions such as duplicate transactions.

It was noteworthy that the researcher had not come across the benefit of improved accuracy during the review of literature, yet it was evident from the participant interviews that they saw this benefit as highly useful in the line of work. It is the opinion of the researcher that this benefit is potentially a motivator for internal auditors to invest in GAS as well as continue its usage if the benefit has been experienced in practice, like in the case of most of the participants.

5.4.1.4 Efficient way of working

Like the improved accuracy benefit, the benefit of GAS bringing about a more efficient way of working was referred to eleven (11) times by interview participants. This benefit was therefore the fourth (4^{th}) ranked benefit participants acknowledged to be brought about by the adoption of GAS technology.

In today's environment, where organisations are generating a large amount of transactional data, internal auditors working manually spend hundreds of hours trying to analyse samples of this data. As a result, auditors cannot achieve much coverage because of this limitation. With the adoption of GAS technology, auditors can analyse thousands and millions of transactions in a fraction of the time it will take them when working manually. Achieving a hundred per cent analysis of transactional data with minimum effort and little time means auditors can work efficiently and deliver greater value through increased coverage. The ability to analyse data quickly using GAS resulted in internal auditors increasing the audit coverage, which was mentioned as significant in previous studies. The actuality of this in practice, as evidenced by the contributions from interview participants, was a confirmation of how GAS was adding value and satisfying an audit need in this respect.

One of the participants mentioned,

> *"GAS has given me a lot of leverage in terms of data analytics in the sense of bulky computations and all those tasks that would actually be difficult to achieve results without the aid of GAS."* (R15)

The ability of GAS to enable an auditor to do complex analysis in a simplified manner is a valuable benefit that the participants referred to frequently.

5.4.1.5 Independent of Information Technology Resources

Internal audit departments that do not have data analytic technology typically depend heavily on IT personnel to get access to the data source systems since IT departments are the custodians of the corporate data. If an IT resource is unavailable to provide them with support and access to the data timeously, it may result in a delay in internal audit work. At the same time, internal audit loses their independence to conduct their work as required by their role to provide "independent assurance" if they depend heavily on IT to provide them with the data.

GAS technology enables internal audit practitioners to access data directly and independently from the source system without the dependency on IT to get to the data. This independence from the IT department benefit was ranked as the fifth (5th) most realised benefit from GAS by interview participants. This benefit was referred to nine (9) times in the participant interviews. Most participants referred to the need for IT support mainly in the initial set-up and establishing direct connectivity of GAS to the source systems. Subsequently, they required minimum IT intervention, which was mainly sought after when servers were down or if there had been changes to the internal IT environment, such as databases. In support of this one of the participants states,

> *"We use IT, but we do not depend on them, because IT basically is confined to IT services such as ensuring that the server and the platform is available, and the IT infrastructure only. IT is confined to this work, nothing to do with the use of GAS."* (R12)

One of the participants mentions with great emphasis,

> *"As an independent function, we are not dependent on any other department."* (R11)

This brings out how crucial GAS is to enable the successful achievement of the independent role of an internal auditor. The researcher had identified the benefit of GAS to support auditor independence in the review of literature.

5.4.1.6 Faster identification & resolution of exceptions

The objective of performing data analysis by an auditor is to test controls and identify risks or exceptions that are hidden in the transactional data. The ability of GAS to analyse data with speed means that exceptions and risks can be identified much faster. Identification of data analytic exceptions in a quicker manner means the relevant process owners can be alerted timeously, enabling them to remediate exceptions in a shorter space of time, consequently minimising any negative impact of fraud, inefficiencies, and control failures.

Based on this rationale, it was no surprise that participants identified the ability to identify exceptions faster and, likewise, address exceptions quicker as a popular benefit they were experiencing from the adoption of GAS. However, when the researcher reviewed literature from previous GAS studies, this benefit had not been mentioned explicitly. This benefit was referred to eight (8) times by interview participants and ranked as the sixth (6^{th}) most popular benefit of GAS.

Participants expressed passionately on numerous occasions how fast it was to accomplish a data analytic task using GAS technology, irrespective of the volume of data. Participants were inspired by the capability to share findings with the business in a shorter period, which empowered the business to address findings much faster. Most of the participants could still relate to how hard and daunting the task of analysing data was before using GAS and how much time it used to take them to work on just a sample of the data population.

One of the participants acknowledges how the use of GAS has enabled him to have more valuable meetings with the board. It has become easier for this participant to address "what-if" scenarios in the actual board meetings by simply using GAS to analyse data quickly in alignment with the what-if scenarios. According to this participant,

> *"Sometimes the board just wants to know what will happen, so I use the software to model what will happen and that is easier for the board to appreciate."* (R7)

GAS, therefore, makes it possible to achieve these scenario analyses quickly as well as make it easier to communicate and present the information for quick decision making.

5.4.1.7 Speediness of getting work done

The overall capability of GAS technology to automate aspects of data analysis and being a purpose-built data analytic tool was noted by participants as enabling them to get their work done quicker. GAS tools are provided with prebuilt data analytic commands as well as functions that enable users to accomplish data analytic tasks with a few clicks of a button. Some of these tests will be very difficult to complete manually, and for those using Microsoft Excel, it requires users to have advanced levels of Microsoft Excel skills to replicate a prebuilt command in GAS. Internal auditors can increase the coverage of their analytic tests and audit plan when they have the capability to do their work faster, essentially the same resources will now have an increased capacity to do more.

Participants referred to the speediness of getting work done six (6) times in the interviews, and this was ranked as the seventh (7^{th}) most common benefit internal auditors were realising from the utilisation of GAS technology. Participants referred to

GAS technology enabling them to complete data analytic tests in a matter of minutes, as opposed to days or weeks, which characterised the time it used to take them when they did these tests manually. The greatest value (perceived usefulness) participants attached to this was the creation of more time to allocate to other tasks and other audits, ultimately increasing the scope and breadth of audits that the internal audit team could complete. This also meant these auditors were more confident in providing assurance to the business as they now had increased capability to look at the millions of transactional data generated by the organisation daily.

5.4.1.8 Direct access to source system

In an ideal environment, internal audit teams need to be able to work independently to provide independent assurance. Part of this independence means the ability to access the organisation's transactional data and records for analysis. More and more information are currently generated in electronic format by ERPs or other departmental software applications. To execute their role independently, internal auditors need to be able to access this information directly; however, this is very difficult to achieve without technology; hence, internal auditors working in a traditional way depend on IT to provide the data for them. This takes away their independence and may also compromise the accuracy, completeness, and integrity of the data as it can be tampered with deliberately or erroneously. Studies by Beridze (2017) and Xie (2020) evidence this by highlighting emerging risks from digitalisation and the need for internal auditors to leverage off IT to remain relevant and effective in the computerised environment.

Interview participants acknowledge the ability of GAS to directly connect to source systems as a benefit. This benefit was referred to six (6) times in the interviews and ranked seventh (7^{th}) of all the identified benefits. One of the participants stated that the ability to access information instantly saved them a lot of time when working on an audit, and it was also valuable that they would get to work with the raw data that had not been cleaned or manipulated. This increased their overall level of confidence when providing assurance as they were working with the source data. Internal auditors appreciated the capability of GAS to arrive at relevant information without relying on clients or auditees for that information as a very powerful capability that made executing their roles more efficient.

It was noteworthy that the researcher had not come across this benefit articulated in previous GAS studies. The researcher found that the benefit of direct access to data resulted in multiple benefits, such as auditor independence, data integrity, confidence in the assurance process and the speed of data analysis. In the opinion of the researcher as well as interview participants, this is a significant benefit of GAS, which has the potential to provide huge value.

5.4.1.9 Detect trends & inconsistencies in data

GAS, as a technology for data analytics, makes it possible for users to analyse data in numerous ways and from different perspectives depending on the test and audit objectives. Besides testing specific internal controls or performing tests to identify suspicious transactions or fraudulent activities, it is also important for internal auditors to analyse data to understand trends or unsuspected irregularities. Such tests provide an overall view and understanding of the full data population, which can provide important insights in decision making as well as understanding the risk environment of the organisation. The capability of GAS to quickly analyse full data populations makes it a suitable technology to detect trends and irregularities in transactional data.

Interview participants who had adopted GAS experienced the ability to detect trends and irregularities in data as a benefit derived from the use of GAS. A participant from a financial institution supports this by saying,

> *"On the positive side, I would say GAS has been very helpful because we have been able to detect some irregularities in our data and some inconsistencies, and we have even added value to the institution to improve on how they capture data."* (R3)

Participants associated this benefit as directly impacting and improving business operations, for example, by improving the data capturing processes. Another participant further reinforces this benefit by stating,

> *"For exceptions, it has been beneficial. We have picked a number of anomalies which we recommended for correction or improvement."* (R11)

In this case, we can observe once again how internal auditors directly impact the organisations in a valuable manner when using GAS. The fact that they could recommend corrective action or improvement to the business meant they could be viewed as business partners by stakeholders in the organisation.

This benefit was referred to six (6) times in the interviews and it ranked seventh (7th) of all the identified benefits. The researcher found it noteworthy that most participants who referred to this benefit were linking the value directly to the organisation's operations.

5.4.1.10 Automation of repetitive tasks

For the past two decades or more, there has been a great emphasis for organisations to leverage off automation for greater efficiency. More recently, in line with automation, there has been a great focus on how organisations can leverage off robotic process automation (RPA). According to Aalst *et al.* (2018), "RPA is an umbrella term for tools that operate on the user interface of other computer systems in the way a human would do. RPA aims to replace people by automation done in an 'outside-in' manner." GAS enables the automation of the data analysis processes. Depending on the type of GAS, the extent of automation and capability can differ. For example, Galvanize (2020) states that "ACL Robotics goes way beyond any simple analytic solution or BI technology — running your data access, reporting, and workflow tasks from beginning to end." ACL Robotics is the GAS tool that Galvanize distributes commercially to assurance professionals to enable them to execute their data analytic requirements.

In situations where some data analytic tests need to be done repetitively, leveraging off GAS tools to automate this process not only saves the internal auditors time by reducing human assistance but also results in consistency in how a test is done in the organisation. Several interview participants recognised this benefit as it enabled them to rely on GAS to do the repetitive tasks accurately whilst the time saved gave them the capacity to focus on investigating exceptions and suspicious transactions, the things that technology is limited in doing effectively. The benefit of automation was referred to six (6) times in the interviews. In the process of reviewing literature on GAS studies, the researcher had not come across this benefit.

5.4.1.11 Enhanced managers' oversight role

Interview participants referred to the GAS benefit of enhancing managers' oversight role five (5) times. This benefit was ranked eleventh (11th) in the frequency of being referred to during the interviews. The researcher found it noteworthy that the benefit of enhanced manager oversight role was referred to by internal auditors, even though it impacted the auditee managers directly rather than the internal audit function. The benefit showcases that GAS is not only a tool that benefits internal auditors in their work but also other stakeholders outside audit in the organisation. A benefit like this also illustrates how an effective internal audit team can be a strategic partner to the organisation at large.

GAS tools are used to identify exceptions that need to be flagged to process owners and management so that they can investigate and resolve any control failures, inefficiencies, waste, fraud, or abuse. Interview participants acknowledged that auditees tended to take ownership of the exceptions generated using GAS due to them being more comprehensive, timely, and accurate. One of the participants observed the reduction of erroneous transactions, such as duplicate payments, after they adopted GAS and used it to flag and notify exceptions to the auditees. Not only did the GAS tool add value to the internal audit work but provided value to process owners who were able to learn of the common occurrence of errors or abuse as well as providing them with the opportunity to address these errors timelier before much damage or losses are incurred by the organisations. According to another participant,

> *"Most of our senior managers are rarely in the office travelling. The introduction of GAS enhanced their oversight responsibilities on transactions despite their absence in the office as they would be able to receive emails of exceptions identified by GAS tools."* (R8)

5.4.1.12 Visualisations

According to Kirk (2016), "A data visualisation is a visual representation of data, often in charts and graphs. It shows statistical, numerical data in visual ways to help people make sense of data." Visualisation of analysed data makes it easier to make immediate sense of the data and supports data-driven decision making. GAS tools provide for the capability to visualise data easily with a few "clicks". These visualisations are for use by both internal auditors as well as other organisational stakeholders.

Interview participants referred to the benefit of visualisation five (5) times during the interviews. They noted that visualisations generated from GAS made it easier for them to form an opinion as it was much easier to make sense of the data presented in visuals rather than looking at hundreds of transactions presented in rows and columns. A participant states,

> *"To generate a pie chart or any other visual, actually makes decision making very easy, even for an internal auditor to decide what kind of further tests may be required on the huge data."* (R12)

Visualisations directed internal auditors to the areas to further focus on as part of the audit. Another benefit illuminated by the participants in relation to visualisation was the fact that dashboards created excitement when working with large data sets because they provide the big picture in terms of the whole big data population. Trying to do this manually or with other tools that require complex skills is a difficult task for most internal auditors who do not have technical backgrounds.

Reports are a key output of any audit as these documents communicate the work and recommendations of the auditors to the organisation managers and executives. Including visualisations in reports makes them more impactful from a communication perspective and ultimately valuable for data-driven decision making. Executives run on tight schedules and may not have time to review information laid down in rows and columns. Visualisations, therefore, add value to internal auditors as it increases the probability of their work being reviewed by executives and the board.

It was interesting to the researcher that this benefit had not been mentioned in previous GAS studies he came across. The researcher assumes this capability may not be available in all GAS tools; hence, it may not have been mentioned as a benefit under the core capabilities of GAS to perform analysis. However, based on the view of the participants, this capability delivered tremendous value to auditors as well as executives in the organisation.

5.4.1.13 Improved confidence in providing assurance

The improved confidence in the provision of assurance benefit is an aggregation of how the holistic impact of benefits, efficiencies, and job effectiveness provided by GAS technology, provides an internal auditor with confidence and comfort that their opinion, recommendations, and assurance will be accurate and most effective. This benefit speaks more to the value that GAS provides, in contrast to just recognising a feature or functionality of the software. The researcher views this benefit as one that translates to whether the impact of GAS can be perceived useful or unsatisfactory in relation to set expectations.

Interview participants referred to the improved confidence in providing assurance four (4) times in the interview, ranking this benefit as the thirteenth (13^{th}) most popular benefit. This benefit is significant from the perspective that it means that the internal auditors who mentioned this benefit felt more confident about how effective they were at achieving their job objectives. Given the significance of such a benefit, it is reasonable for it to be included in the proposed conceptual framework of GAS as it aggregates the previously mentioned benefits' value.

One of the participants in support of the above benefit states,

> *"GAS gives me comfort in knowing that the data that I am actually referring to has not been tampered with. I am really working with the raw information."* (R2)

Another participant also mentions that the output from work from GAS can be used as evidence in court because the software maintains data integrity from the source system. Internal auditors can therefore be very confident when presenting the output of work done from GAS, which also contains an audit trail that evidences the steps taken by the internal auditor to get the results or exceptions they are presenting in support of their findings.

5.4.1.14 Data integrity maintained

In this study, data integrity refers to the maintenance and consistency (validity) of data over its data analysis lifecycle. GAS tools extract data from the source system for analysis, which is then executed within the software. It is therefore important that the data integrity is maintained from initial data access and throughout the analysis process to ensure the results are accurate. When analysing data manually, data integrity can be compromised at many points, for example, during the data extraction or analysis phase. Compromise to data integrity can occur either deliberately or erroneously, which will result in incorrect audit opinions on pertaining to the organisation's internal control environment.

The benefit of data integrity was mentioned three (3) times during participant interviews. The researcher was surprised by the low number of times participants referred to this benefit as he was of the view that this benefit was very significant to the output of the work of internal auditors. This benefit also came across as a significant benefit identified in the literature review process.

The low recognition of this benefit during the interview process could be due to the difficulty for an internal auditor to establish that data integrity was ever a challenge in the past when they worked manually, given the possibility of reporting on incorrect results or findings if the manipulation was done purposefully to deceive them. For example, if internal auditors are dependent on receiving data from IT, IT can deliberately remove any fraudulent transactions from the data that they are submitting to an internal auditor for analysis. In this case, internal audit will not be able to pick up the fraudulent activities and report that the internal control environment is working effectively. In this case, data integrity is compromised but will go unnoticed.

5.4.1.15 External Audit Work Lessened

The researcher had not come across this benefit in the review of literature; therefore, it expanded the researcher's view of the additional value that GAS offered. It was mentioned three (3) times by research participants. When the work of internal audit is comprehensive, accurate, and well-documented, it can translate to reduced hours of work for external auditors; lowering the overall costs of external audits, since they will spend less time auditing the client because reliable, comprehensive, well-documented, and accurate internal audit work would have been done.

If the area or transactions that external audit would like to focus their audit on has had hundred per cent (100%) of the data tested by GAS and an audit trail recording the tests and logic is available, external audit will not have to spend a huge amount of time testing the same data with similar tests. They may simply do random tests of the sample of the data to confirm the accuracy of the results. In such a case, the use of GAS increases the accuracy and coverage of the tests; therefore, reducing the number of hours that external auditors will have to spend on an audit, which will translate to financial savings for organisations using GAS.

5.4.1.16 Fewer exceptions through improved processes

Some of the interview participants realised that with GAS, they were able to timeously notify business process owners of exceptions that occurred in the audit period under review. In some cases, internal auditors were using GAS to continuously monitor key risk areas, meaning exceptions were identified more quickly, and process owners were able to rectify and improve controls in a shorter time frame. In the case organisations, participants had observed an improved control environment in the area where they were implementing testing with the use of GAS. The benefit of improved processes was noted three (3) times in the interviews by participants.

One of the participants substantiates this benefit by noting,

> *"External auditors have been able to appreciate in the second audit, that we were experiencing much fewer exceptions."* (R1)

The participant attributed this reduction of exceptions to the use of GAS to enable the business to identify control weaknesses faster and therefore implement better controls in the areas of concern. Another participant in support of this states,

> *"There are areas where the exceptions have reduced when compared to one period to the other. You see a reduction because they solved the root causes of those exceptions."* (R12)

This participant felt that the ability of GAS to accurately identify a hundred per cent (100%) of exceptions from the data population changed the attitude of the process owners, who then took the results seriously and put effort into investigating and correcting the cause of the exceptions.

5.4.1.17 Increased audit coverage

In this study, the benefit of increased audit coverage emanated from the capability of GAS to analyse data quickly as well as its capability to analyse a hundred per cent (100%) of data populations. This benefit was referred to three (3) times by the research participants. For internal auditors to have more confidence in reporting their assurance work, they strive to increase the coverage of the audit work that they can achieve within a certain period. When they can cover more audit work in different areas, processes, and data, they can confidently provide an opinion on the state of the internal control environment of the organisation. With GAS, internal auditors found that they achieved greater audit coverage within a given audit period.

According to one of the participants, since the adoption of GAS, their audit scope increased through the ability not only to increase the number of audits in their annual audit plan but also the ability to continuously monitor other business areas even, if these areas were not part of their audit plan. Another participant reported,

> *"Use of GAS means I can expand my testing in a larger pool of data instead of a few or handful of samples."* (R14)

The other participant reinforces this point by stating,

> *"For me, GAS has given me a bigger spectrum in terms of my scope and coverage."* (R15)

This participant personally experienced this benefit from GAS and therefore could relate to how it has impacted their effectiveness in the internal audit role.

This benefit overlaps with earlier identified benefits that acknowledged the efficiencies and speed of performing data analysis that was attributed to the functionality of GAS.

5.4.1.18 Creating and progressing careers

In this study, the benefit of creating and progressing careers refers to how GAS technology has directly impacted the career of internal audit professionals in their organisations. This benefit was mentioned by two (2) interview participants. The researcher found this benefit noteworthy since he had not come across this benefit whilst reviewing literature and found it of significance since it refers to the moulding and progression of the careers of internal auditors. Based on this finding, GAS tools play a role in shaping the profession of internal auditors to ensure they remain relevant in the dynamic and evolving environment.

5.4.1.19 Consistency of work output

The benefit of consistency of work output in this study refers to the ability of GAS to provide the same results accurately when the same analytic test steps are followed and applied to the same data population. Consistency in work output is extremely important as it validates that the results produced by GAS are accurate when the proper steps, procedures or logic are followed. Therefore, the reports that internal auditors share can be depended on for decision making. This benefit was referred to twice (2) during the participant interviews.

5.4.1.20 Continuous monitoring

In this study, continuous monitoring refers to the use of GAS technology to detect risk and control failures in data through the ability to run analytic tests frequently on an ongoing basis. This benefit from GAS is referred to twice (2) in the participant interviews. Although continuous monitoring is a topical matter in auditing, the researcher is of the opinion that this benefit was not a common one cited by participants because internal auditors require more advanced scripting skills to achieve this, which was not the case for most of the interview participants in the study.

According to one of the participants,

> *"The other benefit we experienced was continuous monitoring, whereby we were not just focusing on erroneous transactions, but on all transactions that had been generated or created and all payments that had been made."* (R8)

The other participant who cited the continuous monitoring benefit referred to this benefit as the ability to detect anomalies around the clock and in turn enable the identified exceptions to be addressed in the shortest possible timeframe.

In the review of literature, the researcher came across a total of six (6) benefits whilst in the analysis of participant interview data, the researcher came up with a total of twenty (20) benefits. Although a few of these benefits appear to overlap, the researcher found all of them noteworthy as key considerations for the assessment of the value of GAS as far as perceived usefulness is concerned. Table 5.4 summarises the benefits found in Chapter 2, the literature review.

Benefits identified from the review of GAS literature
100% analysis of data
Increased speed of analysis/increased audit scope
Ability to analyse data from multiple formats
Read-Only Access
Audit Trail
Support auditor independence

Table 5.4 *Benefits identified from the review of GAS literature* ***Source:*** *Chapter Two of this thesis*

Table 5.5 summarises the benefits identified during participant interviews.

Benefits identified from data analysis of participant interviews
Hundred per cent analysis of large data population (1)
Saves time (2)
Improved Accuracy (3)
Efficient way of working (4)
Independence – IT resources (5)
Faster identification & resolution of exceptions (6)
Speediness of getting work done (7)
Direct access to source system (8)
Detect trends & irregularities in data (9)
Automation of repetitive tasks (10)
Enhanced managers oversight role (11)
Visualisations (12)
Improved confidence in providing assurance (13)
Data integrity maintained (14)
External Audit Work Lessened (15)
Fewer exceptions through improved processes (16)
Increased audit coverage (17)
Creating and progressing careers (18)
Consistency of work output (19)
Continuous monitoring (20)

Table 5.5 *Benefits identified from data analysis of participant interviews* ***Source:*** *Chapter 5 of this thesis*

Table 5.6 is the key for both Tables 5.4 and 5.5.

KEY – *For Tables 5.4 & 5.5*

- Matching colours are for benefits that are related or similar.
- Blue – refers to benefits identified from participant interviews and not in the literature review process.
- Purple – refers to benefits identified in the literature review and not in the analysis of interview data.

Table 5.6 *Key (colour coding) for Tables 5.4 and 5.5*

Two benefits were identified in the literature review but not in the analysis of participant interviews. The researcher was surprised that the benefit of analysing data from multiple systems or formats was not recognised by the participants. This could have been due to participants not experiencing this benefit as they could be accessing data stored in one system like an ERP. Although the benefit of the audit trail was not explicitly mentioned by participants during interviews, several benefits they mentioned emerged from this capability. Out of the total of twenty (20) benefits identified from the participant interviews, ten (10) of them had not been identified during the literature review. Bearing in mind that most of the benefits identified by the researcher during the literature review emanated from a pre-adoption of GAS phase whilst those from the participants were from actual usage experience post-adoption, the variance could be attributed to how the perceived value and impact of GAS can change or broaden from a practical usage experience as internal auditors start to relate to what, in practice, adds more value to their job requirements.

5.4.2 Theme Two - Challenges

The theme challenge had the second largest number of codes amounting to a total of twelve (12). A total number of seventy-five (75) references were generated as part of the analysis in Atlas.Ti, which was associated with this theme. This represented 16.6% of all quotations identified as relevant to the study during the analysis of data in Atlas.Ti. The theme was also useful in providing answers to the research question of the challenges internal auditors in SOEs are encountering when using GAS.

The theme of challenges in this study referred to the hurdles and deterrents that are obstacles for users of GAS technology to get optimum value from GAS technology. It is the perspective of the researcher that these obstacles can result in users discontinuing the use of GAS as their needs, goals, and expectations will not have been met by GAS. Findings under challenges will be useful in the development of the conceptual framework as awareness of these challenges will assist in implementing strategies that avoid or minimise the impact of likely challenges. This insight can also help service providers of GAS to find ways to address user challenges, either through further development and enhancement of GAS software or the provision of necessary support to users on adoption and post-implementation support.

Twelve (12) challenges were identified from the interview participants. These challenges are listed in Figure 5.7 and their occurrence frequency is also reflected based on the number of times the challenge was mentioned by research participants in the actual interviews.

Figure 5.7 *GAS challenges experienced by interview participants*

The challenge description and frequency are discussed further in the following sections.

5.4.2.1 Steep learning curve

The challenge that was most frequently referred to by participants during interviews was that GAS had a steep learning curve, with some of the participants referring to GAS as complex or difficult to use. In this study, a steep learning curve refers to GAS technology requiring much more effort from users to learn how to apply it in the actual work environment. It is important to note that not all the participants viewed GAS as complex or difficult to use; however, the majority had this perspective. The importance of this challenge as a factor that influences continuous usage of GAS is captured in the preliminary conceptual framework under the user competency construct.

During the interviews, quotations implying that GAS had a steep learning curve totalled eighteen (18). Given the number of interviews, the researcher believes this challenge is therefore significant and noteworthy as users were of the view that they required much more effort to get to a point where they could comfortably use GAS to achieve valuable outcomes. Participants believed the steep learning curve resulted in the problem of slow adoption of GAS by internal auditors. Some of the internal auditors felt that the basic usage of GAS was not complex but the more advanced functionalities, like scripting to achieve more automation, were much more complex. About thirty per cent (30%) of the internal auditors who participated in the interviews felt that users needed programming background to easily grasp the concept of the more advanced uses of GAS in line with scripting capability.

According to one of the interview participants,

> *"I think we are coming from a generation where people who are not IT savvy, always believe that applications like the data analytic tools are very complex and difficult to learn."* (R12)

This participant was implying that the technology barrier of the older internal auditors or those with a fear of technology was more of a perception rather than the tools being complex. The view was that the fear they had of technology was the actual reason the adoption was low.

Most of the internal auditors felt that GAS tools were complex to use and had a steep learning curve. However, the internal auditors who felt that GAS was not complex to use also had very strong views and opinions that the internal auditors who felt GAS was complex to use were limited by that perception, which resulted in them not fully adopting the tools. They felt it was this perception that was the actual challenge, not the GAS tools.

5.4.2.2 Non-IT Auditors Struggle with GAS tools

The second most challenging aspect that was identified was that the interview participants felt that GAS tools were more suitable for internal auditors with an IT background, especially those who were qualified to be IT Auditors. According to Deloitte (2021), "IT Audit typically evaluates and reports upon the procedures and control environment around the IT systems in place within an enterprise with a view to achieving more effective management of the risks to which the entity is exposed." The skills of IT auditors generally include a good understanding of general computer controls (GCCs), data analytics, basic system infrastructure, and risk assessment. This is because IT Auditors are responsible for analysing and assessing an organisation's IT infrastructure to ensure systems and processes are operating efficiently and effectively.

During interviews, quotations implying that the use of GAS was challenging for non-IT auditors totalled ten (10). The researcher observed that it was mostly the non-IT auditors who felt they were disadvantaged by not having the IT background to use GAS, whilst most of the IT auditors did not feel they had an advantage over non-IT auditors when it came to the use of GAS. One of the participants felt that IT Auditors were likely to adopt the usage of GAS faster because they had a better understanding of relational databases in the source system, they needed to extract data from. They also felt that when it came to using the scripting capability of GAS, IT auditors caught on to the concept significantly faster than non-IT auditors. This sentiment was held strongly by most of the participants, with some of them being able to back up this thinking based on the observations they had made amongst their team members. Participants had observed that internal auditors who had been exposed to programming caught on to the use of GAS much faster. This thinking was also supported by the fact that the nominated Data Analytic Champions from the different organisations all had a background in IT Audit. From the interview participants, none of the IT Auditors referred to GAS as being complex to use.

In support of the above-mentioned belief, one of the participants who is an Internal Audit Manager stated,

> *"I actually have an intern, he is a Systems person, my plan is to get another one because I have actually realised this person has not used any GAS tool in the past, but he joined us for Scripting training, and because of his IT background he got the concepts faster, and even now he is one of our reference resources".* (R12)

From these findings, there is a mixed view concerning whether GAS is a tool more suitable for IT Auditors. Although most of the financial auditors felt that the tool was more suitable for IT Auditors, the experience of both financial and IT Auditors seems to suggest this concern was driven more by a general perception or belief at pre-adoption. However, in contradiction to this, the researcher found that the data analytic champions in the various organisations were all IT Auditors who seemed to be executing the champion role successfully.

5.4.2.3 Easy to forget without practice.

The third most common challenge identified by the interview participants referred to GAS users finding it easy to forget how to use the tool if they did not practice or use the tool regularly. The participants found that even after attending extensive training, they would easily forget how to navigate the tool if they did not use it frequently. The researcher's view was that this challenge was somehow related to the challenge of the steep learning curve for GAS, but it, however, differed from the perspective that even users who had reached a point of mastering the skills to use the tool at a proficient level tended to forget the skills if they had prolonged periods of not engaging with the tool.

The "easy to forget without practice" challenge was referred to eight (8) times during the full interview process. The extent of this challenge was expressed by one of the participants as follows,

> *"GAS requires that you have training on the tool and from there on, you need to continuously practice, you need to engage and use the tool, you just need to keep practising and applying all that training that you went through such that you keep wanting to know more. If you only just learn and then you put your certificates down, you are going to forget, you are going to be like you never went through the training and it becomes very difficult to use the tool."* (R2)

This participant's explanation and passionate expression of this challenge were shared by about fifty per cent (50%) of the interview participants with some of them having undergone GAS training several times but finding themselves forgetting to use the tool if they did not interact with the tool for lengthened periods. In support of this, another participant explained that once one starts to forget to use the tool then they also lose their confidence in using the tool during assignments which ultimately results in low adoption as the internal auditor will likely revert to the old way of working, using traditional methods to perform data analysis.

The researcher is of the view that the low adoption of GAS, therefore, triggers a vicious cycle of users forgetting the know-how of using the tool, which, in turn, results in further lower adoption and ultimately the discontinued use of GAS. GAS tools need to be utilised for every data analytic task that the internal auditor conducts, which will result in higher confidence in using the tool as the skills become more sharpened and, in turn, result in higher utilisation and a higher return on the GAS investment.

One of the internal audit participants in a senior leadership audit role explains that unlike transactional tools like ERPs, which licensed users interact with on an ongoing basis, GAS is only used when an auditor has specific sets of data that they need to analyse to meet an audit objective. Therefore, the non-routine or non-repetitive nature of an internal auditor's assignments means they do not have to use GAS frequently, and as a result, the challenge of internal auditors easily forgetting to use the tool becomes magnified. This challenge was captured in the preliminary conceptual framework under the effort expectancy construct. If internal auditors have to apply a lot of effort to competently use GAS each time, there may be discouraged from continuously using it as the user experience will not be as intuitive as other user-friendly technologies.

5.4.2.4 Software is expensive.

Like the challenge of "easily forgetting without frequent practice", the challenge of GAS software being expensive was the third most common challenge. It was mentioned eight (8) times during the participant interviews. The cost of GAS software includes the initial cost of the software, as well as the ongoing maintenance cost. In this study, both costs are considered. Over half of the interview participants were adamant that the price of the software was expensive, which became a significant hindrance to the adoption and ongoing use of the software.

Since, in this context, GAS is used in an organisational set-up, individual users are not paying for its adoption and continued usage. However, the users and the head of the internal audit department must motivate and justify the GAS investment. When users themselves do not feel the price for GAS is justified compared to the value they receive or expect to receive, it becomes increasingly difficult for them to motivate convincingly for this investment to other stakeholders. One of the interview participants highlights this challenge by stating that,

> *"It is questionable if the support and maintenance fees for GAS is really giving the business optimum value."* (R2)

SOE's in Southern Africa are generally faced with budget constraints to meet their operational objectives, and in that respect, the budgets for support functions, like internal audits, are either very low, or the annual allocations are reduced to meet other operational expenses. This is likely to be the case when the value of GAS is not realised. According to another participant who was passionate about the value GAS can add, they are faced with budget constraints that limit the number of licenses they can have to provide sufficiently for all team members. In this case, the full potential and value of GAS cannot be realised as the shortage of licenses means some of the data analytic work is done manually on samples of the transactional data. Several of the participants felt that cost constraint is the biggest reason why some of the organisations have not adopted GAS tools.

Without the provision of sufficient budgets to invest in GAS, it would not be possible for internal auditors to adopt GAS or maintain its ongoing usage. Given the significance of this factor, the researcher will consider including it as a standalone factor in the enhanced conceptual framework that can inhibit or enable the usage of GAS in an organisation.

5.4.2.5 Competency

The competency challenge in this study refers to the ability of GAS users to utilise and develop analytic tests in GAS tools efficiently to achieve the data analytic objectives. Although related to previously mentioned challenges of a "steep learning curve" and "easiness to forget without practice", this standalone challenge refers to the user acquiring the skills to sufficiently utilise GAS tools to achieve valuable outcomes and correct results. This challenge was mentioned eight (8) times during participant interviews and is of significance since, without the competency to use GAS, no valuable results or adoption can be expected from users. This challenge was also noted in the review of literature and was, therefore, included in the preliminary conceptual framework proposed earlier.

Most of the interview participants did not feel they were fully competent to utilise GAS to achieve results that met their expectations. These participants mainly attributed the lack of sufficient competency to the lack of adequate training to enable them to utilise the tool. An equal number of participants, who confirmed that they had undergone training, felt that the training was not sufficient to get them to a position to adopt and utilise GAS to its full potential.

The researcher observed that participants battled with the transition from receiving training in a classroom set up with dummy data to the implementation of that knowledge in the actual work environment. The researcher recommends that users need more practical support to have the confidence and know-how to apply GAS in the work environment. With application and continuous usage and learning, users are likely to become more competent and the level of adoption and likelihood of continued usage will increase.

5.4.2.6 Stakeholder frustration from false positives (client fatigue)

The challenge of "stakeholder frustration from false positives" in this study refers to the client fatigue that business process owners encounter when the analytic results generated from GAS are false positives. The internal auditor has the responsibility to ensure that the analytic test logic they develop in GAS performs the analysis accurately and on the correct data set for GAS to produce the correct exception report. As much as GAS has the capability to access data from any data source and perform the analysis, it is the test logic developed by the user that ultimately produces the output through GAS. Once exception reports are generated, internal auditors share these results either automatically through the use of GAS or manually through reports distributed by email to the process owner for remediation and comments. When the analytic logic is incorrect, it results in internal audit sharing false-positive exceptions to the process owners, who may then find themselves investigating results that have been incorrectly generated, which is a complete waste of their time. If false-positive reports are continuously or frequently generated, it results in stakeholder frustration or fatigue and the challenge is that, in the future, they may decide not to act or pay attention to any exception reports, correct or incorrect, generated from GAS as they will have lost confidence in the work done by the internal audit team.

During the interview process, this challenge was referred to eight (8) times by participants. It is significant because if process owners do not review or action exception reports, little value will be derived from GAS as the reports become “white elephants”. A reason shared by participants for generating false positives was the result of inaccurate process mapping of the analytic tests, which emanated from failure by the internal auditor to understand business processes. Another reason provided was the lack of or poor skills when using GAS and the lack of collaboration by internal auditors and process owners to fully understand areas of concern or the workflow of information. When process owners feel overburdened with the number of false positives, they resist investing more time in future outputs from GAS. The researcher, however, observed that there was a consensus amongst participants that when the exception reports are accurate, the business process owners experience great value from GAS and will, in turn, action any exception reports generated from GAS timeously as it helps them improve processes as well as strengthen the internal control environment.

5.4.2.7 Knowledge of tables from data sources

For data analysis to occur, GAS users need access to the correct data source and database tables within the source system to access the correct information required for the test objective. A database table is a data structure that organises information into rows and columns. It can be used to store and display data in a structured format. A specific value can be accessed from the table by requesting data from an individual column and row.

During the interview process, participants referred to the challenge of a lack of knowledge of the right tables to access within the database five (5) times. This challenge was experienced by about thirty per cent (30%) of the interview participants. Ideally, internal auditors need to extract data directly from the source system, and GAS achieves this by connecting at the database level. Once connected to the database, the GAS user needs to access the tables in the database that are relevant to the test objective.

One of the participants refers to the challenge of not having a data dictionary available for the ERP that they currently use. A data dictionary provides information describing the contents, format, and structure of a database and the relationship between its elements. Therefore, without this, users may find it extremely difficult to extract the required data for analysis. In this case, the participant advised that they depend heavily on IT as a solution, as their IT team has the knowledge of where the data is sitting. However, this has constraints, as they can experience delays in getting information because they must rely on IT, which removes their independence ability, as IT personnel will be aware of the work and information internal audit wants to analyse.

5.4.2.8 Resistance by process owners to accept analytic results.

The powerful capability of GAS to analyse a hundred per cent of the data population and to perform an unlimited number of tests in the fraction of the time it would take to do it manually is at times mind-boggling to both the users and other stakeholders in the business. Traditionally, the analysis of data was done on samples as this was the only practical solution given the limited constraints of time and resources. This meant there was a high probability for the business to miss out on identifying exceptions, abuse, fraud, wasteful expenditure, and inefficiencies. However, business process owners rely heavily on these findings to make decisions. Hence, when internal audit uses GAS, the results they produce may be shocking to the business, which results in the business process resisting these findings and becoming sceptical of GAS tools. When process owners resist or reject the findings from internal audit, it takes away the required collaboration and strategic partnership that internal audit needs to add value to the business.

The challenge of process owners resisting analytic results was mentioned four (4) times in the participant interviews. Although it was mentioned only four (4) times, the participants who encountered this challenge emphasised it to be quite material as it affected the value, they could derive from GAS tools. This was the eighth (8^{th}) most common challenge that participants were encountering. One of the participants from the banking sector illustrates this perspective and can be quoted to say,

> *"There were a lot of anomalies, a lot of duplicates, a lot of errors. So, when we did an audit, the people could not believe the report, and they were so defensive."* (R8)

This illustrates how some findings from GAS can make it difficult for process owners to comprehend the extent of errors and mistakes of their work, especially when they were of the view their internal controls were working perfectly, and their business processes were flawless. According to another participant in support of this,

> *"As an institution, there was a period where we were rolling GAS out, there was some form of resistance and each time that we would compute our results and present to management or the audit committee, there used to be some dispute especially when exceptions exposed a manager's position, they would argue that this is not the correct position."* (R15)

Another participant explained that the process owners' resistance and shock were due to the results being analysed from different perspectives. Process owners were making conclusions based on the results that they were reading and interpreting from front end reports. Internal audit using GAS, on the other hand, was analysing data from the backend or database level of the systems, which is, in essence, the raw data that has not been manipulated, filtered, or aggregated to produce front end reports, which resulted in conflict and resistance from process owners. In the case of this participant's organisation, this challenge was overcome by educating process owners regarding the working of GAS and the accuracy of the results and, subsequently, pursuing their buy-in.

Based on these findings, it is reasonable to conclude that stakeholder and process owner collaboration and cooperation is an important element of the data analysis cycle. For GAS to provide useful benefits to the organisation, all stakeholders must play their role to ensure effective adoption of the tool and remediation of exception reports generated from GAS. The researcher considers stakeholder collaboration and cooperation as a facilitating condition that enables the continued usage of GAS.

5.4.2.9 Getting direct access to data

To experience some of the benefits of GAS, like independence in performing data analysis work, saving time in accomplishing the analytic task, and increased confidence in providing assurance, internal auditors will need to have direct access to the data source systems. Some GAS tools have the capability to independently connect to a data source directly at the database level, thereby enabling the users to extract the required data. When the challenge of failing to connect directly to a data source is encountered, the perceived usefulness of GAS is compromised as some of the earlier stated benefits will not be attainable.

The challenge of failing to directly access or connect to the data was mentioned three (3) times by participants. Given the significance of such a challenge, the researcher was of the view that it was a positive sign that only a few participants had encountered this challenge in practice. This was the ninth (9th) common challenge raised by participants. A participant mentioned that one of the reasons for this challenge was the scepticism of IT personnel to provide internal auditors with access permissions to connect directly to the source system. In an example case shared by a participant, their IT resources had concerns that once GAS was connected to the system, the users would compromise data in the source system. In this case, the internal audit team tried to educate the IT team and other stakeholders that GAS was a read-only tool and, therefore, did not write back or delete data in the source system. This attempt was, however, frustrating, and lengthy, as it was characterised by a lot of resistance by IT personnel.

In another case, one of the participants points out that at the initial adoption of GAS, it was a struggle for internal audit to be granted direct access to the live system by IT. The workaround was for IT to move data from the live system to a test environment, and only in this environment was internal audit granted access to the data. This was not ideal for internal audit as they found that the data in the test environment would have either been changed, incomplete, or tampered with, which defeated the purpose of direct connectivity. This also resulted in delays to accomplish audit tasks, as internal audit would have to depend on the availability of IT resources to transfer the requested data to the test environment. The participant points out that it has been a long journey trying to resolve this issue, but at this stage, they are now experiencing a level of buy-in and trust and are being granted access to the live environment.

5.4.2.10 Manual transactions

GAS can only read data in electronic format. The challenge of manual transactions refers to data captured in physical files or hard copies, for example, by pen and on paper, which GAS cannot read. This data will need to be captured into Excel or an accounting package, for example, where it will be in an electronic format, to enable GAS to extract that data. In today's environment, most organisations have adopted ERP's or accounting and software packages to capture and process transactional data. It is from these platforms that internal auditors will use GAS to extract the data for analysis purposes.

All the organisations that participated in this study had implemented ERPs and software for capturing and processing data. The ERPs mostly used by the participating SOEs in this study were SAP and Oracle. The challenge of data being manual was mentioned three (3) times in the participant interviews. Like the challenge of "getting direct access to the data", this challenge was the ninth (9th) common challenge. According to one of the participants,

> *"We are still in this world where we find we are probably fifty per cent (50%) or forty (40%) automated, we are still pushing a lot of paper, and this pushing of paper means that even during the audit process we have to go through a lot of manual records."* (R12)

Despite the organisation implementing an ERP, they were not fully automated, and some of the data and processes were manual and paper-based. In this scenario, GAS cannot be used, and internal auditors will have to revert to old tedious ways to analyse such data.

This challenge was identified in the review of literature and included under the factor of the electronic (automated) data source.

5.4.2.11 Data quality from source system

The accuracy and meaningfulness of the data analytic results also depend on the quality of the data from the source system. GAS tools will analyse data as extracted from the data source and as per the test (script) logic designed by the user in alignment with the test objective. When data are captured incorrectly into the ERP at the data input stage, it will be analysed "as is" by GAS and, subsequently, such errors will compromise the quality of the reports generated.

This challenge was raised by only one (1) participant once during the participant interviews. This implies this challenge was not a general concern amongst the participants. This challenge was raised in the context of how improper capturing of data by the ERP users may result in the problem of internal auditors sharing inaccurate reports.

5.4.2.12 Getting buy-in from audit leadership and management.

Internal audit GAS users require the buy-in and support from both the audit leadership and managers of other business processes to ensure GAS tools are adopted and utilised properly and the generated exception reports embraced by process owners for remediation purposes.

The challenge of lack of buy-in and support from audit leadership and management was cited only once by one (1) participant during the interviews. This means this was not a challenge affecting most of the interview participants when it came to utilisation and continued usage of GAS. The participant who raised this challenge opined that implementation of GAS required changes to some of the audit processes as well as some of the organisational processes for optimum value. Changes to processes are difficult to implement without the buy-in of and support from the organisational leadership; hence, it was of paramount importance leaders had a full appreciation of GAS, its benefits and the changes that need to be implemented for its optimum usage. This user found it frustrating that such support and buy-in were not provided in their set-up; hence, they were not getting the most out of their GAS tools.

Table 5.7 provides an overview of the challenges identified during the review of literature versus the findings from the analysis of participant interviews.

Challenges identified from literature review
Access to production data
High cost
Complexity
Attitude of user
Training and expertise
Lack of regulation

Table 5.7 *Challenges identified in the review of GAS literature* ***Source:*** *Literature Review Chapter 2*

Table 5.8 provides a summary of the challenges identified by the interview participants.

Challenges identified from data analysis of participant interviews
Steep learning curve
Complex – suitable for auditors with IT background
Requires frequent usage
High Costs
Competency challenge
Stakeholder frustration from false positives
Knowledge of data sources and tables
Resistance by process owners to accept analytic results.
Direct access to data
Manual data
Data quality from source system
Buy-in from audit leadership and management

Table 5.8 *Challenges identified from interview participants*

Table 5.9 provides a key for Tables 5.7 and 5.8.

KEY – Tables 5.7 & 5.8
➢ Matching colours are challenges that are related or similar.
➢ No colour – refers to challenges identified that do not match any other challenge

Table 5.9 *Key for Tables 5.7 & 5.8*

A total of six (6) challenges were identified from the literature review whilst twelve (12) challenges were identified from the participant interviews. There were two (2) challenges identified in the literature review that were not identified by interview participants. These two (2) challenges were the attitude of users and lack of regulation. The five (5) challenges that were identified by participants during the interviews but were not identified during the review of literature were stakeholder frustration from false positives, resistance by process owners to accept analytic results, manual data, data quality from source system, and buy-in from audit leadership and management. The researcher will consider the inclusion of these into the conceptual framework where they are not incorporated into the factors already proposed in the preliminary framework.

5.4.3 Theme Three – Pre-adoption Considerations

The theme of pre-adoption considerations consisted of four (4) codes and a total of nineteen (19) quotes referenced from the participant interviews. Out of the ten (10) themes identified in the study, this theme contributed three per cent (3%) of all the quotes referenced by the researcher as significant to the study. Based on the number of codes, this theme was the seventh (7^{th}) most common theme.

In this study, the theme of pre-adoption refers to the factors that have been identified by interview participants as important considerations or drivers for the adoption of GAS technology by internal auditors. This construct sets the foundation for the expected outputs and usage experience of GAS for internal auditors and set the foundation for mobilisation of the necessary support and drivers to ensure its successful adoption during the implementation and post-implementation phase. The researcher identified factors that participants viewed as significant considerations that users and internal audit leaders should evaluate and plan for before the implementation of GAS technology within the internal audit environment. These factors, therefore, become drivers and enablers for the successful continued usage of GAS post-adoption, amongst other factors.

Four (4) pre-adoption factors (codes) were identified by the interview participants. The factors under the pre-adoption construct are shown in Figure 5.8 and their overall contribution to the theme is reflected, based on the number of times the factor was referenced by the research participants during interviews.

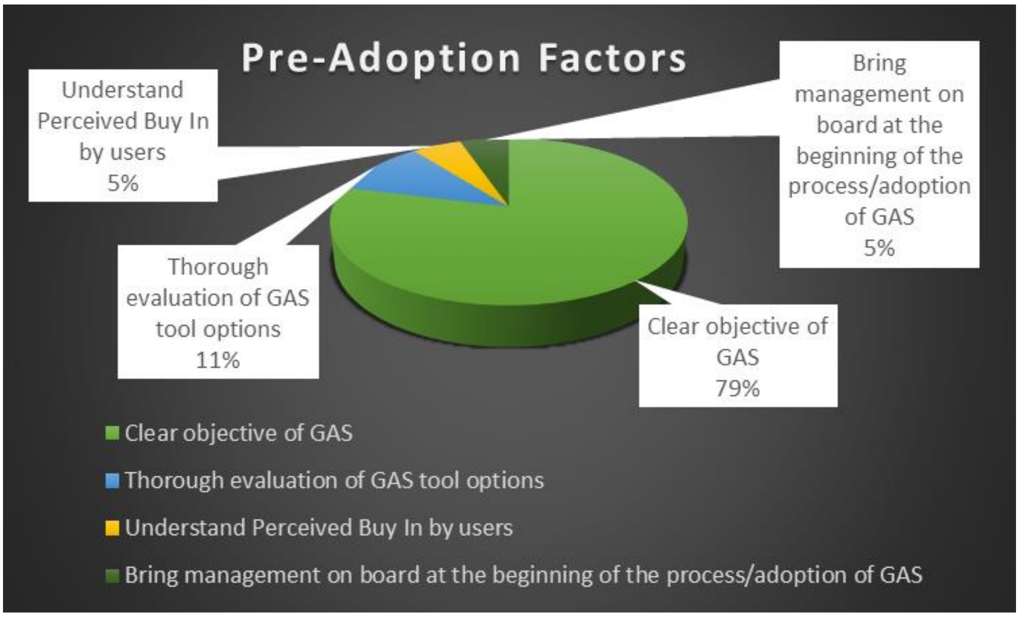


Figure 5.8 *Factors characterising the pre-adoption theme*

A detailed analysis of each of the considerations is provided next.

5.4.3.1 Clear objective of GAS

To have a clear objective of GAS was by far the most significant factor identified by participants during interviews, representing seventy-nine per cent (79%) of all factors. This translated to fifteen (15) of the overall nineteen (19) references identified under the theme being accounted for by this factor. This evidences the significance of this factor and how most interview participants viewed it as an important factor that needed to be considered at the GAS pre-adoption phase.

In this study, the factor of "clear objectives" refers to the internal audit leader and the team members having specific plans and expectations of where and how they intend to use GAS in their environment once adopted. In addition, the theme refers to the specific expectations of the benefits and value additions that internal auditors anticipate to derive from the adoption of GAS. Clear objectives in the context of GAS provides clarity and alignment on the business areas and audit analytics that will be performed, determining the scope of usage, clarity of which team members will be allocated licenses and setting a baseline for measuring, monitoring, and assessing achievements of results, individual performance, and tracking of return of investment. Awareness of clear objectives facilitates the continued usage of GAS as they become the foundation for assessing progress in different milestones in line with expectations, required outputs, and perceived usefulness.

According to one of the participants, setting clear objectives for GAS is important not only at the pre-adoption phase but also on an ongoing basis to ensure continued and optimum usage of the tool. They explained that as they do their annual audit plan, they undertake exercises to identify the specific areas where GAS will be applied. By engaging other stakeholders while they plan, they also leverage off this opportunity to educate and get buy-in from other stakeholders on what role they are expected to play.

Another participant highlights that a common mistake made by internal auditors is that they buy software "fashionably" to imitate other organisations they regard highly without first contextualising how this software will work and add value to their processes and organisations. This normally results in software like GAS being underutilised post-implementation as no clear plan or thinking have gone into how the technology will be applied in their environments. In support of the need for in-depth research of GAS before investing in it, another participant explains,

> *"There must be an identified gap in current processes that GAS is going to fill before its adoption. There must be a need for it, and it must be clear that the identified gap will be addressed by the specific GAS tool the organisation will decide to invest in."* (R7)

The participant highlights that there are different types of GAS, such as IDEA and ACL, therefore, part of the research should aim to establish the specific type of GAS suitable for the client's environment.

Furthermore, the need to set clear objectives of GAS at the pre-adoption phase is explained by participants as important to achieving optimum usage of GAS. The participants mentioned that it was common that GAS was underutilised once adopted as internal audit teams would not apply it in all potential areas as identification of those areas would not have been done upfront.

One of the participants emphasised that having clear objectives of how GAS will be used was not only important for the CAE or head of internal audit, but the same vision and objective had to be sold to all team members who were often the actual users of the tool. When the vision is accepted by the team, there is an increased likelihood of optimal GAS usage at a sustainable level, resulting from alignment and ownership of the GAS vision among team members. The participant supported this belief by narrating how the usage of GAS decreased in their environment when their previous CAE, who was obsessed with GAS, was replaced by the current CAE, who did not have a vision or passion for GAS. According to the participant,

> *“Our manager then was very obsessive about GAS and made us fall in love with his dream concerning GAS. Since he left, we currently have no direction from the new manager on the vision for GAS”.*

Most of the participants were in strong agreement with this view.

To encourage continuous usage of GAS and afford all individuals in the team an opportunity to use GAS, one of the participants pointed out that the audit plan should provide all team members with an opportunity to work on audits where GAS needed to be applied. As highlighted under the “challenges theme”, the lack of continuous usage of GAS reduced the proficiency of using GAS tools.

Another explanation on how the lack of clear objectives of GAS resulted in the under-utilisation of GAS post-adoption is explained by another participant as emanating from a general misconception amongst some auditors that once one implements GAS, it will automatically start to produce analytic results with minimum interaction by the users. With this misconception, users are not prepared on how to utilise GAS fully and can easily be discouraged as they will now associate the tool with complexity and perceptions of unrealistic effort would have been established. Not only do participants need the skills to use GAS, but they should understand the area GAS can be applied.

As elaborated previously, the “clear objectives” construct under the pre-adoption theme significantly impacts the future adoption levels and usage of GAS. Clear objectives provide direction and set expectancies on both the perceived usefulness and effort expectancy perspective. These two constructs have an overall impact on the user’s decision to continue or discontinue the usage of GAS as it influences the user’s satisfaction with GAS, basing it on set pre-adoption expectancies. The researcher is of the view that this theme and construct needs to be incorporated in the conceptual model because of its significance based on participant input.

5.4.3.2 Evaluation of GAS tool options

As mentioned earlier in this study, there are different types of GAS that auditors can opt to invest in. Examples of GAS types commonly identified by the interview participants are ACL, IDEA and TeamMate Analytics. These competing solutions offer similar core capabilities as they are audit specific data analytic tools; however, they vary in terms of their capability and functionality to address an internal auditor's analytic requirements. Based on the differing offerings, it is important for internal auditors to evaluate the GAS types extensively to ensure the preferred technology will be able to achieve their data analytic objectives, access their data sources, handle volumes of data that they need to analyse, generate desired reports and visualisations in the required format, as well as meeting budget expectations in the view of pricing models offered by the vendors. Implementing a GAS type without proper evaluation may result in GAS failing in the client's environment, not because of the limitation or constraint of GAS tools but limitations resulting from the procured GAS type.

The factor to evaluate GAS tools options at the pre-adoption phase was the second (2nd) most popular factor identified by the interview participants, translating to eleven per cent (11%) of the references identified by the researcher from the interviews under the pre-adoption theme. Although this factor was referred to significantly fewer times compared to the clear objectives factor during interviews, it was still an important factor that needed to be considered when internal auditors are considering adopting GAS tools.

In both instances, participants were of the view that the process of evaluating the different GAS types should be thorough and not rushed. The important outcome of the evaluation exercise is to match the organisation's environment, internal audit data analytic objectives, and budget requirements to the offered software solutions to ensure the organisation settles for the greatest match. This is then likely to increase the chances of success once invested in GAS, as well as increase the chance of the tools being used sustainably in the long term.

5.4.3.3 Perceived buy In by GAS users

It is the responsibility of CAEs to ensure that the internal audit team members have an appreciation of the objectives of GAS, their expected roles in respect to GAS, and ensuring buy-in from the team before the implementation of GAS. As much as the CAEs carry the vision for the department, and have the greatest influence and decision-making power to invest in GAS, in most cases, they do not become the actual users of the software but, instead, become the consumers of the report outputs from GAS. The importance of this factor at preadoption recognises that users will need to buy into the vision of GAS at preadoption to enable them to successfully adopt the tool and fully utilise the tool in alignment with set expectations and vision.

The factor of understanding perceived buy-in by GAS users was only mentioned once in the participant interviews. Given that only four (4) factors were mentioned relating to the preadoption theme, the researcher felt it was important to include this factor as an important consideration when investing in GAS. The participant who refers to this factor points out that it is of importance the CAE gauges the level of buy-in from his or her team members towards GAS. The perception of buy-in of the team will then provide direction to the CAE in terms of the next steps. For example, if the perception is negative, then the CAE should rather delay investing in the software whilst focusing on motivating and educating the team on the importance of GAS.

5.4.3.4 Bring management on board at the beginning of the process.

One of the findings under the challenge theme was that of stakeholder frustration and resistance by process owners when it came to their involvement in remediating data analytic exceptions reported by GAS tools. The main cause of this was due to the various stakeholders not appreciating GAS tools, not knowing what their role was when it came to GAS, and how it added value to their existing processes. Based on this, the factor of bringing management on board at the beginning of the GAS adoption process is of importance as buy-in and support can be established early in the process to avoid the frustration experienced by users and other stakeholders when GAS is implemented. Resistance and frustration from any of the stakeholders can result in the failure of GAS use post-adoption. When managers from other departments are educated in and buy into GAS, they can cascade the knowledge down to their team members, therefore, creating an environment that is knowledgeable and accepting of GAS tools.

The factor of bringing management on board at the beginning of the GAS adoption process was only mentioned once in the participant interviews, however, it contributed five per cent (5%) of the overall factors identified. The participant who refers to this factor is also of the view that CAEs can leverage off service providers of GAS to assist in the lobbying and education of GAS to other business heads at the pre-adoption stage.

5.4.4 Theme Four - Perceived Usefulness

The theme of perceived usefulness comprised eight (8) codes with a total of eighty-eight (88) references associated with it. Out of the total of ten (10) themes, this theme represented thirteen per cent (13%) of all references identified from participant interviews. Based on this, this theme was rated as the fourth (4th) most significant. Therefore, it is the view of the researcher that this is an important theme to be considered for the development of the GAS continued usage conceptual framework.

In this study, perceived usefulness refers to the users' perception of the expected benefits of using GAS. The theme of perceived usefulness was explored in detail by the researcher in Chapter 2, the literature review. The findings from the collected interview data are in line with the literature review from the perspective of the significance of this theme towards adoption and usage of technology. According to Bhattacherjee (2001), perceived usefulness could be adjusted based on confirmation experience. The findings of the study emphasise that post-acceptance satisfaction is grounded in users' first-hand experiences with the IS. It is, therefore, more realistic, unbiased, and less susceptible to change. The researcher agrees with this view. The theme will be explored from the confirmation of experience perspective since the interview participants had all adopted and used GAS technology and, therefore, their view on its perceived usefulness will be from practical usage and interaction with GAS.

The eight (8) concepts identified from the interviews categorised under the perceived usefulness theme are shown in Figure 5.9.

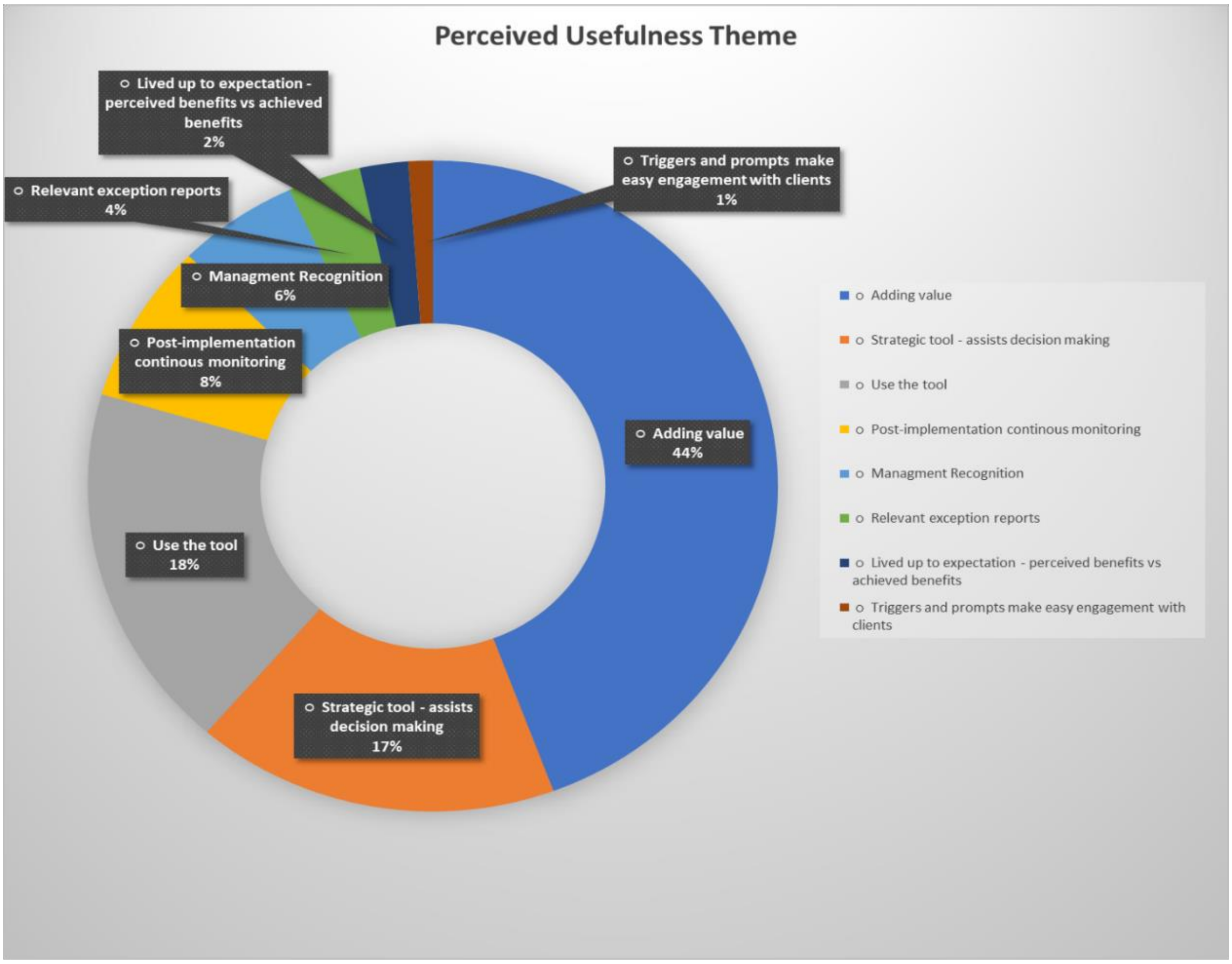


Figure 5.9 *Perceived Usefulness Theme*

A detailed analysis of each of the concepts is provided below.

5.4.4.1 Adding value

In this study, the concept of "adding value" under the perceived usefulness theme refers to the positive impact and experience of GAS in terms of delivering visible and tangible improvement in the internal audit data analytic processes, efforts, and results. When GAS adds value to the internal audit department and the organisation, the realised benefits and value should be tangible and demonstratable, especially when one compares achievements before adoption to improvements and changes post GAS adoption. It is crucial for the value added to be identified for the continued use of GAS to be supported, funded, and to obtain buy-in for collaboration by other stakeholders. Organisations today are seeking the most effective and efficient ways to deliver value and attain objectives; hence, it is important for project owners to showcase the return on investment (ROI) for any investment that the organisation have embarked on. As internal audit teams continue to seek to add value and gain their “seat at the table”, it is crucial for them to demonstrate and communicate how software investments, such as GAS, are adding value. Not only should this be communicated, but the benefits they experience should also impact other stakeholders.

Under the perceived usefulness theme, the concept of adding value was by far the most referred to by participants during interviews. This concept represented forty-four per cent (44%) of all references under the theme, which translated to a total number of thirty-nine (39) references out of the eighty-eight (88) that had been identified by the researcher. This is a significant representation by the concept, which came as expected to the researcher, who had the perspective that it was critical for GAS to provide tangible value to the audit process if users and the organisation at large are to continue to be invested in using the software. As per an earlier finding in this study, which was related to securing stakeholder buy-in, it was of the researcher’s viewpoint that as GAS adds value to other stakeholders, it would, in turn, become easier to secure their collaboration and support.

Most of the participants mentioned that they had a positive experience with GAS tools already and realised their tangible value. This is further supported by one of the participants, who mentions,

> *“With regards to the audits that we perform and the output that we get from the tool, management does appreciate looking at the financial impact of identifying anomalies in the business transaction data.”* (R2)

Most participants could relate with how GAS was helpful in the detection of irregular transactions and the identification of inconsistencies in the data, which resulted in internal audit driving the improvement of processes and accuracy of the data capturing process.

In some organisations, participants’ use of GAS was acknowledged throughout the organisation because of the value it delivered. One of the participants shared a case where business process owners would contact the internal audit department if they did not receive notifications of exceptions from GAS regularly. The process owners, in this case, were senior organisational members, like The Secretary to Treasury, The

Director of Budgets, The Accountant General and the Chief Financial Officers (CFO), who became reliant on GAS to notify them of duplicate payments, erroneous transactions, and suspicious transactions. This case demonstrates the level of value that GAS provides to internal audit as well as the organisation at large. Another participant also provided examples of how the Supply Chain and the Salaries department in their organisation depended on GAS to illuminate high risks and alert them of any suspicious or fraudulent transactions. Internal audit can become a strategic business partner when GAS tools provide value at this level.

Another participant explained how GAS had enabled them to have a "bird's eye view" of how other systems were operating in their organisations. Because of the ability to read data from other systems, internal auditors were now able to have insight into control inefficiencies that other systems had. A separate benefit provided by GAS, mentioned by other participants, was the ability to tell a story from the huge volumes of data. Financial institutions especially benefited from the capability of GAS tools to forecast, which helped management with making data-driven decisions.

In addition to GAS's powerful capability to access big data from various systems and analyse hundred per cent (100%) of it, one of the participants shared how it has made it much easier to present their findings in a more convincing way to the board as well as senior management. The added visualisation capabilities in GAS made it easier for senior management and the board to digest the information and appreciate it at a very high level to inform decision making.

The different and numerous examples shared by participants evidenced how GAS provided a positive impact within their various organisations. Most of the participants had a very positive perceived usefulness of GAS due to the tangible benefits it was providing, and this was despite some of the challenges they were encountering. Participants, therefore, had a strong opinion that they could leverage more from GAS to derive more benefits over time as they came up with strategies to overcome the challenges they were encountering.

5.4.4.2 Strategic tool for decision making.

Organisations invest in people, processes, and technology to achieve their strategic objectives. Therefore, when internal audit invests in software like GAS, it is expected these tools will aid the department in assisting the organisation to achieve its objectives efficiently and effectively. In the researcher's view, it is important for internal auditors to appreciate at the pre-adoption phase where GAS fits into the overall strategic "big picture" of the organisation and what role it will play towards the achievement of the strategic objectives. Once GAS is adopted, users need to continuously evaluate its usefulness towards the achievement of strategic objectives. Interview participants identified the contribution of GAS as a strategic tool for data-driven decision making as useful.

Strategic tool for decision making was the third (3^{rd}) commonly identified perceived usefulness factor by interview participants. This factor contributed seventeen per cent (17%) of all factors under the perceived usefulness theme and this was represented by a total of fifteen (15) quotes referenced in the interviews. In a world where organisations are creating and dealing with big data, the researcher expected that the contribution of GAS towards strategic data-driven decisions was a significant factor under the perceived usefulness theme of GAS tools. GAS's capability to illuminate risks from the data contributed significantly to the decision-making process for senior managers.

The strategic role GAS plays in organisations is explained by one of the participants,

> *"I believe ACL is working aligned to the strategy of the business because it has to ensure that we don't get any anomalies from the strategies that are going to derail the business from achieving its strategy."* (R2)

The participant highlights the importance of the high adoption of GAS across the organisation and giving it a top priority as a reliable resource that communicates the "story" hidden in the transactional data. In support of this, another participant makes mention that the outputs of GAS should not end with the internal audit department but must be communicated to process owners to inform decision making and raise awareness of the possible risks that may prevent the organisation from achieving its objectives. Another participant elaborates that is important for the CAE to champion the adoption of GAS for it to be taken up as a strategic tool within the organisation. CAEs participate in strategic meetings, therefore, at that level can educate and lobby for the buy-in of GAS tools by other stakeholders.

Another participant thought that the capability of some GAS tools to present findings in a visual format made it easier for strategic decision-makers to consume the information for decision making. According to another participant, when GAS tools are used to continuously monitor business areas, they inform process owners frequently of possible exceptions occurring in their various business processes. They recommend that the scope of GAS should therefore be expanded beyond internal audit requirements, but also incorporate risk management.

One of the participants describes how GAS has shaped their internal audit role to a strategic consultant role within the business. They witnessed that business was now coming to them with data analytic programs, seeking assistance from internal audit to understand how their control environment was functioning. The interview participants also mentioned cases where they had to execute complex analytics using GAS in meetings to inform decision making in the shortest period. This assisted the business in making timeous decisions with the confidence of having understood their data.

5.4.4.3 Use the tool

The concept of "use the tool" in this study was interpreted to mean that for users to derive any benefit or usefulness from GAS, the first necessary step is for them to "use" the tool. GAS is not a "plug-and-play" solution; it requires the user to actively interact with the software to access data and develop the specific tests that speak to the audit objective. From interaction with internal auditors, the researcher found that there was a general misconception by the profession that once one had the tool, the data analytics processes immediately became automated. GAS is deployed with the inherent capability to access data directly as well as analyse a hundred per cent (100%) of the data population, etc. However, to derive benefit from the tool, users need to actively engage with the tools to generate meaningful and actionable results. With some GAS tools, once this initial work is done, the steps can be automated to run repetitively with minimum human intervention.

The "use-the-tool" concept under the perceived usefulness theme represented eighteen per cent (18%) of all references identified as relevant from the interviews. This made the "use-the-tool" concept the second most popular. A total of sixteen (16) references were noted from participant interviews falling under this concept. The common finding amongst participants was that users who were not experiencing many benefits from GAS post-adoption were not utilising the GAS tools. This was attributed to several reasons, most commonly the lack of skills and know-how to use GAS as well as the fear of technology that resulted in some users reverting to the traditional manual way of working.

According to one of the participants, as far as GAS is concerned, one can only learn through the practical usage of the software, and only then can they establish what it can do and cannot do. He encouraged users to apply the software to the live environment to gain the experience required to use the tool optimally and comfortably. This finding aligns with an earlier finding in the study that GAS required users to frequently use the tools to become competent enough to use the technology.

A participant mentions the importance of user buy-in to ensure GAS is adopted by all licensed team members. Without buy-in by users, GAS will be at risk of becoming a "white elephant", which increases the likelihood of GAS being discontinued. Another participant recommends the immediate and continuous use of GAS as soon as it is deployed in the environment and training is completed. They had observed that users who wanted to apply training skills weeks after GAS training battled with the use of GAS since they forgot the content covered in training. They recommended that to be able to fully utilise GAS it is important for users to attend workshops and webinars that cover new features and functionalities frequently so that they are informed of the technological advancements going into the tool. Knowing the full capability and functions of GAS means that users can apply GAS in broader scopes.

5.4.4.4 Post-implementation continuous monitoring

The concept of "post-implementation continuous monitoring" in this study refers to the need to regularly observe and review the progress that internal auditors are generating from the use of GAS. Systematic processes to track GAS progress towards its intended usage and scope objective ensure that management has visibility whether GAS is delivering on results as per the performance expectancy (PE). Monitoring how GAS is utilised is crucial for continuous usage as "what is not working" can be resolved whilst that which is not going as planned can be improved or remedied. The researcher is of the opinion that when users are aware that there is some monitoring mechanism in place to track GAS usage, they tend to put effort into utilising the tool fully. Consequently, continuous monitoring becomes a benchmark that informs or drives the perception of how useful GAS is in the environment.

According to one of the participants,

> *"Once the tool is procured, it's important to still drive people to use the tool and monitor whether that usage is in line with the expected levels".* (R1)

In support of this, another participant emphasises the importance of putting mechanisms in place to monitor the usage of the tool. They mention that investing in GAS tools without also investing in the tools or systems to monitor its usage will not be a complete investment as the CAE needs to be certain the tool is used to the expected level or beyond. The experience of this participant at the two organisations he had worked for was that there were inadequate monitoring mechanisms to monitor GAS usage, and as a result, there was an unawareness to what extent the tool had been utilised. They felt with a monitoring mechanism GAS was going to be used more extensively.

As part of a post-implementation continuous monitoring program for GAS, one of the participants suggests the use of a KPI's framework to monitor the usage of GAS. CAEs will need to agree with the GAS users on what exactly will be measured to show usage of GAS. Tracking individual development through a proper performance management system is likely to result in higher adoption and utilisation of GAS tools.

Based on this finding, the researcher observes that post-implementation continuous monitoring is crucial and an important driver for continued usage that should be incorporated in the conceptual framework.

5.4.4.5 Management recognition

A useful benchmark that can be adopted by users to establish the perceived usefulness of GAS is to take note of management recognition. In this study, the concept of "management recognition" refers to both the informal and formal acknowledgement or feedback from managers from internal audit and other departments on the relevance and usefulness of analytic results produced by GAS in support of departmental and organisational goals. Where social influence (SI) is a huge motivator, management recognition can be a huge driver for continuous adoption. SI is one of the adoption factors identified in the UTAUT model. It is defined as the degree to which the individual perceives that important others believe he or she should use the new technology.

The management recognition concept contributed to six per cent (6%) of all the references identified under the perceived usefulness theme. This translated to a total of five (5) references under this concept According to one of the participants, they found it motivating that management appreciated and recognised the value of the exception reports generated from GAS. They elaborated that management was very appreciative of these reports which had a positive impact on the internal audit team as it validated the value that their output delivers to the business. In support of this, another participant states,

> *"Management is getting value from GAS. It is a technology that is pretty much known in our business when it comes to the performance of data analysis."* (R4)

In another case example, the participant explained how management was now proactively seeking data analysis reports from internal audit.

There was a consensus amongst participants on how management feedback encourages the continuous usage of GAS. Not only was recognition by management validating the work of internal auditors, but it was also assisting in the broadening of the scope of GAS usage by contributing and collaborating with internal audit on the business's high-risk areas and processes that needed continuous monitoring. Based on the finding, the researcher perceives that SI is an important factor, which drives the adoption and continued usage of GAS.

5.4.4.6 Relevant exception reports

In this study, the concept of relevant exception reports refers to the output of analysis reports being accurate, correct, and pertinent to the needs of the business process owners and management. This concept is very much aligned with the challenge raised by participants concerning the frustration that business process owners experienced due to false positives. This concept, however, goes further by incorporating the matter of the relevance of reports, which speaks to internal audit developing analytical objectives that are aligned with both departmental and organisational objectives as well as the high-risk areas that management is largely concerned with. Accurate and relevant exception reports greatly improve the perceived usefulness of GAS in the organisation.

Under the theme of perceived usefulness, the concept of relevant exception reports contributed to four per cent (4%) of all references identified under this theme. The percentage translated to a total of three (3) references identified under this concept. It was noteworthy that this concept was not mentioned by most of the participants; however, when its analysis acknowledges its relations to the challenge of false positives mentioned earlier, it becomes a significant concept that reinforces the importance of producing correct and relevant reports for management consumption.

According to one of the participants, there is a need to engage stakeholders when developing data analysis tests for GAS, to develop tests that address their needs as well as facilitate accurate mapping of tests for business processes. This speaks to the need for audit to collaborate with stakeholders, not only to develop analytical tests that address internal audit objectives but to be inclusive of the business needs of other stakeholders. In support of this, another participant mentions,

> *"Management wants to see exceptions that actually add value, those that have meaning to them".* (R12)

This point reinforces how meaningful relevant exception reports from GAS is to management.

5.4.4.7 Lived up to expectation.

This concept looked at how GAS was delivering actual benefits in comparison to the perceived benefits pre-adoption. This concept was referred to by only two (2) participants during the interviews. The two (2) participants opined strongly that GAS has lived up to their expectations.

One of the participants felt that although GAS had matched their initial expectation, from experience, they strongly believed that it would exceed their initial expectations because, through usage, they had been exposed to more capabilities and were more aware of the larger scope where GAS could be applied in their environment. This finding agrees with the finding by Bhattacherjee (2001), which suggested that perceived usefulness could be adjusted based on confirmation experience. In this case, the users' initial view of perceived usefulness was adjusted upwards due to the experience they had with GAS. The user expects the usefulness of GAS to increase as they explore and implement the use of more features and expand usage in other business areas.

5.4.4.8 Triggers

The least popular concept identified under the perceived usefulness theme was that of "triggers and prompts enabling easier engagement with clients". Some GAS tools have the capability to completely automate the end-to-end data analysis process once a test or script has been developed. These GAS tools can be scheduled and automated to perform data access, data analysis, and to send notifications of exception reports to process owners or clients. This process involves minimum human intervention.

Only one (1) participant referred to the concept of triggers during the participant interviews. The participant found this capability in GAS to be extremely useful as it enabled information to be sent out by email to clients when the set threshold or exception breach occurred. This is a useful capability for continuous monitoring. Although a very powerful and beneficial capability, given that only one participant mentioned it, the researcher did not find it to be a significant capability that drove continuous usage of GAS post-adoption. This could be explained by the capability being one of the advanced features of GAS; hence, users can only derive value from it when base level usage and acceptance of GAS occurs in the organisation.

5.4.5 Theme Five - Perceived Ease of Use

The theme of perceived ease of use (PEOU) was comprised of concepts emerging from the contribution of participants during interviews. From all the themes identified in the study, it was the least significant based on the number of quoted references emerging from the data analysis process. The total number of concepts identified amounted to seven (7), which represented only one per cent (1%) of all references identified as relevant for the study from the analysis of participant responses.

The theme of perceived ease of use is one that had been identified in the literature review and covered by the UTAUT model. PEOU, in this study, refers to the degree of ease the user associates with the use of GAS. Under the theme of challenges, most participants viewed the use of GAS as characterised by a steep learning curve, mainly because the users viewed the tool as complex. This finding is in support of a study by Ahmi (2012), who found that despite auditors recognising the advantages of GAS, the low adoption or usage could be explained by what they believed to be the significant learning curve and lack of ease of use.

5.4.5.1 User friendly

In this study, the only concept identified under the PEOU theme is "user friendly". User friendly, in the context of the study, refers to the user's view of how simple, intuitive, and straightforward it is to use GAS to achieve data analysis objectives. The most common challenge that was identified by GAS users in interviews was that GAS had a steep learning curve and required frequent usage for effective adoption of the tool. There is a general expectation by users that technology should make it easier and more efficient to complete tasks compared to the manual and traditional ways of accomplishing a task. Based on this, when technology is difficult to use, there is a high likelihood that clients will revert to the manual way of working, which threatens the continued usage of said technology.

Most participants referred to having a perception that GAS was a tool designed for IT Auditors; hence, the non-IT Auditors believed GAS would be complex to use before adoption. However, according to the interview participants, once they had attended training, most of them were of the view that GAS was not a complex tool and could therefore be utilised by both financial and IT auditors. However, most of the CAEs participating in this study had a conflicting view. Through observation of how their team members grasped GAS concepts from training and the actual application in the work environment, they strongly felt that IT Auditors and those auditors that had a programming background were able to adopt GAS much faster and fully utilise it in the work environments. Most of the non-IT Auditors initially found it hard to use GAS. Most of the CAEs considered recruiting more IT Auditors to use GAS and champion the data analysis programs. However, some of the non-IT Auditors had successfully adopted GAS and were using it successfully.

There were conflicting views on how user-friendly GAS was and whether it was a tool that should be adopted by IT Auditors or all internal auditors. Given that this theme was the least commonly raised by participants in the interviews, it suggests that perceived ease of use was not a big driver of continuous usage of GAS. This contradicts findings from earlier studies by Shamsuddin *et al.* (2015) and Ahmi (2012), who found EE as a significant factor influencing the usage level of GAS. This finding, however, agrees with an earlier study by Bierstaker *et al.* (2014) on actual GAS usage, which found effort expectancy to not have a significant impact on actual GAS usage. Despite the inconsistencies in findings around this concept, when the researcher considers the steep learning curve challenges and the competency theme detailed next, the researcher is of the view that PEOU is an important factor to be considered in the proposed conceptual framework for GAS continued usage. If internal auditors find the tool too complex to use, there is a high probability the tools will not be used effectively.

5.4.6 Theme Six - Competency Theme

The theme of competency referred to the ability of the GAS users to efficiently and successfully use GAS tools optimally to achieve the audit data analytic objectives. Competent GAS users will have the know-how and skills to navigate the software to extract relevant data from the source, perform analysis of the data according to objectives and generate reports to communicate the identified exceptions.

Under the competency theme, five (5) constructs were coded as being relevant to the theme. These five (5) constructs were characterised by a total of eighty-six (86) quotes referenced from the participant interviews. This translated to a thirteen per cent (13%) contribution of all quotes identified under this theme, which made it the fifth (5^{th}) most popular theme. Based on this, the researcher believes that this theme is significant in its contribution towards the adoption and continued usage of GAS technology. Considering that this study focuses on the actual adoption and usage of GAS, the researcher expected that this theme would be a significant one. As highlighted under the challenge and ease of use theme, usage of GAS is dependent on the users' know-how. The need for users to have the ability to develop tests makes the competency of a user critical for any value to be derived from the use of GAS.

Service providers for GAS solutions also provide consultancy services for their data analytic specialists to assist or develop the actual analytical tests. These services are billable, and, therefore, may become too costly if the users over-rely on them. To manage costs and efficiencies when developing numerous data analytical tests, it is greatly beneficial for the internal auditors to have the capability to develop their own analytical tests in the GAS software.

The details of the constructs under this theme are shown in Figure 5.10.

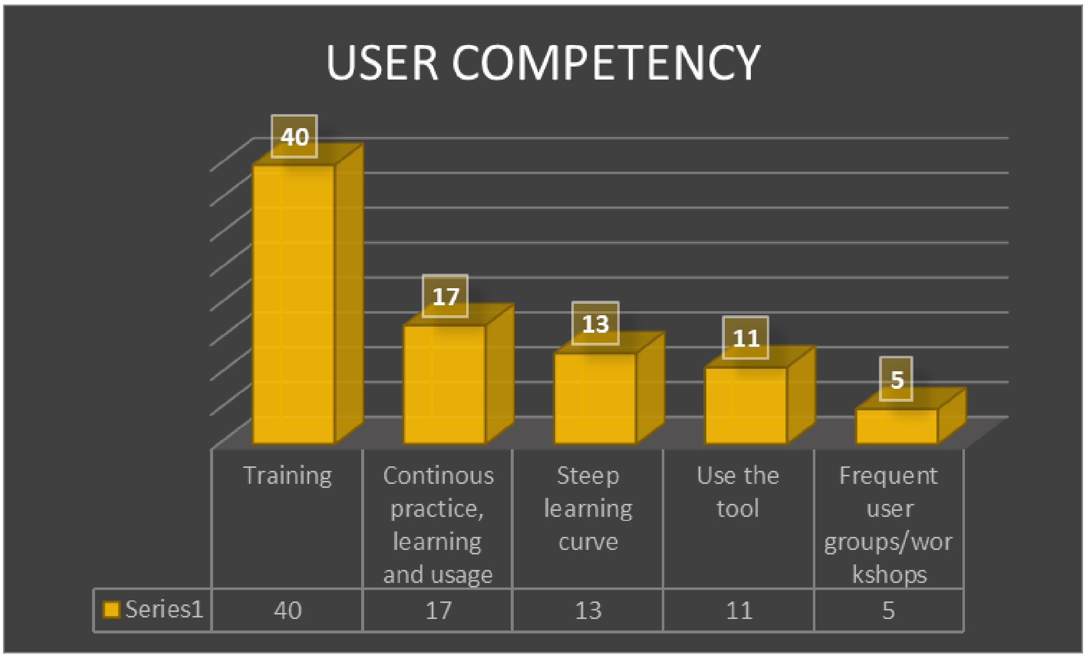


Figure 5.10 *User-competency Constructs*

The construct description and frequency are elaborated in the following subsections.

5.4.6.1 Training

The training construct refers to the process of teaching and upskilling GAS users to have the ability and knowledge to use GAS software to perform the end-to-end data analysis process as per the capabilities and functions of the software. Training is important at both onboarding when GAS tools are procured as well as for continuous usage post-adoption. The user training can either be facilitated by the software service provider or in house by data analysis champions in the team who have undergone training.

The training construct contributed to forty-six (46%) of all the constructs identified under the competency theme. This reflects the importance of user training in impacting the competency of users, which is necessary for users to have a positive experience with the software. The training construct was characterised by forty (40) quotes referenced by the researcher from the analysis of participant interviews.

The participants were all in agreement that training is a critical success factor for GAS to be fully utilised to provide value to the organisation. Most participants felt that the one-week training they received was inadequate. The training construct is captured in the user-competency construct in the preliminary proposed GAS PA CU conceptual framework. This concept will be retained in the framework as interview participants have validated the significance of the concept toward the continued usage of GAS. In addition, training will have an indirect influence on the perceived ease of use of GAS, as competent users are likely to find GAS less complex to use.

Most participants attributed the underutilisation of GAS tools to the lack of know-how to use the tool. It was noteworthy that some of the participants had been provided with GAS licenses without having undertaken the necessary basic training. Non-IT Auditors especially felt, because of their non-technical background, they needed to attend more intensive training to become as competent as users who already had a technical or programming background. Based on the interview participant responses, it was a common practice by most organisations to provide GAS licenses to new team members without them undertaking any training. This was mostly the case with the organisations whose management still questioned the value GAS software provided, which made it challenging for the CAE to secure additional budget to facilitate the training of new members. As can be expected, these users found it hard to fully utilise GAS tools.

One of the participants expresses the benefits of training to go beyond competency in GAS. They mention that training ensures the user is kept abreast with any advancements that have been happening in the software. Exposure to this keeps the internal audit profession relevant and progressive. They also identified the opportunity to network with other users during training and benchmark current usages of analytics with other colleagues. Learning from others opens the mind and broadens the scope of the areas where analytics can be implemented.

Most of the participants thought that although training was critical, users should not expect to be able to comfortably navigate the GAS software immediately after training. It was noted that it was important for users to think about the application of the software in their environment and then continuously practice on the platform to fully explore its potential. Another participant had the view that training delivered by colleagues within the organisation was more effective as the training examples and exercises would be relevant to the organisation's environment. In addition, one of the interviewees who has earned "Data Analytic" champion status in their organisation, had a positive influence on learners as they can relate to his success in the space and how practical the GAS tool is to the work of internal audit.

Some participants applauded GAS providers who provided their customers with access to free, self-paced online training. This served a lot of value from an ongoing usage perspective, as users could do refresher training at their own pace to ensure they sharpen their skills. Participants also found such platforms useful when onboarding new users, especially in cases where there were budget limitations for investing in a classroom set-up training. This option addressed the challenge of new users being allocated licenses with no support or basic training to get them started.

5.4.6.2 Continuous practice, learning and usage

The second most popular factor characterising the user-competency theme was continuous practice, learning and usage of GAS. This represented twenty per cent (20%) of the total number of references identified as relevant under this theme, which translated to a total of seventeen (17) references. Continuous practice, learning and usage referred to the repetitive interaction of GAS tools by users either from an upskilling perspective or in the actual execution of their duties. This was found to be important to participants to get users to a level of comfort when navigating the platform as most felt GAS was complex to use and were of the view that training was generally inadequate to grasp the necessary knowledge to comfortably use GAS. This construct aligns with the earlier finding, which identified that GAS required frequent usage for participants to become comfortable and competent enough to utilise the tool.

The need for users to continuously interact with GAS is conveyed by one participant,

> *"From getting that training, you need to practice, you need to continuously practice, you need to engage, you need to use it, you just need to keep applying all that training that you went through such that you keep wanting to know more."* (R2)

The importance of using the tool repetitively once implemented is expressed by this participant, who was of the view that users of GAS who do not do this would struggle. Another participant expresses this by stating,

> *"If the members are not using the tool for some time, they tend to forget the parameters that they are supposed to use. So, the tool requires constant usage, so the more you use it the more you improve the effectiveness of the tool".* (R9)

Almost all the participants shared this view, which reflects the significance of the need for users' continued and consistent interaction with GAS.

5.4.6.3 Steep learning curve

The construct of a steep learning curve was mentioned earlier in this study under identified challenges of using GAS. In addition, this construct is in line with the constructs of the need for training and continued usage and practice already pointed out under the theme of user competency. The construct of a steep learning curve characterises the use of GAS as requiring an extended and dedicated commitment for users to become comfortable with its usage. This factor represented fifteen per cent (15%) of all the references identified by the researcher from the participant interviews under the user-competency theme. This translated to thirteen (13) references from interviews related to this factor.

One of the participants argued that the basic usage of GAS to perform the basic analysis is not complex. However, as the users work towards developing more complex tests or scripts, the use of GAS requires more advanced skills, and it is at this stage the learning curve becomes steeper. In support, one of the interview participants who was a CAE had a strategy to recruit more IT Auditors to use GAS tools. The CAE had observed that the IT Auditors in his team grasped the concept of developing scripts much faster.

Based on this finding, the researcher concludes that GAS users with an IT and programming background have an advantage over financial auditors when it comes to grasping the use of GAS. However, the researcher's view is that this is merely an advantage but not a limitation as far as financial auditors mastering the use of GAS. Therefore, it can be concluded that financial auditors have a steeper learning curve when mastering the use of GAS.

5.4.6.4 Use the tool

In the study, the concept of "use the tool" refers to licensed users of GAS taking on the initiative, effort, and drive to explore and adopt the tool. From the participant interviews, it was evident that there were some licensed users who did not even put in the effort to try and explore the tool. However, those who put in the effort to use the software were likely to gain the skills and competency to use the tool. This concept contributed thirteen per cent (13%) of all the references identified by the researcher under the competency theme.

According to one participant,

> *"As far as software is concerned, you can only learn by using it, and you can only know what it can do or cannot do by struggling through with it."* (R1)

This participant was expressing their view that in addition to the theoretical knowledge of GAS, internal auditors needed to be committed to getting the practical experience of GAS by utilising the tool. As expressed by another participant, some licensed GAS users do not apply the acquired skills from the training environment to the organisation's environment. Without taking this crucial step, GAS will not add any value, nor will the competency of the user improve; therefore, its potential will not be exploited.

The view of another participant is that just using GAS is not enough, the use needs to be continuous to get optimum results from the tool. This supports an earlier construct that refers to the importance of the continuous practice, learning and usage of GAS. It is emerging that repetitive usage of GAS is crucial to improve the competency of users when it comes to GAS. Another participant admits that they are not dedicating enough time to practise using GAS; therefore, they underutilise the tool. The participant acknowledges that GAS tools have the potential to deliver on the promised benefit. However, their lack of commitment is resulting in the underutilisation of the tool. This statement highlights the significant role of GAS users in making the tool valuable.

5.4.6.5 Frequent user groups/workshops

Software providers generally provide events, workshops, and user groups for their client base, with the objective to notify the market of any new releases, software updates and to share industry trends. This platform can enhance user competency and knowledge related to the software.

Six per cent (6%) of the participant references related to the theme of competency believed that frequent attendance of user events and workshops were useful to improve their knowledge of and competency in GAS. In one of the organisations, the internal audit department had their own fortnightly internal workshop aimed at team members to demonstrate what they had learnt, discovered, or implemented using GAS software. The internal audit team members found this platform to be useful.

One of the participants opined that service providers of GAS software were not providing enough user groups and conferences to keep them up to date with new trends and developments within the GAS space and how it is impacting the profession. They were adamant that such events would have a positive impact on the adoption and continued usage of GAS. In support of this, another participant pointed out that the benefits of user workshops were that they kept users abreast of the new changes that were meant to facilitate more effective and efficient ways to adopt and utilise GAS tools.

5.4.7 Theme Seven - Facilitation Conditions

In this study, the theme of facilitation conditions refers to the enablers and disablers (barriers) in the organisational and external environment GAS users perceive to either support or disrupt the use of GAS. The successful adoption of GAS tends to depend not only on the support of the internal audit team but also on other stakeholders within the organisation. In addition, support and maintenance from GAS service providers may also influence its successful adoption.

Based on the interviews, the theme of facilitating conditions is a very significant factor in the view of post-adoption and continued usage of GAS software. This theme had the second most codes identified from participant interviews. The theme is second to the theme of benefits in the ranking. A total of one hundred and twenty-three (123) references were identified from the interview participants as being relevant to the study, which contributed eighteen per cent (18%) of all references identified in the study. The significance of this theme is also further evidenced by the number of concepts that were identified by the researcher as falling under this theme. A total of eight (8) concepts were identified under this theme.

The identified concepts under this theme and their overall representation are shown in Figure 5.11.

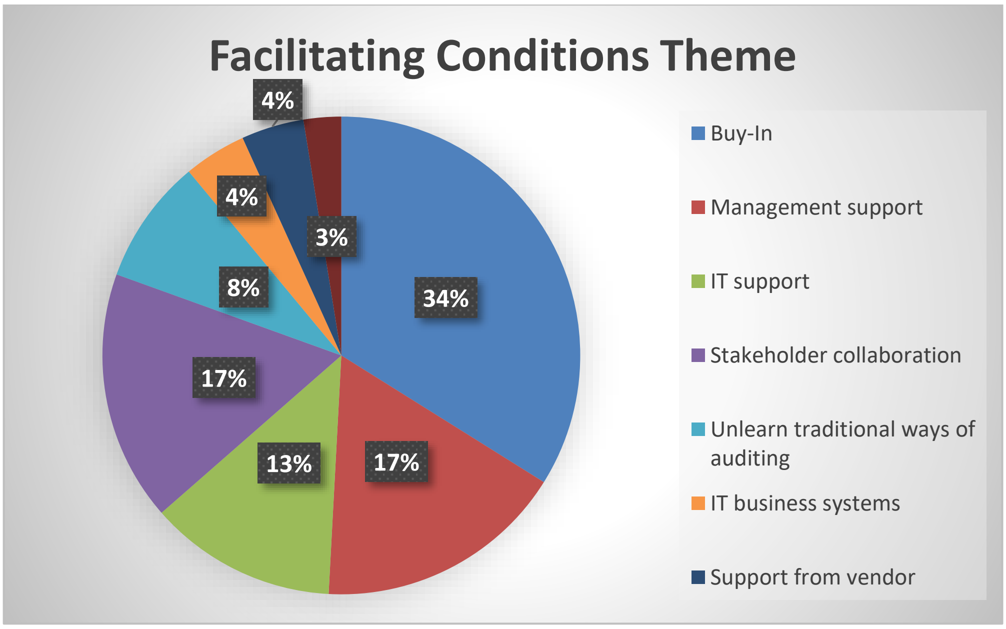


Figure 5.11 *Facilitating Conditions Theme*

The concept description and frequency are elaborated below:

5.4.7.1 Buy-In

The concept of buy-in, in this study, refers to the willingness and acceptance of GAS technology by stakeholders resulting in them supporting its successful adoption and usage. The stakeholders range from the actual users of the software, management, process owners and IT personnel. GAS is not only a tool meant to benefit internal audit; hence, support from stakeholders across the organisation results in the greatest impact and value. At a more advanced and mature usage of GAS, internal auditors can use the tool for continuous auditing and monitoring. The continuous monitoring aspect demonstrates how the solution directly benefits the business, as data analysis exceptions are directly notified to business process owners for remediation. Therefore, the GAS data analysis end-to-end process requires the collaboration and support of various stakeholders for each phase of the cycle. For example, at the data access phase, the support of IT is required to access data, whilst at the remediation phase, the collaboration of business process owners is crucial.

Thirty-four per cent (34%) of the references related to the theme of facilitation conditions were represented by the buy-in concept, which reflected the importance of this concept. This concept was significantly the most common in relation to references cited by the researcher under this theme. The percentage translated to a total of forty (40) references cited by the researcher under this construct from the total of one hundred and eighteen (118) references that had been categorised under the FC condition's theme.

One of the participants identified the ability to demonstrate the value of GAS to stakeholders as an important driver that internal audit departments could leverage to get buy-in and support from the different stakeholders. According to another participant,

> *"It is absolutely important to make sure everyone is on board, and they appreciate the benefits of GAS before procuring it."* (R1)

This participant was in support of establishing buy-in for GAS prior to its procurement. Establishing GAS support was also emphasised as important under the pre-adoption theme.

Another participant strongly felt that the CAE needed to be responsible for championing the buy-in of GAS for its successful adoption as well as securing sufficient resources to support the adoption and usage process. The participant reasoned that the CAE was involved in strategic meetings, where budgets and strategies for the department were presented to the board and management. Budgets are important for the initial financing of GAS as well as the ongoing maintenance. In support of this, one of the participants notes how GAS has enabled them to present results in very convincing ways which would not have been possible or very difficult to achieve without GAS. The impact of such presentations at the board or senior management level has resulted in a lot of buy-in and support being provided for GAS tools within their environment.

According to another participant, the business needs to view GAS tools as their “right-hand man”. The participant was adamant that since their organisational systems and processes were IT-based, GAS tools played a significant role in providing visibility in the details occurring in the transactional data. The participant was of the view that once the business appreciated this capability of GAS, they should have buy-in for GAS as a necessary tool that provided visibility in IT systems and business processes. In support of this thinking, one of the participants emphasised that the entity management, leadership and EXCO, needed to understand today’s organisations were faced with big data that they generated in relation to customers, revenue data, etc. Therefore, it meant as a business, data analysis tools became crucial for the provision of assurance on 100% of the data population. However, in another organisation, another participant noted that they were finding it challenging to get buy-in from top management, including leadership in the internal audit department. They cite one of the reasons to be the resistance to embrace changes that came with the adoption of GAS. They found that even internal auditors licensed to use GAS resisted some of these changes, for example, reverting to using Microsoft Excel, despite it being a less effective and efficient tool compared to purpose-built GAS tools.

Another participant confirmed that in their organisation there had been buy-in of GAS by the different stakeholders. They provided an example of how their IT department was also adopting GAS tools to achieve their IT-related data analysis objectives. Contrary to this finding, a participant from a different organisation cites how the lack of buy-in from management and the CAE was resulting in the poor adoption of GAS in their environment. The lack of support for GAS meant that budgets were not available to empower GAS users to be proficient in the usage of GAS; therefore, no value had been derived from the GAS tool.

One of the participants was of the view that in their organisation there was a mixed level of buy-in by stakeholders when it came to GAS. According to them, those who lacked buy-in were the result of a lack of appreciation of the objective and role of GAS. They provided an example whereby some business process owners found the process of reviewing and remediating exception results as cumbersome, whilst those who had bought into GAS appreciated that it was a tool that supported the proactive identification and illumination of control weaknesses. With this understanding, the business processes owners found exception reports as value-adding and therefore gave them a high level of priority.

According to one of the CAEs, the process of involving department heads in the planning process of the audit plan resulted in stakeholders appreciating the role of internal audit and, likewise, buying into tools like GAS that internal audit had adopted. The process of doing risk assessments with departmental heads contributed to the finalisation of the annual audit plan. They note,

> *"With the interactions that we're doing with our current assessments, departmental heads have the opportunity to contribute the nature and type of analytics that we can do with GAS that address their high-risk areas."*

This process made the implementation of GAS easier as departmental heads also felt ownership of GAS tools and were appreciative when data analysis tests were relevant to the high-risk areas that they would have identified.

According to another participant,

> *"I think some stakeholders resist GAS because they think the objective of its use by internal audit is to pinpoint or to be forensic auditors."* (R10)

With this perspective, stakeholders are unlikely to have buy-in for GAS as they will associate it as a tool to expose them of any wrongdoings instead of a supporting tool to enhance their control environment. As a result, the participant observed that such stakeholders were unwilling to cooperate or support the use of GAS.

The researcher found that there was mixed feedback from interview participants on the level of GAS buy-in and support their different organisations were providing. However, the need for buy-in and support of GAS at all levels was an important factor that results in the successful adoption and continued usage of GAS. Participants were also in agreement that the CAE had a significant role to play to ensure that support was achieved at both pre- and post-adoption.

5.4.7.2 Management Support

Management support was the second most popular factor under the facilitating conditions theme. In this study, management support refers to the allocation of time, budget, and other forms of support by the organisation's management team towards the procurement, maintenance, and adoption of GAS technology. According to Young & Jordan (2008), "Top management support (TMS) is considered a critical factor for the success of information systems projects." In alignment to this, Kong & Nelson (2021) top management support had a robust influence on audit technology performance. The study provides evidence that top management support is the most important critical success factor for project success. This thinking is supported by a later study by Bueno & Gallego (2017), who concluded that TMS had a positive impact on achieving success in IS projects in different aspects. They found that end-users have a perception that organisational communication and training are positively related to TMS. The findings of this study under management support agree with the findings of these previous studies.

The researcher found a total of twenty (20) references from the interviews that related to the significance of management support in relation to successful adoption and continued usage of GAS. This translated to a seventeen per cent (17%) representation of the management support construct in the facilitating condition's theme, which also communicates its significance.

Most of the participants were of the view that the CAE provided them with the management support to use GAS. The support for GAS by CAEs was mostly characterised by budget provisions to procure and maintain the software licenses as well as encouragement and oversight on how to best adopt and apply the software. One participant had a strong opinion that CAE support was crucial when it came to the championing of GAS adoption and usage in the organisation. They identified this as very important since the CAE should drive the strategic direction of the department and communicate this to other senior stakeholders in strategic meetings. The CAE is responsible for presenting the departmental budget to the board and management and is therefore able to advocate for the financing of GAS if they take ownership of how it should be used and adopted by the rest of the internal audit team members.

However, most participants felt that there was a lack of support towards budgets for training, especially when new staff were being onboarded which resulted in a lack of the adequate skills and competencies for GAS tools to be used effectively. According to one participant,

> *“When it comes to GAS tools, you find you are thrown in, you're not provided with the support to do the training. Because there is a cost to the organisation for training, sometimes the management or even the CAE themselves do not understand or see the benefits in the tool, it's hard to get the funding to train people.”* (R6)

The frustration shown by the participant was a result of a lack of management support of training programmes to capacitate internal auditors to use GAS tools effectively.

However, the participants who experienced management support showed great appreciation of this support, which reflects the significance of management support as a factor that drives the successful adoption and continued usage of GAS tools. According to one such participant,

> *“Support is very high. We are starting to use all sorts of the different functions of the data analytics tool, and we're also getting the relevant training so that we are capacitated, for the organisation to get a return on investment.”* (R6)

The remediation process of identified exceptions is also a process in the adoption of GAS that requires support from top management. Top management themselves will be required to respond to exceptions in their areas as well as drive their department team members to also respond to exceptions generated from the GAS tools. Participants had a mixed view on how the management support was reinforcing the responsiveness of team members to exceptions, with some expressing that other stakeholder did not value the analytic exceptions results, with a general perception that it was just adding to their workload.

5.4.7.3 Stakeholder collaboration

Stakeholder collaboration is also identified by participants as an important factor related to the facilitating conditions theme that impacts the adoption and continued usage of GAS tools. Stakeholder collaboration in this study refers to the need for internal audit GAS users to partner with other stakeholders, such as managers, executives, process owners and auditees, to complete the data analysis cycle. Educating stakeholders to understand and appreciate the role and importance of GAS was identified as an important factor to enable "winning" collaboration between the different stakeholders.

Similar to the factor of management support, stakeholder collaboration came out as the second most important factor under the facilitating conditions theme. It represented seventeen per cent (17%) of all the references from the interviews that were categorised by the researcher under this theme. This translated to a total of twenty (20) references identified under the facilitating conditions theme, which is a significant number given that the total references identified under the theme were one hundred and eighteen (118).

Most participants felt that the greatest amount of stakeholder collaboration was required at the time of exception remediation. Internal auditors identify potential red flags, which can either point to control breakdown, potential fraud, abuse, waste, etc., through analysis of transactional data. Once these potential red flags are identified, the exceptions need to be passed on to the business process owners for remediation or comments. It is at this stage where stakeholder collaboration and involvement are crucial as internal audit cannot complete this process alone.

One of the participants expressed their experience with collaborating with process owners,

> *"For us, we do need to interact with the different business units to get feedback on the results. More like the control self-assessments officers, they get the exceptions from our data analytic tool and then they have to address the exceptions that come up. And I think because it's a monthly exercise some of them find it cumbersome. And I think the reason why they find it cumbersome*

is because it's also an issue of lack of understanding and maybe issues of priority." (R6)

For the organisations that were implementing continuous auditing and monitoring programs, ensuring the continued and consistent support of process owners was challenging when it came to responding to exceptions timeously. When exception numbers are high, the reports can be viewed as cumbersome, which results in resistance by some process owners to respond to these reports. The participants believed that this mainly resulted from a lack of appreciation and understanding by process owners on how crucial it was for them to review and resolve exceptions to improve the control environment.

Another participant explained that they had managed to achieve stakeholder collaboration for exception remediation through involving the various departmental heads during the audit planning phase, to take into account the areas they wanted internal audit to perform data analysis. This approach meant that there was a sense of ownership by process owners of some of the data analytic tests that internal audit was performing, especially from the perspective of the continuous monitoring program. Not only did this process achieve buy-in from stakeholders, but it also ensured exception reports were given the priority they required as process owners were depending on them to address some of the high-risk areas within their processes and controls that they had identified.

Furthermore, collaboration with IT was identified by a few of the participants as crucial to enable GAS to access the organisational data.

Stakeholder collaboration emerged as a significant construct towards the successful adoption and usage of GAS in the facilitating conditions theme. This construct is related to the buy-in concept as stakeholder commitment was required to motivate their collaboration. The stakeholders that emerged as playing an important collaboration role were IT personnel and process owners.

5.4.7.4 IT Support

IT support, in the context of this study, refers to the technical support users of GAS require from IT to achieve their data analysis objectives. Examples of IT support required by GAS users is the granting of user's access permissions to the organisational data, management and allocation of user licenses, provision of expertise in evaluation and procuring of a suitable GAS tool that is compatible and aligned with the organisation's technology architecture, and assistance with technical support from the first line of support perspective.

IT support was the fourth most important construct identified under the facilitating conditions theme. It represented thirteen per cent (13%) of the references from participant interviews identified by the researcher as falling under the facilitating conditions theme. The actual number of identified references was fifteen (15). This construct was expected by the researcher, since GAS is a technology solution, with expectations of most organisations being that IT should either drive or take ownership of technology projects and their adoption.

The two main areas identified by participants as requiring IT support had to do with access to the organisational systems to access data and, secondly, the actual process of understanding the format and table layouts of the data. IT will, in most cases, know the tables in which the required data reside, which is a requirement for internal auditors to get to the data using GAS tools. Database Administrators within the IT department mainly provided the role of providing this support. Most of the participants had experienced some resistance or scepticism by IT to authorise them to access data directly from source systems when they initially adopted the GAS tools. This resulted mainly from IT being concerned that internal audit would tamper with source system data, distorting the integrity of the source system. This concern came about due to a lack of knowledge or education of IT resources, that the GAS tools are mostly read-only, with no capability to change source system data.

One of the participants indicated that IT support was needed mainly on the administrative side of things as opposed to the actual usage of GAS. According to them:

> *"We do depend on IT since they host our server, sometimes the server is down due to technical faults in the business. So, we request that they sort out the server and ensure that it's running accordingly. That is the only assistance that they would give us or if there are changes on the actual database*

> *password, we will have to re-establish those connections with them, so that we can get access to the data sources."* (R2)

Almost half of the interview participants felt that the support from IT was minimum when it came to the actual usage of GAS tools and in most cases when support was needed, the software vendor's support was adequate without the need to involve their internal IT resources.

Another participant supports this,

> *"We use IT, but we don't depend on IT, because IT basically is confined to IT services, for example, to ensure that the server is available, the platform, basically the IT infrastructure only, the application setting you know is available. In terms of the use of the system, I would say that we are basically independent".* (R12)

Two participants advised that they were also dependent on IT support when it came to the actual technical usage of GAS software. Although IT personnel in their organisations were not allocated GAS licenses, what they found was that when they involved them in GAS training, they grasped concepts much faster because of their technical and programming backgrounds. This, therefore, made them a useful IT support resource when internal auditors battled to use GAS, especially for implementing more complex analytics and scripts. In support, one of the participants mentions,

> *"What I noticed is that the initial group we got trained, there was someone from IT, and they really excelled when it came to the scripting part. So, I think they are better able to grasp as sometimes it can be complicated, so when they are included in the group of core users, it is very easy for them to offer support to others".* (R7)

Based on the participant's views, IT support is more critical at the adoption phase of GAS as their support is required to enable direct connectivity to databases and provision of oversight on the tables where information will be sitting. When it came to the continued usage of GAS post-adoption, the support from IT becomes less significant as internal auditors should be able to use GAS independently to execute their tasks. Although having IT resources competent in GAS to provide user support was value-adding, most participants did not find it critical for them to be involved in the usage process.

5.4.7.5 Unlearn traditional ways of auditing

The process of unlearning a certain way of doing things to accommodate a new way was identified as an important concept under the facilitating conditions theme. In the case of internal audit, the process of data analysis in a manual environment (in the absence of GAS tools) is done differently compared to when the team has automated the process using GAS software. For example, in the absence of GAS tools, internal auditors depend on IT resources to provide the data. In this study, the concept of unlearning traditional ways of auditing refers to the process of discarding the manual way of executing data analysis and adopting the new behaviours of accessing, analysing, and reporting on data.

The concept for unlearning traditional ways of auditing contributed eight per cent (8%) of the references identified from the interviews by the researcher under the facilitating conditions theme. Although this percentage is almost less than half of the percentages of the constructs discussed earlier, the researcher believes it is still a significant factor as this translated to ten (10) references identified from interviews under the facilitating conditions theme.

Most of the participants had observed that the transition of adopting a new way of doing things, by letting go of a traditional way of working, was not an easy effort that required commitment and motivation to do so. According to one of the participants:

> *"You find that within teams, they are always people who prefer the old way of doing things, even with explanation, after explanation that everybody is moving towards using computer-assisted auditing techniques or using software to be able to comprehensively look at risk and to get data."* (R1)

This participant expressed a lot of frustration and failure to understand the rationale of how team members resorted to manually performing data analysis, despite being licensed for GAS software. This thinking was aligned with the researcher's question, which resulted in the study to try and establish why internal auditors are not effectively using GAS software, despite the many years of information on the benefits of GAS software. Another participant attributes this resistance to fear of the unknown and the unwillingness of people to leave their comfort zones to learn a new way of doing things.

According to another participant, the biggest challenge they observed in their environment was the transition of internal audit members to use GAS software instead of Microsoft Excel. Although GAS tools offer superior data analytic capabilities to Microsoft Excel, users feel comfortable with using a tool they have been exposed to for years and feel content with accepting the limitations of the software, even if it is at the expense of adopting data analytic best practices, such as the capability to analyse hundred per cent (100%) of large data populations, maintaining data integrity through GAS read-only capability, and accessing data directly from the source for independent assurance. This participant also emphasised that the resistance to change was not a unique characteristic of internal auditors in their organisation, as he had also witnessed that their bank managers across the group, had continued to do their accounting in old ledgers, despite a more advanced electronic system being procured for them.

Another participant felt that the older generation was the one that was typically resistant to change and found it very difficult to unlearn the old ways of doing things. According to the participant, unfortunately, the older generation occupies CAE positions, therefore their resistance to adopting new technology generally impacted the adoption of GAS for the whole department. In their view, the younger generation that had been exposed to CAATs and GAS at university or other tertiary education institutions was more technology savvy and, therefore, keen to adopt and explore software with a strong appreciation of how it is meant to make their job more effective and efficient.

5.4.7.6 IT Business Systems

In this study, the construct of IT Business Systems refers to the electronic software and packages that support the systems and processes necessary to run the organisation to achieve its organisational objectives. Such software can either be departmental or process-focused systems, such as packages for accounting, manufacturing, marketing, sales, human resources, payroll, or, more commonly these days, integrated systems called Enterprise Resource Planning (ERP) software. Organisational transactions and processes are executed and managed on the software, which is characteristic of today's digital world. The organisations that participated in the study have automated most of their processes to run on electronic software and ERPs. The ERPs mostly adopted by the organisations that participated in the interview were mainly Oracle and SAP. For these organisations, at least ninety per cent (90%) of their processes were automated, with a smaller percentage being conducted manually.

GAS is a technology that can only analyse data from electronic data sources. If an organisation's data are captured and processed manually on paper, files and hard copies, GAS technology will not be able to extract that data for analysis. That data will need to be captured manually on an electronic source, for example capturing information from hard copies into Microsoft Excel to enable GAS tools to read the data for analysis. Given the significance of IT Business Systems when it comes to the use of GAS tools, it was no surprise that this came out as one of the factors identified under necessary facilitating conditions for the use of GAS tools. The significance of IT Business Systems is also included in the preliminary conceptual framework under the electronic data source construct.

The references identified by the researcher from the interviews that were classified under the IT Business Systems amounted to a total of five (5). This number represented four per cent (4%) of the total references that were categorised under the IT Business Systems. This factor ranked sixth (6^{th}) most important factor identified under the facilitating conditions theme. Although the representation percentage of this factor may appear small, in comparison to the factors already discussed, the researcher views this as a very important factor impacting the successful adoption and continued usage of GAS. With no automated systems in an organisation, it will be pointless for the organisations to invest in GAS tools, as they will not be effective. In agreement with this, one of the participants states,

> *"It is obvious, you need systems that you need to be connecting to, systems you need to be auditing with GAS."* (R5)

According to another participant,

> *"Our systems and our processes are really IT based, so we are reliant on IT systems, so from a business perspective, GAS tools should be used as an advantage to view organisation transactions".* (R2)

The participant felt that the fact that systems in their organisation are automated brought about a strong business case for a reason why GAS tools should be viewed as a strategic tool in this digital and big data environment. GAS tools make it possible to analyse the huge volumes of data to have insight into control effectiveness, operation efficiencies, as well as potential fraud, waste, and abuse. In support, another participant mentioned that in their organisation, they had multiple systems, and because of the capability of GAS to analyse data from multiple sources, they have been able to improve their control environment.

Based on the findings, it can be concluded that IT Business Systems are a prerequisite to enable the adoption and continued usage of GAS tools. The reverse is also true – because organisations have IT Business Systems, the use of GAS tools becomes crucial to provide the business with insights into the "story" their data are telling them, thereby assisting in data-driven based decision making.

5.4.7.7 Support from vendor

The "support-from-vendor" construct refers to the services provided by the GAS software vendors to ensure the adoption and usage of GAS. Support from vendors can be in the form of the provision of consulting, training, education, maintenance, and upgrades of GAS software, both from a pre- and post-adoption perspective. Therefore, support from the vendor is an important driver and enabler of the adoption and usage of GAS tools and, consequently, an important facilitating condition.

Similar to the IT Business Systems factor, the references identified under this factor represented four per cent (4%) of the references identified under the facilitating conditions theme. This translated to a total number of five (5) references identified from the interviews as falling under this factor.

The participants who mentioned vendor support had strong opinions – that it was crucial for the successful and continued use of GAS tools. About half of the participants felt that they required more vendor support to ensure they got the expected value from GAS tools. One participant recommended that GAS vendors needed to work more closely with them post-adoption to have insight into how effectively the adopted tools have been and also to verify that the implemented software is working the way it should. Another participant felt that GAS vendors should do more to provide more pre-built, pre-packaged data analysis solutions, scripts or tests for their clients. The benefit for internal auditors was that they would have a lot of “plug-and-play” analytics to leverage off, making it easier for them to get meaningful results from the software.

Only two (2) participants made mention that they were satisfied with the current level of support they received from their GAS software vendors. One of the participants even went further to say they did not even require any support from their internal IT resources since the vendor support was adequate.

5.4.7.8 Relevant Exception Reports

According to AccountingTools (2021), “An exception report is a document that states those instances in which actual performance deviated from expectations, usually in a negative direction. The intent of the report is to focus management’s attention on just those areas requiring immediate action.” GAS tools generate exception reports from the data analytic test that would have been executed. When exception reports are inaccurate or provide too many false positives, management and process owners who receive these reports from internal audit are unlikely to take them seriously. Therefore, relevant and accurate exception reporting is an important facilitating condition towards receiving buy-in and support of GAS by other stakeholders. Client fatigue from false positives and wrong exceptions was highlighted as a challenge by participants in this study.

Three (3) references were identified by the researcher from the interviews that were classified under the relevant exception reports construct. This translated to a three per cent (3%) contribution to the total number of references identified under the facilitating conditions theme. This was the least common factor identified under the theme.

One participant expressed that it was critical to engage and collaborate with stakeholders and process owners to ensure business processes were well understood so that the data analytic tests or scripts provided accurate exception reports. Their view was that the main source of inaccurate and irrelevant exception reports was the result of business processes not being clearly understood, resulting in the inaccurate mapping of the data analytic tests. The stakeholder collaboration factor identified earlier under facilitating conditions is related to this factor in this respect.

Another participant attributes incorrect and irrelevant exception reports to the GAS users having inadequate scripting skills. Lack of skills by GAS users results in the ineffective use of the solution. The impact of generating false positives when it comes to exception results creates client fatigue. When process owners find themselves expending a lot of energy reviewing false positives, incorrect and irrelevant exception reports, they are likely to tire and pay less attention to future exception reports generated from GAS tools.

5.4.8 Theme Eight - Leadership Theme

The leadership theme focuses on how organisations' senior managers and those individuals in a position of influence can impact the adoption and continued usage of GAS. According to Rosari (2019), there must be four essential elements that need to exist for a leadership relationship to exist. These elements are:

I. The relationship is based on influence;
II. Leaders and followers are the people in this relationship;
III. Leaders and followers intend real changes; and
IV. Leaders and followers develop mutual purposes.

Rosenbach (2018) states that leadership is not hierarchical, top-down or based on positional power and authority but rather the art of getting people to work together to make things happen that might not otherwise occur without their involvement. Therefore, in this study, the theme of leadership looks at how leaders within the organisation have impacted and can impact the effective adoption and continued usage of GAS by the influence on their followers.

A total of thirty-four (34) references were identified from interviews falling under the leadership theme. Given all the identified themes for this study, the combined total of references under the leadership contributed five per cent (5%) of references identified in the study. Out of the total of ten (10) themes, the leadership theme ranked seventh (7^{th}) in terms of total references that were identified under this theme. Although this theme is not amongst the most common themes identified by the interview participants, the researcher still views this as a very important theme that must be considered when organisations are implementing strategies to ensure the best utilisation of GAS tools. The fact that it was referenced thirty-four times in interviews, suggests leaders in an organisation play a large role to influence the effective adoption and continued use of GAS technology.

Under the leadership theme, a total of three constructs were identified, with their individual contributions to the overall theme shown in Figure 5.12.

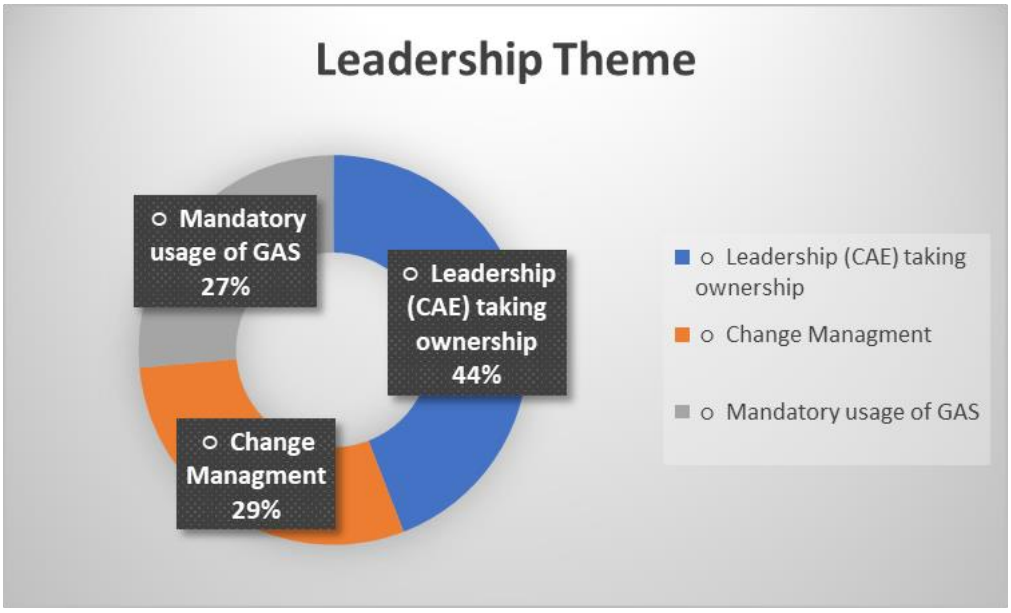


Figure 5.12 *Constructs under the leadership theme*

Each of the constructs is looked at in more detail in the following subsections.

5.4.8.1 Leadership taking ownership.

In this study, this construct refers to CAE as the leaders for the internal audit unit taking ownership of GAS as a resource that will enable the internal audit team to deliver value effectively and efficiently. This entails the CAE exhibiting high levels of commitment and drive to be responsible for the successful adoption and sustainable usage of GAS technology. Without the departmental leader taking ownership of GAS, its successful adoption is left to chance and driven by the individuals who may have a passion for the technology and will not be backed by the organisational hierarchy and influence to interact with other stakeholders to lobby for budgets and buy-in.

The leadership taking ownership construct was the most common one identified by participants, contributing forty-four per cent (44%) of the references identified under the leadership theme. This translated to fifteen (15) references out of the thirty-four (34) identified references under the leadership theme. This statistical evidence evidences how significant this factor is, in the leadership theme. The statistics imply that when CAE takes ownership and responsibility to drive the successful adoption of GAS, its uptake and usage is likely to be effective. In agreement to this observation Garven & Scarlatta, (2020), found that “CAE power may be the key driver in the technology investment decision”. In further support of this, Rakip *et al.* (2021) found the CAE’s soft skills important for the innovation of internal audit function’s techniques favouring the use of data analytics. They also found, “a positive and significant association between data analytic use and the CAE’s ability to build positive relationships with managers”.

One of the participants shared how they related to the impact of high support of GAS adoption by the CAE. Their experience was that the team utilised more and more functions of the software and underwent relevant training when a CAE took ownership of the success of GAS. Due to this, the utilisation of GAS in their environment showed an upward trend. Another participant provided an example of how the challenge of getting direct access to data was addressed by the CAE. Having buy-in at the senior level resulted in an easier implementation of GAS at a lower level. The IT officers cooperated once the instructions to provide internal audit direct access had been issued by the IT executive. This allowed for the smooth implementation of GAS and addressed the issue of resistance encountered at lower levels.

According to another participant,

> *“You definitely need a CAE to champion the adoption of GAS. This is because they are involved in strategic meetings and craft and present the department budget to the board and management team.”*

Because of their organisation hierarchy position, the CAE is better positioned to advocate for the financing of GAS and the budget for continued development and training of GAS users to ensure they are competent to fully utilise the tool. In support, another participant states that for the adoption and utilisation of GAS to be successful, the CAE needs to believe in the value of data analytics. Without this belief, it will be unlikely that GAS tools will be successfully adopted if procured at all.

A participant from one of the organisations that had effectively adopted GAS tools, states,

> *"We are fortunate that our head of internal audit is really an advocate of GAS, to the extent that they are also an effective user of the tool."* (R7)

This resulted in the team and other stakeholders having buy-in and supporting the utilisation of GAS in that organisation.

One of the participants shared how they had worked under two different CAEs during their time of employment at the organisation and how these CAEs contrasted significantly in terms of their ownership of the GAS tools they had invested in. When they procured the GAS tool, the CAE was obsessed with the GAS tool, and because of this passion, the internal audit team "fell in love" with the GAS tool and aligned with his vision of it being a critical tool that added value to internal audit. But, with his departure and the arrival of a new CAE, who did not have much passion and drive for the utilisation of the GAS tool, the team was hardly using the tool, and there was no clear goal on how the tool should be used. This example illustrates the impact of a CAE or leadership in ensuring the successful adoption and continued usage of tools.

Another participant recommended that for GAS tools to be utilised effectively, the audit plans should include the specific areas where data analytic tools must be used for more impactful results. The execution of the plan should then provide an opportunity for all internal audit team members to conduct data analytics using the tool to ensure all team members get the exposure and competency to effectively use the tool through practice. The responsibility of developing the audit plan and allocation of team resources to different audit projects is the CAE's. Therefore, for the afore-mentioned recommendation to be implemented, it requires the CAE to have a belief and desire for GAS tools to be used effectively. The participant mentions,

> *"The utilisation of GAS must be deliberately part of the audit plan so as to build the skills development, competency and proficiency in the use of GAS".* (R12)

Based on this, most of the participants believe that the CAE plays a critical role in the adoption and continued usage of GAS. As a leader, they play a role to encourage and attain buy-in from the internal audit team to utilise the GAS tools and for the team to align with their vision of how GAS tools can transform the audit team to be more valuable. Participants also believed that because of the CAE's hierarchical position in the organisation, they are best placed to lobby support for the use of GAS by other stakeholders and in turn defend a budget for its acquisition and ongoing usage. Given the significance of the role of the CAEs, the researcher will incorporate this construct into the enhanced conceptual framework for continued usage of GAS.

5.4.8.2 Change management.

Change management is another construct that was identified by participants under the leadership theme. In this study, this construct refers to individuals embracing and adopting a new way of working necessary for attaining the effective adoption and continued usage of GAS tools. This transition may require changes to processes, methods, approaches, and techniques to support the people side of the change process. This construct is founded on the premise that the successful adoption and continued usage of GAS rely significantly on how the employees embrace its use. Adoption of GAS means that internal auditors must move away from the traditional way of conducting data analysis and embrace the use of GAS technology to execute this task.

The change management construct was the second most popular factor identified under the leadership theme. It represented twenty-nine per cent (29%) of all the references identified as being related to the leadership theme. The factor accounted for ten (10) out of the total of thirty-four (34) references identified under the leadership theme. In the researcher's view, this is a significant contribution towards the overall leadership theme.

According to one participant, teams are usually characterised by some team members who prefer the old way of doing things, despite education or exposure to the efficiencies and benefits those new methods are likely to deliver. As a result, some team members tend to resist the new way of working by reverting to old practices that they are used to and are more comfortable with. In support, another participant points out that the biggest transition challenges their team encountered when it came to the adoption of GAS were for team members to stop performing the data analytic tasks in Microsoft Excel, a tool that most of the team members were conversant in. Most internal auditors are exposed to the use of Excel in their academic years as they work towards a qualification and for most of their early days or years in the audit field. Because of this exposure and many years of experience in Excel, they observed that it was difficult for most internal auditors to leave this and engage in a process of learning a new way of performing analysis.

Another participant felt that it was the role of the CAE to build a strong business case as to why internal auditors should adopt the GAS tool and not perform analysis in Excel. The process of getting buy-in and educating the team members of the benefits and efficiencies that come with GAS tools is part of the change management process that the CAE as a leader should commit to. If this process is not done satisfactory, the change may be temporary, with team members reverting to the use of Microsoft Excel in the face of any challenge or fear of change.

The process of change is characterised by upskilling and new ways of doing things. This usually requires effort and dedication to understand and learn the new set of skills to do things differently. As a result, people, in general, may dislike the change as it involves putting in the effort, leaving a comfort zone, and overcoming a general fear of the unknown. Therefore, the role of leaders is to motivate team members to buy into the new vision and illuminate how the effort to change and learn a new way of working will be beneficial to the individuals directly and the overall impact of the department and the internal audit profession at large.

5.4.8.3 Mandatory usage of GAS

The third and last construct identified under the leadership theme is that of mandatory usage of GAS. In this study, this factor looks at the enforcement of non-negotiable and compulsory measures to ensure all internal auditors use GAS tools. The CAE, as the head of the internal audit unit, needs to be responsible for implementing and monitoring such a policy to ensure it is adhered to, and if not, there are negative consequences for the team members that do not comply.

This construct was the third and least popular factor under the leadership theme. It was characterised by a representation of twenty-seven per cent (27%) of references under this theme. This percentage is only two per cent (2%) less than the second most popular construct of change management, which makes this factor a significant one to be considered under the theme. The twenty-seven per cent (27%) of references translates to a total of nine (9) references identified under this construct, which is just one (1) less than the factor of change management. Based on this, it can be concluded that most interview participants were of the view that to achieve successful adoption and continued usage of GAS, its usage should be mandatory for all team members without the choice to conduct data analysis traditionally and manually.

According to one participant,

> *"The top people must say we have adopted GAS tools and set a target date where everyone in the team must be on board using the tool."* (R1)

Setting a timeline when all internal auditors should have shifted from the traditional way of working to using GAS enables the CAE to track and enforce the adoption of this tool. Another participant expressed that within their internal audit department, a policy had been implemented to govern the use of GAS for all data-analytic work. From their view, this had been effective in ensuring team members adopt GAS tools to perform all data analysis work, as reports generated from other sources would not be acceptable.

In alignment with these sentiments, one of the CAEs expresses,

> *"It is a must for everybody in the audit team to use GAS and our audit plans are designed to ensure all team members are given an opportunity to use data analytics."* (R9)

In their environment, the use of GAS is mandatory, regardless of an individual's competency level, passion, or interest in using GAS. To address areas where an individual is less competent to use GAS and are struggling with, the CAE has put in measures of pairing up teams to work on audit projects that are data intensive. The team will consist of an individual who is more competent and confident in the use of GAS to impart skills to all team members. This measure provides the opportunity for the less-skilled team member to gain an understanding and appreciation of GAS from a practical, hands-on experience. The CAE also explains,

> *"It must be deliberately part of the audit plan to build skills development or competency or proficiency in the use of the tool."* (R12)

This approach has proven to be effective in their environment, with GAS tools being used effectively and efficiently.

Another participant suggested that the use of KPI metrics to measure and monitor how internal auditors were using GAS tools was an effective measure to drive compulsory usage of GAS. The participant states that these KPIs need to be individualised to cater for the different skill levels and exposure to GAS for each internal auditor. However, the goal of the KPIs was to ensure increased adoption and continued usage of GAS by each internal auditor. KPIs can therefore be a basis for a performance management system for internal auditors that track individual development of the skills and competency in the use of GAS.

It can be concluded that the organisations that have implemented individual measures to monitor the adoption of GAS by each internal auditor have experienced increased utilisation of GAS tools. In organisations where those measures are not in place, they have experienced internal auditors reverting to the traditional and manual ways of conducting an audit.

5.4.9 Theme Nine - User Characteristics

Once an organisation invests in GAS technology, licenses are allocated to individual users to utilise the software. The utilisation and continuous usage of GAS are therefore dependent on the acceptance and buy-in of individual users as they are ultimately the end-user of the tool. Based on this, it is the researcher's perspective that the user characteristic theme is a very important theme that needs to be explored in detail as it focuses on how the end-user of the software adopts and utilises the technology. This theme explores the view of participants of which factors drive and influence end-users to adopt and utilise GAS software. The preliminary conceptual framework captures two (2) user characteristics as factors that drive the continued usage of GAS. The two (2) factors are user competency and user analytical abilities.

Based on the total number of references from interview participants allocated under each of the themes identified by the researcher, the user-characteristic theme ranks third (3rd) compared to the total of ten (10) themes identified in this study. This aligned with the researcher's view and expectation that user characteristics is a theme that is a critical determinant of the successful adoption and post-adoption continued usage of GAS technology. The user-characteristic theme contributed fourteen per cent (14%) of all the references identified from the interview participants.

A total of six (6) constructs were identified under the user characteristic theme from the participant interview data. These constructs and their percentage of contribution to the user characteristic theme are illustrated in Figure 5.13.

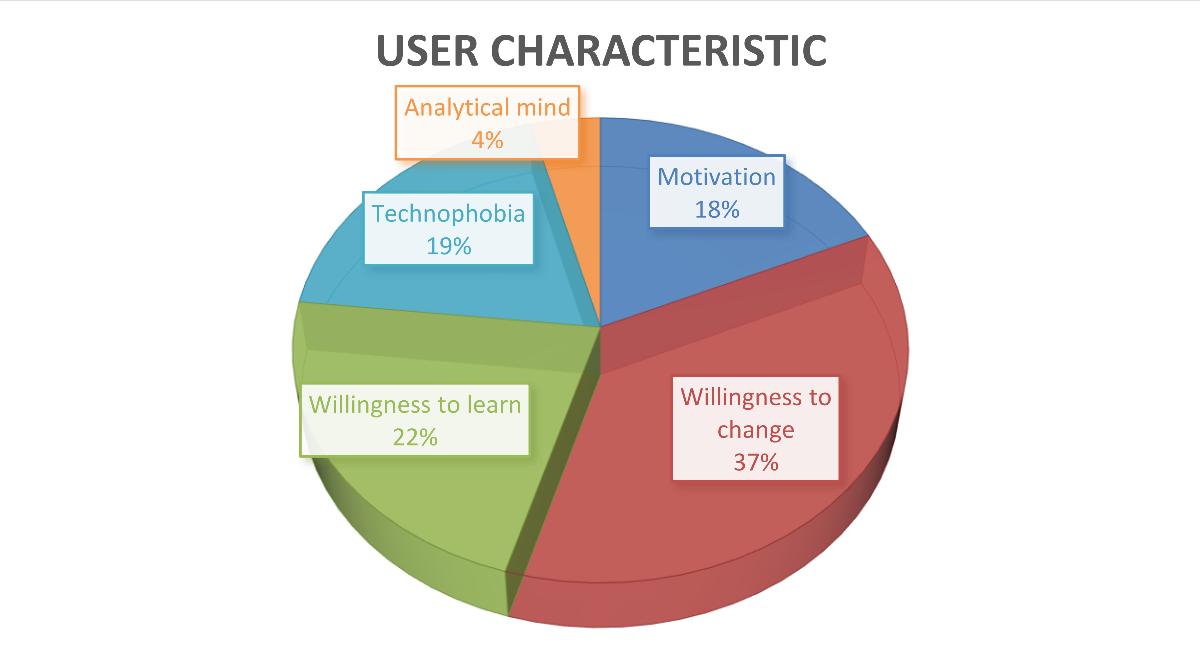


Figure 5.13 *Constructs under the user characteristic theme*

The five (5) constructs are explored in greater detail in the following subsections.

5.4.9.1 Willingness to change.

According to Schönefeld & Horn (2020), "general willingness to change is an attitude of users towards innovations." They also define willingness to change as an individual's readiness to accept change and to embrace innovation. Stoffers & Mordant-Dols (2015) state that "professionals' willingness to change is a necessity for successful implementation of changes in the organisation." Their study found that the most important factors of an employee's willingness to change are timing, involvement, emotions, necessity, and expected value addition (perceived usefulness). In alignment with these previous findings and definitions in literature, the factor of willingness to change in this study is defined as the cognitive and emotional buy-in by users, sufficient to drive them to work towards the adoption of GAS technology and the changes that it comes with. Without the users' willingness to change, there will be no continued usage of GAS technology post-adoption. This construct relates to two (2) other constructs identified earlier in the study, which are unlearning traditional ways of auditing under the facilitating conditions theme and the change management construct under the leadership theme. The recurrence of this theme is an indicator of its importance towards the adoption and continued usage of GAS.

The construct of willingness to change is the most significant factor identified under the user-characteristic theme based on the analysis of data from the participant interviews. A total of thirty-six (36) references were identified by the researcher from participant interviews relevant to this construct. This translated to a thirty-seven per cent (37%) contribution of this construct to the theme, which signifies its importance under the user-characteristic theme that determines whether a user will utilise GAS technology. The contribution of this construct to the user characteristic theme is significantly above the other constructs, with it being fifteen per cent (15%) higher than the second most common construct.

One of the participants expressed the difficulty of moving from traditional ways of performing data analysis to doing it using GAS by explaining that it was a process of change that demanded learning new skills and unlearning the old ways. They explained that because of this effort required to go through this change, individuals may prefer to remain in their comfort zone of the old way of doing things and may, therefore, resist changing to adopting GAS software. This participant concluded that individuals would, therefore, need to be motivated enough to undergo the learning process of utilising GAS technology. In support, another participant explained that the biggest challenge they encountered in their environment was to encourage team members to use GAS instead of Excel, a tool that most were comfortable to perform data analysis with. In alignment with this, one of the participants felt it was an important characteristic for internal auditors to have an attitude that was willing to adopt new things or ways, as an important driver for them to adopt new technology like GAS tools.

In several organisations, participants had observed that it was mostly the older generation that was not willing to change from the traditional ways of working. They observed them resisting adopting GAS tools. According to another participant,

> *“If we are stuck in the way we have always done things, and we are not willing to read about the things impacting our profession, we will never understand why we need to change”.* (R6)

Their belief was that the more exposed an individual was to the trends that were impacting internal audit, the more willing the individual would be to change, knowing some of the best practices that were making the profession more valuable. Another participant was of the view that it was important for GAS users to be educated on the role of GAS and its expected benefits to make them willing to adopt and utilise it. However, some of the participants aired concerns that despite internal auditors knowing the benefits of GAS, they still resisted adopting it. This is aligned with what the researcher had identified in literature and was a motivator for this study.

One of the participants explained that in their environment, the provision of sufficient training to users was effective in getting users to understand the benefits of GAS and made them more willing to adopt GAS. They mentioned,

> *“Once you get an appreciation of GAS, then you can visualise and imagine what it can do to the way you work, and you start realising how it is going to make you more efficient.”* (R7)

When users can relate and visualise how GAS will add value to their work, they are more likely to change from the traditional way of working.

5.4.9.2 Willingness to learn

According to Hotifah *et al.* (2020), “Willingness to learn is an important aspect for everyone associated with all changes and uncertainties.” Interview participants found willingness to learn to be an important construct that drove the adoption and continued usage of GAS technology. In this study, willingness to learn refers to the readiness of internal auditors to acquire a new skill set and knowledge pertaining to GAS software to use to perform data analysis work. Willingness to learn is classified as an important construct under the theme of user characteristic as it is the actual user who needs to be willing to acquire new knowledge to be competent to use GAS.

The willingness-to-learn construct was the second most important construct identified under the user-characteristic theme. Based on the references identified from the interviews, it represented twenty-two per cent (22%) of all the references identified under the user-characteristic theme. The total number of references from the interview identified under this construct was a total of twenty-two (22) references. Participants recognised this construct as a very important factor that played a significant role in driving the enablement of a user to be able to utilise the software. Without the adequate skills and knowledge of GAS, users will struggle with using the technology and will therefore be unlikely to continue to use the technology. Participants had identified a steep learning curve and lack of adequate skills as challenges that contributed to the low utilisation of GAS software. The two (2) challenges relate to the willingness-to-learn construct as they all contribute to the competency level of users, which in turn influences the perceived ease of use of GAS.

One of the participants had observed that in their environment, internal auditors who had the desire and discipline to consistently learn about GAS were able to enhance their competency in the tool. This is supported by another participant, who believed that to get competent with GAS tools, one would need to be willing to experiment and explore the functionality of the tool. This practical way of learning ensured that users got to grips with the wide and diverse data analytical capabilities and functionalities of the technology. Another participant equates the willingness to learn to individuals who has "a mind that is willing to explore". They feel that this is a necessary attribute for a user to be able to utilise GAS tools successfully.

Another participant states,

> *"As internal auditors, we need to be willing to have an attitude that is willing to adopt new things that are meant to help the internal audit function."* (R6)

Change and adoption are characterised by a process of taking on new skills and new ways of doing things; hence, the importance of the willingness to learn new things. Put in another way - one participant expresses that individuals need to be willing to learn continuously and be aware of the need to change, which ultimately affects the attitude of individuals towards change. One of the participants explains that they have observed that the individuals who struggle most with the use of GAS tools are those who do not have a culture of reading and exploring new things. This level of complacency makes the process of learning the skills of GAS frustrating for them, which results in resistance when it comes to the adoption and utilisation of these technologies.

The view of participants on the willingness-to-learn construct was consistent with all participants agreeing that users need to be willing to learn the new skills and processes of analysing data with GAS to be able to embrace and utilise the tool.

5.4.9.3 Technophobia

A study by Khasawneh (2018) found that employees' technophobia should be considered when implementing any new technology. Employees' emotional intelligence positively influences acceptance of the technology and technophobia negatively impact employees' acceptance of new technologies. He defined technophobia as a "general or a specific fear or anxiety towards technology". Nimrod (2018) defined technophobia as a "fear of modern technologies or discomfort with them". In another study by Khasawneh (2018), he found that technology typically changed at a fast and exponential rate, which resulted in a process that created gaps between individuals' skills and knowledge and the technology, since humans' cognitive skills developed slowly over time and might not be able to adopt or learn all these technologies timeously. As a result of this gap, individuals' adoption of new technology may be slowed, a factor that may be attributed to technophobia. In alignment with this finding, in an earlier study, Norman (2013) explains the paradox of technology as "The same technology that simplifies life by providing more functions in each device also complicates life by making the device harder to learn, harder to use." This paradox may explain some of the contributing factors to why the adoption and utilisation of GAS are not as expected despite internal auditors being educated and aware of its benefits for several years now.

In this study, technophobia refers to the fear or dislike of technology. This construct was the third most common under the user-characteristics theme. The construct represented nineteen per cent (19%) of the total references identified from interviews under this theme, which translated to a total of nineteen (19) references. Given it was the third most common construct under the theme, it is a construct that needs to be considered as an important contributor to the user characteristics that influence the continued usage of GAS post-adoption.

One of the participants states that “a reason for non-adoption of GAS may be the fear of the technology”. Another participant described the fear of technology as an “allergy” to technology. This participant was adamant that it was important for internal auditors to change their attitude and mindset towards technology and new ways of working to enable them to embrace technology for their benefit. A different participant was of the view that internal auditors feared adopting technology like GAS because they perceived it as a threat to their jobs. They felt its efficiencies would result in their roles being replaced by technology. This fear resulted in most internal auditors resisting GAS as well as being technophobic. One of the participants had observed that it was mostly the older generation that had a great deal of technophobia. Most of the participants felt strongly that technophobia was a big contributor to the low adoption and underutilisation of GAS in their organisations.

One of the participants who is now a committed and proficient user of GAS explained that they overcame their fear of GAS by challenging themselves to read more on the capabilities and functions of GAS and subsequently, they started to explore the tool practically until they got comfortable with its functions and capabilities.

5.4.9.4 Motivation

According to Roubi (2019), “motivation is an internal impulse that allows an individual to complete an action.” Hartnett (2018) states that motivation is concerned with “the goals that direct attention and behaviour in pursuit of their achievement”. They note that motivation determines our level of commitment and effort to a task or activity. In alignment with these definitions, in this study, the motivation factor explores whether internal auditors are driven to use GAS and the impact of motivation on its usage and utilisation post-adoption.

The motivation construct was the fourth most common factor under the user-characteristic theme. It contributed eighteen per cent (18%) of the references identified under the user-characteristic theme. This construct was just one per cent (1%) under the technophobia construct in terms of the overall total contribution of references, which in the view of the researcher, makes this factor noteworthy and an important one that needs to be considered when looking at the drivers of continued usage of GAS post-adoption.

One of the common constructs identified by interview participants explaining the underutilisation of GAS was internal audit team members who were not motivated to use the tool. In support, one of the participants had observed that the users who used GAS tools frequently and, in turn, became very proficient at using the tool were internally motivated to learn and use the tool. In the participant's context, to be internally motivated meant that their adoption of the tool was not driven by external motivational factors, such as incentives, but rather the individuals' interest in the tool. Another participant who was not utilising the GAS tool advised that they had no reason or explanation why they were not using the GAS license they had been allocated. The researcher understood this to mean this individual was not motivated to use the tool and, therefore, did not adopt it at all. In a different organisation, another participant attributes the non-usage of GAS tools in their environment to the lack of drive and vision pertaining to GAS at a departmental level. With the lack of a clear vision and defined expectations to be achieved from the use of GAS, team members were not motivated to use the software. There was a similar explanation from another participant in another organisation who stated that if team members understood the objectives to be achieved using GAS tools, they believed the tool would be fully utilised.

Several interview participants were of the view that tenacity and personal interest in GAS tools were necessary to motivate users to adopt GAS. Participants also pointed out that GAS required a lot of practice for a user to become proficient at using it. This also magnified the importance of users being motivated to use the tool as there was a need for persistence and commitment to get to the desired level of competency and comfort using GAS tools. The constructs of effort expectancy, social influence and facilitating conditions adopted by the researcher from the UTAUT model in the preliminary conceptual framework looked at the motivation for users to adopt GAS software. Based on this, the researcher believes that the proposed model captures the motivation construct fully, and no further additions need to be done to the preliminary conceptual model to capture this aspect.

5.4.9.5 Analytical Mind

In this study, the factor of analytical mind refers to an individual's ability to detect patterns from large volumes of data and information and, therefore, tackle complicated issues by evaluating information through gathering and organising large data sets into meaningful information. In the context of internal audit, an analytical mind can also be considered to be investigative in nature.

The analytic-mind construct was found to be the least popular factor under the user-characteristic theme based on the occurrence of this factor in the interview data. This factor contributed four per cent (4%) to the total references identified under the user-characteristic theme.

GAS tools are used to analyse large populations of data. According to one participant who had successfully adopted GAS tools, they love dealing with numbers, solving problems, and experimenting with information to make decisions. They feel challenged and driven to solve complex problems, and that is why they believe they cultivated a passion to use GAS. In their view, not everyone has this kind of mindset, and these people easily get discouraged when using GAS as they will find it complex to use. Another participant stated that it was important for users of GAS to "think outside the box" to develop analytics that added value. They explained that GAS tools were very versatile and, consequently, needed users to be versatile to apply their minds to develop tests that dealt with different scenarios.

Although the construct of an analytical mind is not prominent in either the review of literature or interview data, the researcher is still of the opinion that it is an important contributor to the continued usage of GAS. The researcher found this construct noteworthy as he had encountered this concept several times in his professional experience and found it to influence the adoption and usage of GAS technology. Based on this, the analytical-mind construct will be retained in the conceptual framework and will need further validation by future research.

5.4.10 Theme Ten - Social Influence

Social influence is defined by Venkatesh *et al.* (2003) as "the degree to which the individual perceives that important others believe he or she should use the new technology they are considering". Social influence influences how an individual's attitudes, beliefs or behaviour are altered or shaped by significant others' expectations. As noted in earlier discussions in this study, despite internal auditors' requirement to work independently, they do not work in a vacuum but must interact with stakeholders across the organisation to achieve their objectives effectively. These stakeholders vary from business process owners, auditees, support resources like IT, team members and management from across the organisations. It was, therefore, of interest for the researcher to understand the impact of social influence on the continued usage of GAS.

The theme of social influence ranked ninth (9th) out of the ten (10) emerging themes that had been identified by the researcher from the analysis of interview data. This ranking was based on the total number of references pertaining to the theme as identified and categorised by the researcher. The total number of references identified by the researcher under this theme was sixteen (16), which converted to a three per cent (3%) contribution of all references.

A total of two (2) constructs were identified under the social influence theme. Their contribution percentage to this theme is reflected in Figure 5.14.

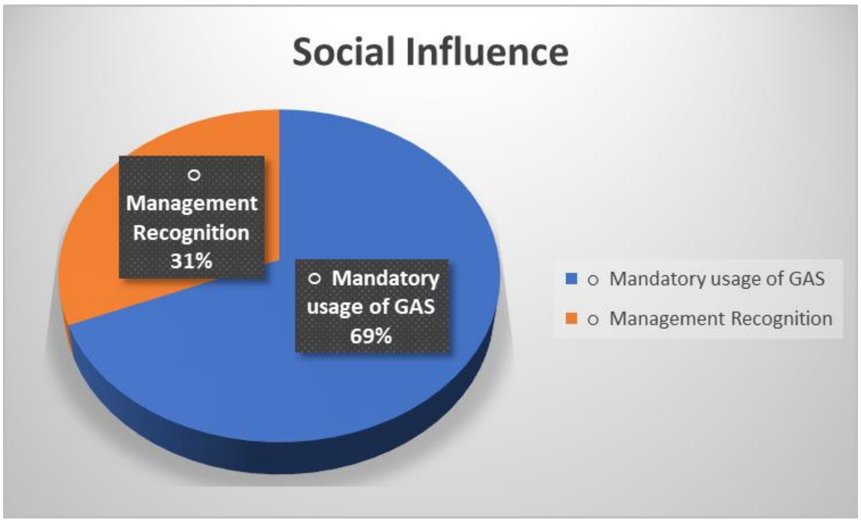


Figure 5.14 *Constructs under the social influence theme*

The detailed analysis of each of the factors is as follow.

5.4.10.1 Mandatory Usage of GAS

The construct of mandatory usage of GAS explores the possibility and effectiveness of making the adoption and usage of GAS compulsory. According to Al-Hiyari *et al.* (2019), the usage of CAATs by internal auditors remains unsatisfactory. Their study recommends policymakers motivate internal auditors to adopt CAATs by educating them on the benefits of automated tools and implementing a reward system to motivate internal auditors to use CAATs. Mandatory adoption of GAS can be viewed from two perspectives, making it mandatory for the users to utilise GAS and, secondly, making it mandatory for the process owners to respond to exception reports generated from GAS tools as part of the remediation process. Business process owners and auditees are the consumers of the exception reports generated from GAS tools, whilst internal auditors are the users of the GAS tools as well as consumers of the outputs from GAS.

Of the two (2) constructs identified under the social influence theme, mandatory usage of GAS was by far the most important factor, based on the total number of references the researcher had identified from the analysis of interview data. A total of eleven (11) references were identified, which represented a percentage weighting of sixty-nine per cent (69%) under the theme. This is a very significant contribution that can be attributed to this construct, therefore, noteworthy when reviewing and analysing social factors that may influence the continued usage of GAS post-adoption.

In relation to an earlier finding that most of the internal auditors who participated in this study lacked the motivation to utilise GAS frequently, research participants opined that making the use of GAS compulsory was an effective solution to increase adoption and continued usage of GAS. According to one participant, it was the responsibility of the organisation's leadership and management personnel to enforce the utilisation of GAS as well as put in the necessary measures to ensure the tool had been utilised as required. In alignment with this, one of the CAE's who participated in the interviews mentioned that in their environment, it was compulsory to use GAS for all audits that had an element of data analysis. They felt this was a necessary enforcement, especially for users that were reluctant to use GAS in place of Excel. According to the CAE, making the use of GAS mandatory had proven to be effective for their internal audit team. The researcher agrees with this assessment, as other internal auditors interviewed from this organisation gave the impression that they were utilising GAS effectively and the organisation was achieving a satisfying level of return on the GAS investment made. The CAE states,

> *"The utilisation of GAS in audits was governed by a policy in the internal audit department."* (R4)

A different participant, who supported making the use of GAS mandatory, recommended that the audit plan needed to be specific about the audits that would require the utilisation of GAS for data analysis and, likewise, specify the personnel resources to undertake this audit. The resourcing of audits should then be done in a manner that all internal auditors are given the opportunity to use GAS. Although the initial adoption of GAS tools appears to be mandatory and forceful, the participant explains that the objective of this approach is to ensure internal audit team members get to appreciate, understand, and experience the role and benefit of GAS tools through practical hands-on usage of the tool. In the participant's view, this strategy was yielding successes in achieving the continued usage of GAS post-adoption.

Participants also suggested the use of key performance indicators (KPIs) that had metrics that tracked and assessed the effective utilisation of GAS tools per individual team members as a strategy to implement the mandatory usage of GAS tools. A system of KPIs support assessment of usage at an individual level as well as provide an individual development plan aimed at ensuring everyone in the internal audit department works towards being proficient in the use of GAS. According to the researcher, this can be an effective way to increase continued usage of GAS, as it was found that GAS competency and skills were a major challenge affecting the utilisation of GAS tools.

Another participant gave an account of how they had personally observed the increased usage of GAS in their department, emanating from the CAE demanding team members show proof that an analysis had been done using GAS tools. Most of the participants agreed on the importance and need to make the use of GAS compulsory, a factor that drove a high adoption of GAS.

5.4.10.2 Management Recognition

Management recognition was identified as the second construct under the social influence theme. According to a study by Baqir *et al.* (2020), "reward and recognition and supervisor support can engage employees for better performance". A study by Bosire *et al.* (2021) concludes that "recognition programs had a positive and significant relationship with employee output" and recommends that, "organizations need to work towards recognising their staff appropriately so that they can exhibit improved employee output". Lai *et al.* (2018) found that management support was one of the factors affecting application-level usage of audit analytics. In this study, the management recognition factor looks at the impact of informal or formal acknowledgement or recognition by management of an internal auditors' effort and adoption of GAS tools and exception results that support internal audits and the organisation's goals. Based on previous studies, recognition of employees' results improved employee performance.

The management recognition construct contributed thirty-one per cent (31%) of the interview references identified under the social influence theme. This translated to a total of five (5) references that were categorised under the management recognition factor. Given that only two factors were identified under the social influence theme, this factor contributed significantly to the theme.

According to one participant, management in their organisation was very appreciative of the exception reports that internal audit was generating using GAS. Internal audit has been successful in reporting on exceptions that had huge financial values, which meant financial impact and potential losses represented by the exceptions were of interest to the business. As a result, the use of GAS is supported by the business, and with this support and recognition, the internal audit team intends to continue to use GAS as a value-adding tool to the organisation. In another case, the participant shared that GAS was highly appreciated by the business as it played a crucial role in exposing the control deficiencies in the business processes as well as the ERP and other systems. Instead of internal audit driving the objectives of analytics, they are also experiencing the business being proactive in requesting internal audit to use GAS to monitor some of their key risks and concerns. This has resulted in the internal audit department using GAS in wider areas, and because of this recognition, the department is utilising GAS tools more frequently on a wider scope.

According to one participant:

> *"Management are getting value from GAS and it's a technology that is pretty much known in the business when it comes to data analysis."* (R4)

This is evident of the great deal of value that GAS is providing for this organisation, to the extent that it is not just a tool for internal audit. This also implies that internal audit should be getting a lot of recognition in the organisation for using this tool to deliver value. Another participant explained that they get recognition from the board because they can convincingly present their data-analytic findings, backed up with evidence from the organisation's transactional data. GAS has also enabled the participant to address "what-if" scenarios by performing predictive analytics through modelling what is likely to happen using data. Not only has this resulted in a lot of recognition from the board, but also enabled him to make the board appreciate his presentation which facilitates data-driven decision making.

In another organisation, the recognition of the GAS tool and the internal audit department has been evidenced by process owners notifying internal audit if they do not get weekly exception reports on the routine tests that they are now aware internal audit runs with GAS. The process owners have advised audit that they are getting value in terms of the monitoring responsibilities that they have. This has led internal audit to utilise GAS tools more broadly by incorporating more tests and ensuring they are running tests that satisfy a larger audience of process owners and departments.

There was consistent feedback from the participants on how the organisations realised value from the analytic outputs they generated from GAS. Teams that had reached this level of value delivery and recognition throughout the organisation tended to utilise GAS tools more effectively and more broadly. In some cases, participants recommended that the continued usage of GAS was driven by demand from process owners for more exception reports. Based on this information, it can be concluded that recognition from management and process owners, as far as GAS is concerned, results in the continued utilisation of GAS tools.

5.5 Analysis of GAS Use Cases Emerging from participant interviews.

It was of interest for the researcher to learn from the interview participants the areas in which GAS technology was being utilised mostly in their different environments. The findings can indicate where GAS users obtained the greatest value from the software, and at the same time can also provide insight on the breadth of scope of GAS tools currently being utilised. This information can provide useful insights to current users of GAS, potential adopters of GAS and service providers of GAS, especially from an SOE perspective, on areas of focus when using the software as well as a basis for expanding the utilisation of GAS in other areas for increased benefit and value, which should result in continued usage of the software.

Figure 5.15 provides a summary of the GAS use cases shared by participants during interviews.

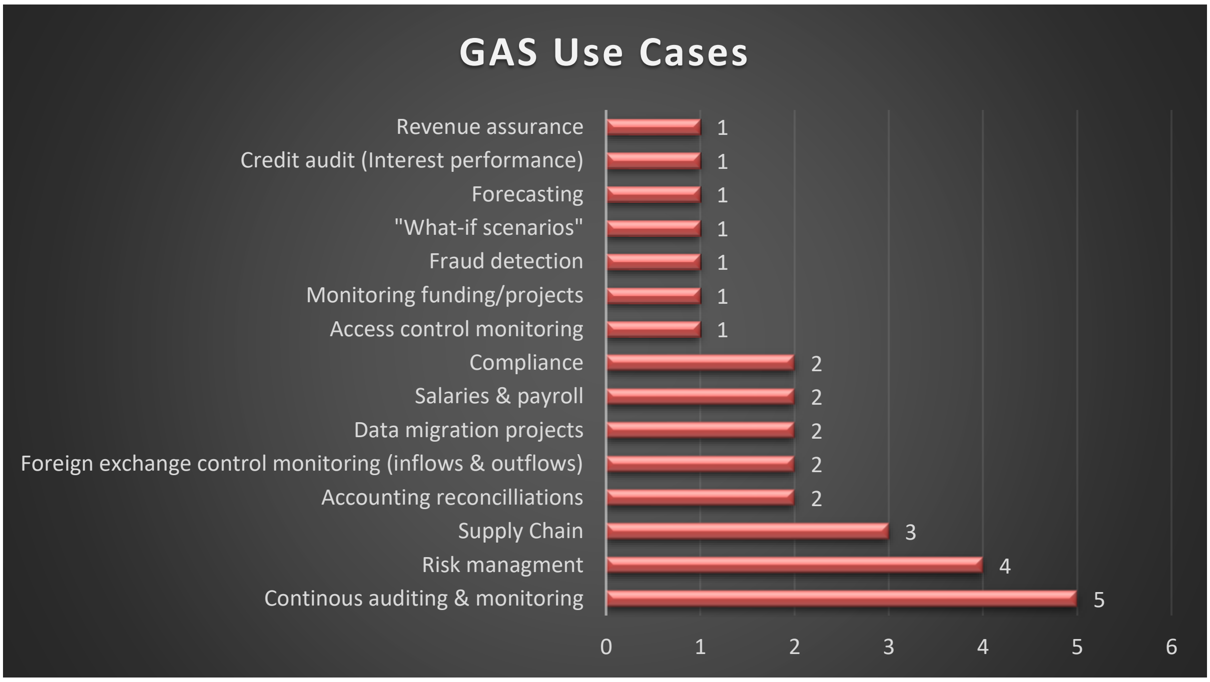


Figure 5.15 *GAS use cases adopted by interview participants*

A total of fifteen (15) GAS use cases were identified by the participants during interviews. The most common use case mentioned by participants referred to the use of GAS to achieve continuous auditing and monitoring. It was mentioned by five (5) participants. Continuous auditing is the use of GAS to perform analytics in an ongoing and automated fashion to deliver exception notifications to the internal audit team. With continuous monitoring, the exception notifications and reports are directed to the business process owners as well. According to one of the participants, using GAS for continuous monitoring ensures that the business can experience the direct benefit of GAS tools which is likely to ensure the tool gets sufficient support across the organisation for its ongoing usage. Another participant felt that to achieve a sustainable continuous auditing and monitoring program, it is crucial for internal auditors to have scripting tools to automate tests using GAS.

The second most popular use case identified by participants was the application of GAS for risk management. This use case was identified by four (4) of the participants. According to one of the participants, in their environment they have been using GAS for internal audit projects; however, they have identified the potential of applying GAS to a larger scope and are targeting its application in the risk management department. GAS can be used to identify potential risks before they materialise.

The third most popular use case for GAS identified by participants was the supply chain process. This was identified by three (3) participants during interviews. One of the participants reports that they are using GAS to identify control weaknesses and control failures in the supply chain department. In agreement, another participant states that GAS is crucial in the supply chain area as it can perform tests to identify duplicate payments and duplicate suppliers. In their organisation, the amount of money and volume of transactions in the supply chain is huge; hence, utilising GAS has a huge opportunity to save the organisation from losing large amounts of money. In another case, one of the participants explains that they already have several analytic tests being run in the supply chain process using GAS, and they are still in the process of adding more tests. In the same organisation, the supply chain is also requesting GAS licenses so that they can run their own tests next to real-time and publish results in dashboards for real-time monitoring of transactions.

The use case of adopting GAS tools for accounting reconciliation processes was identified by two (2) interview participants. This was the fourth most popular use case identified from participant interviews. In one of the SOEs, they are in the process of acquiring additional licenses for the accounting department that wants to use GAS for reconciliations. Internal audit has demonstrated how the GAS software works, and the Accounts team is confident it will address their requirements. Other use cases that had been identified by two (2) participants were compliance, salaries & payroll, data migration projects, and foreign exchange control monitoring. According to one participant,

> *"GAS software will not just be used for data analytics for internal audit, but the interpretation would assist with the interpretation of the data that would be analysed in compliance."* (R9)

In a different case, GAS tools had proven to be very beneficial for IT projects where data were being migrated from one system to another. In this case, GAS was used to validate the data moving into the new servers or applications to ensure data integrity. One participant reported that since this data migration project, their IT resources have adopted GAS software for their data-analytic work. In one of the financial institutions, there is a huge business case for their foreign exchange controls department to adopt GAS for monitoring outflows and inflows of forex. The department has not yet adopted GAS but is in the process of procuring licenses since they have buy-in on how GAS tools will add value to their work.

The following seven (7) use cases were each identified by one participant: revenue assurance, credit audit (interest recalculations), forecasting, "what-if" scenarios, fraud detection, project funds monitoring, and access control monitoring. These use cases evidence the wide scope of the application of GAS in an organisation and not just focus on internal audit. When GAS is adopted widely across the organisation and on a wider scope, there is likely to be continued usage and support of GAS post-adoption as a large number of stakeholders become dependent on the software to make their jobs more effective and efficient. One participant highlights the power of GAS by expressing how they used it to conduct a credit audit for their entire branch network of thirty-eight (38). They were looking at a hundred per cent (100%) of the data population for a period of five years. In another case, the use of GAS was initially just for the purpose of monitoring funding for projects to ensure funds have been utilised as budgeted and planned. This represented millions of dollars for the organisation, and through the application of GAS, several anomalies were identified for further investigation. The biggest benefit was how it changed the behaviours of employees when it came to the use of funds, resulting in increased efficiencies and reducing fraud when it came to the management of funds.

The use cases for GAS are numerous, therefore, when the software is utilised properly over a wider scope, it is likely to be used continuously post-adoption. When GAS software is adopted over a wider scope, it is likely to provide a significant amount of value to organisations as well as enable several stakeholders to execute their roles effectively and efficiently. It was interesting to observe that most of the participants noted the potential of GAS to add value in many areas, but they had not actually taken the initiative to apply GAS in those areas.

5.6 Summary of findings from the themes

Table 5.10 provides a summary of the key findings from the ten (10) themes emerging from the participant interviews.

Emerging Theme	Sub-theme	Findings/observations
1. Benefits	1.1. Hundred per cent analysis of large data population	1.1.1. Highest referred to benefit by interview participants, making it a powerful motivator for continued usage of GAS.
	1.2. Saves Time	1.2.1. Efficiencies gained from automation from GAS.
		1.2.2. Second most frequently mentioned benefit from GAS.
		1.2.3. GAS enables internal auditors to do more with less – increase audit scope.
	1.3. Improved Accuracy	1.3.1. Makes the role of internal auditors more valuable by improving the quality of work.
		1.3.2. It is critical for internal auditors to provide accurate and reliable evidence; hence, this plays an important role in the perceived usefulness of GAS.
		1.3.3. Adoption of GAS also improves the quality of work of business process owners as there is an awareness that internal audit has visibility into transactional data.
		1.3.4. The researcher had not come across the benefit of improved accuracy during the review of literature.
	1.4. Efficient way of working	1.4.1. A common benefit observed in previous studies as well.
	1.5. Independence from IT Resources	1.5.1. IT support mainly in the initial set-up and establishing direct connectivity.

Emerging Theme	Sub-theme	Findings/observations
		1.5.2. Enabled internal auditors to be independent as required by their role of independent assurance – increased perceived usefulness of GAS.
		1.5.3. A common benefit observed in previous studies as well.
	1.6. Faster identification & resolution of exceptions	1.6.1. The researcher had not come across the benefit of GAS articulated in this way in the review of literature.
	1.7. Speediness of getting work done	1.7.1. The greatest value (perceived usefulness) that participants attached to this benefit was the creation of more time to allocate to other tasks and other audits.
	1.8. Direct access to source systems	1.8.1. The researcher had not come across this benefit articulated in previous GAS studies.
		1.8.2. This benefit resulted in multiple benefits such as auditor independence, data integrity, confidence in the assurance process and the speed of data analysis.
	1.9. Detect trends & inconsistencies in data	1.9.1. Participants linked this benefit to directly provide tangible impact to the business operations.
	1.10. Enhanced managers oversight role	1.10.1. A benefit that directly impacted the process owners rather than the internal audit function directly.
	1.11. Visualisation	1.11.1. This benefit had not been mentioned in previous GAS studies the researcher came across.
		1.11.2. Valuable GAS capability to both internal audit and executives of the organisation.
	1.12. Improved confidence in providing assurance	1.12.1. A benefit that aggregates the previous mentioned benefits.
	1.13. External audit work lessened	1.13.1. The researcher had not come across this benefit in the review of literature.
	1.14. Creating and progressing internal audit careers	1.14.1 GAS tools are playing a role in shaping the profession of internal audit to ensure they remain relevant.
		1.14.2. The researcher had not come across this benefit in the review of literature.
	1.15. Continuous auditing and monitoring	1.15.1. Despite this benefit being a topical matter, it appears most internal auditors have not adopted the technology to that level of maturity yet.
2. Challenges	2.1. Steep learning curve	2.1.1. This challenge was the most frequently referred to by participants.

Emerging Theme	Sub-theme	Findings/observations
		2.1.2. Identified as one of the reasons for the slow adoption of GAS.
	2.2. Non-IT Auditors struggle with GAS	2.2.1. Participants had observed that internal auditors who had been exposed to programming caught on to the use of GAS much faster.
		2.2.2. Data Analytic Champions from the participating SOEs were all from an IT Audit background.
	2.3. Easy to forget without practice	2.3.1. The non-routine or non-repetitive nature of an internal auditor's assignments means they do not have to use GAS frequently and as a result, the challenge of internal auditors easily forgetting to use the tool becomes magnified.
		2.3.2. Identified as a reason for the low utilisation of GAS tools.
	2.4. Software is expensive	2.4.1. interview participants were of the strong view that the price of the software was expensive which became a significant hindrance to adoption and ongoing usage of the software.
		2.4.2. Several of the participants felt that cost constraint was the largest reason why some of the organisations had not adopted GAS tools.
	2.5. Competency	2.5.1. Participants did not feel they were fully competent to utilise GAS to achieve results that met their expectations.
		2.5.2. Participants mainly attributed the lack of receiving adequate training as the reason for user incompetence.
	2.6. Stakeholder frustration from false positives	2.6.1. Sharing of false positives results in client fatigue who may begin to resist working on future exception reports.
		2.6.2. Stakeholder and process owner collaboration and cooperation is an important element of the data analysis cycle.
	2.7. Getting direct access to data	2.7.1. When the challenge of failing to connect directly to a data source is encountered, the perceived usefulness of GAS is compromised as some of the earlier stated benefits will not be attainable.
3. Pre-adoption	3.1. Clear objectives of GAS	3.1.1. Found to be the most important consideration under the pre-adoption theme.
		3.1.2. Provides clarity of the business areas and audits analytics that will be performed, determining the scope of

Emerging Theme	Sub-theme	Findings/observations
Considerations		usage, clarity of which team members will be allocated licenses and sets a baseline for measuring, monitoring, and assessing achievement of results, individual performance and tracking of return of investment.
		3.1.3. Clear objectives need to be set on an ongoing basis to ensure continued and optimum usage of the tool.
		3.1.4. It is common for internal audit departments to procure GAS without contextualising how it will work in their environment.
		3.1.5. GAS was underutilised once adopted because internal audit teams would not apply it in all potential areas as identification of those areas would not have been done upfront.
		3.1.6. It was recommended for the audit plan to provide all team members with an opportunity to work on audits where GAS needs to be applied.
	3.2. Evaluation of GAS tool options	3.2.1. GAS types commonly identified by the interview participants were ACL, IDEA and TeamMate Analytics.
		3.2.2. Implementing a GAS type without proper evaluation may result in GAS failing in the client's environment.
		3.2.3. The important output of the evaluation exercise is to match the organisation's environment, internal audit data analytic objectives and budget requirements to the GAS type.
4. Perceived Usefulness	4.1. Adding value	4.1.1. Most mentioned element by participants as important in determining the perceived usefulness of GAS.
	4.2. Strategic tool for decision making	4.2.1. GAS is contributing to data-driven decision making.
		4.2.2. For more value, exception reports from GAS should go beyond internal audit use, but to other stakeholders across the organisation (continuous monitoring).
		4.2.3. Chief Audit Executive should champion the adoption of GAS.
		4.2.4. Use cases of GAS should span larger business areas such as risk management, compliance, etc.
	4.3. Post-implementation continuous monitoring	4.3.1. Systematic processes to track GAS progress towards its intended usage and scope objective ensure that there is visibility to management whether GAS is delivering results as per the performance expectancy (PE).

Emerging Theme	Sub-theme	Findings/observations
		4.3.2. Mechanisms need to be in place to monitor the usage of GAS once adopted. For example, KPIs
	4.4. Management recognition	4.4.1. Not only was recognition by management validating the work of internal auditors, but it was also assisting in the broadening of the scope of GAS usage by contributing and collaborating with internal audit on the high-risk areas and processes that needed continuous monitoring.
5. Perceived Ease of Use	5.1. User friendly (User Experience)	5.1.1. Given that this was the least common theme raised by participants in the interviews, it suggests that perceived ease of use was not a big driver of continuous usage of GAS.
6. Competency	6.1. Training	6.1.1. Training is important at both onboarding when GAS tools are procured as well as for continuous usage post-adoption.
		6.1.2. Most important construct for competency identified by participants.
		6.1.3. Most participants felt that the one-week training they received was inadequate.
		6.1.4. Most participants attributed the underutilisation of GAS tools to the lack of knowledge to use the tool.
		6.2.5. Delivery of GAS training online was found to be convenient for ongoing usage of GAS.
	6.2. Continuous practice, learning and usage	6.2.1. This was the second most popular factor characterising the user competency theme.
		6.2.2. This construct aligns with the earlier finding that had identified that GAS required frequent usage for participants to become comfortable and competent enough to utilise the tool.
	6.3. User groups/workshops	6.3.1. Frequent attendance of user events and workshops were useful in improving their knowledge and competency of using GAS.
7. Facilitating Conditions	7.1. Stakeholder buy-in	7.1.1. Identified by participants as the most important factor under facilitating conditions driving continued usage of GAS.
		7.1.2. The ability to demonstrate the value of GAS to stakeholders is an important driver that internal audit can leverage to get buy-in and support from the different stakeholders.

Emerging Theme	Sub-theme	Findings/observations
		7.1.3. The CAE needs to be responsible for championing the buy-in of GAS for its successful adoption as well as securing sufficient resources.
		7.1.4. Lack of buy-in for GAS by other stakeholders generally results from the lack of appreciation of the objective and role of GAS.
	7.2. Management support	7.2.1. The second most popular factor under the facilitating conditions theme.
		7.2.2. The required support for GAS by CAEs was mostly in the form of budget provisions to procure and maintain the software licenses, as well as encouragement and oversight on how to best adopt and apply the software.
		7.2.3. CAE support is crucial when it comes to the championing of GAS adoption and usage in the organisation.
		7.2.4. The remediation process of identified exceptions is also a process in the adoption of GAS that requires support from top management.
	7.3. Stakeholder collaboration	7.3.1. There is a need for internal audit GAS users to partner with other stakeholders such as managers, executives, process owners and auditees to complete the data analytic cycle.
		7.3.2 Educating stakeholders to understand and appreciate the role and importance of GAS was identified as an important factor to enabling and achieving stakeholder collaboration.
		7.3.3. Stakeholder collaboration emerged as a significant construct towards the successful adoption and usage of GAS in the facilitating conditions theme.
	7.4. Support from GAS vendors	7.4.1. Support from GAS vendors is an important driver and enabler of the adoption and usage of GAS tools
		7.4.2. Support from vendors can be in the form of provision of consulting, training, education, maintenance, and upgrades of GAS software, both from a pre- to post-adoption perspective.
8. Leadership	8.1. CAE taking ownership	8.1.1. The need for the CAE to take ownership of GAS adoption and usage was found to be the most important construct under leadership.
		8.1.2. The CAEs hierarchical position in the organisation makes them best placed to lobby for support for the use of

Emerging Theme	Sub-theme	Findings/observations
		GAS by other stakeholders and, in turn, defend a budget for its acquisition and ongoing usage.
	8.2. Change management	8.2.2. It was the second most popular factor identified under the leadership theme.
		8.2.3 The transition from traditional audit approaches to adopting new technology needs to be managed to minimise resistance.
	8.3. Mandatory usage of GAS	8.3.1. The CAE needs to be responsible for implementing policies to drive and govern the usage of GAS.
		8.3.2. It was found that organisations that have implemented individual measures to monitor the adoption of GAS by each internal auditor have experienced increased utilisation of GAS tools.
9. User Characteristics	9.1. Willingness to change	9.1.1. Found to be the most significant factor identified under the user characteristic theme.
		9.1.2. Sufficient training to users was effective in getting users to understand the benefits of GAS and making them more willing to adopt GAS.
	9.2. Willingness to learn	9.2.1. Second most important construct identified under the user characteristic theme
		9.2.2. Addresses the two identified challenges of lack of adequate skills and steep learning curve.
		9.2.3. All participants had recognised this as a very important attribute for the successful continued usage of GAS.
	9.3. Motivation	9.3.1. Identified as one of the reasons for the lack of utilisation of GAS (lack of drive).
	9.4. Technophobia	9.3.2. Found as a reason for low adoption of GAS.
	9.5. Analytical Mind	9.5.1. Has already been incorporated in the preliminary conceptual framework.
10. Social Influence	10.1. Management Recognition	10.1.1. When management appreciates and values exception reports, it drives the higher utilisation and continued usage of GAS.
	10.2. Mandatory usage of GAS	10.2.1. Came out as a better-recommended strategy by participants for adoption and continued usage of GAS in opposition to depending on social influence.
		10.2.1. The CAE was found to be central to crafting and executing policies to ensure mandatory usage of GAS.
		10.2.2. Audit plan needs to be specific about the audits that will require the utilisation of GAS.

Emerging Theme	Sub-theme	Findings/observations
		10.2.3. Resourcing of audits should be done in such a manner that all internal auditors are given the opportunity to use GAS.
		10.2.4. CAEs recommended using KPIs to track and assess utilisation of GAS per individual team members.

Table 5.10 *Summary of findings from the themes emerging from interviews*

5.7 Synthesis of findings and enhancing the conceptual GAS PA CU Framework

Following the summary of findings in Table 5.10, in this section, these findings are integrated with the findings from the literature review to enhance the conceptual framework from this study that is proposed for the continued usage of GAS post-adoption. The comparison of the interview data and the literature was used to refine and strengthen the rationale of the conceptual framework. A final enhanced conceptual framework will be proposed as a conclusion to this chapter. The synthesis of findings will focus on the prevalent themes and constructs emerging from participant interviews, which the researcher identified as important for inclusion in the process of refining, enhancing, and finalising the conceptual framework. The synthesis will be categorised under the UTAUT, ECM-IS theory and emerging themes extending the theoretical framework perspectives, which are the fundamental pillars that constitute the preliminary conceptual framework.

5.7.1 UTAUT Constructs

The preliminary GAS PA CU conceptual framework incorporates the effort expectancy, social influence and facilitating conditions UTAUT constructs as factors that influence post-adoption usage of GAS and the decision to continue or discontinue use. According to Gupta *et al.* (2020), “the UTAUT remains a pre-adoption framework with limited examination on post-adoption attitudes/behaviors”. With an agreement to this view, the UTAUT theoretical framework will be extended together with the ECM-IS theory and additional constructs emerging from participant interviews to fully capture the post-adoption phenomenon for GAS.

Interview participants raised concerns about what they believed to be a steep learning curve for GAS tools. This concern was raised a total of eighteen (18) times in the sixteen (16) interviews facilitated by the researcher. This concern was amongst the top challenges participants raised that affected the utilisation of GAS post-adoption. About thirty per cent (30%) of the participants believed that users needed a programming or technical background to grasp the concept of developing advanced analytics and scripts easily. If GAS is viewed as complex, it may result in discouraging frequent and continued utilisation of GAS. Despite conflicting findings in literature, where effort expectancy did not show a significant influence or a consistent influence on the adoption of GAS, evidence from this study suggests perceived effort expectancy will impact the continued usage of GAS. Therefore, this construct will be retained in the conceptual framework and an association arrow to show its influence on the continued usage decision is included.

Without the provision of a budget to invest and sustain GAS, it would not be possible for internal auditors to adopt GAS or maintain its ongoing usage. Over half of the interview participants felt strongly that the price of the software was expensive, which became a significant hindrance to the adoption and ongoing usage of the software. Several of the participants felt that cost constraint is the largest reason why some of the organisations have not adopted GAS tools. Given the significance of this factor as emphasised by the interview participants, the researcher feels that the conceptual framework must communicate this. The budget factor, which was not included in the proposed conceptual framework, will be categorised under the facilitating conditions construct and will be included in the enhanced framework given how crucial it is to the sustainable use of GAS.

Stakeholder and process owner collaboration and cooperation emerged as an important element of the continued usage of GAS. For GAS to provide useful benefits to the organisation, all stakeholders must play their role to ensure effective adoption of the tool and remediation of exception reports. Similar to the budget factor, stakeholder and process owner collaboration, which was not included in the preliminary conceptual framework, will be included under the facilitating conditions construct given its importance as a driver of continued usage of GAS. Educating stakeholders, providing relevant and accurate exceptions, and frequently showcasing value are strategies internal audit can use to foster a supportive environment and achieve optimum collaboration from process owners and stakeholders.

Management, technical (IT) and GAS vendor support are also identified as significant facilitating conditions important to foster an environment where the adoption and continued usage of GAS are sustainable and valuable. These are now included in the enhanced conceptual framework, as they were not included in the preliminary framework.

The researcher also found that when facilitating conditions were adequate and supportive, it resulted in an increase in the internal auditors' perceived usefulness of GAS. When GAS is viewed as useful to the attainment of the different departmental or organisational objectives by the various stakeholders, internal audit is likely to receive more support from process owners, IT, and management. Consequently, resulting in more ideal facilitating conditions to support the usage of GAS. This association between facilitating conditions and perceived usefulness was included in the enhanced conceptual framework, as it had not been included in the preliminary conceptual framework.

5.7.2 ECM-IS Constructs

The preliminary GAS PA CU conceptual framework incorporates the ECM-IS as the underpinning theoretical framework. Perceived usefulness and the decision to continue or discontinue usage, which is influenced by satisfaction and confirmation constructs, are the key constructs in this framework. The ECM posits that an individual's intention to continue IT usage is dependent on three variables: the user's level of satisfaction with the IT; the extent of the user's confirmation of expectations; and post-adoption expectations, in the form of perceived usefulness.

Interview participants identified the perceived usefulness theme as an important measure for the continued usage of GAS post-adoption. Perceived usefulness of GAS is characterised by the identified benefits of GAS from the literature review and participant interviews. These benefits serve as a basis from which internal auditors can assess whether GAS is adding value and meeting their expectations in alignment with their assurance objectives.

The concept of "post-implementation continuous monitoring" emerged as an important consideration under this theme. The concept referred to the need to regularly observe and review how the internal auditors are utilising GAS. The use of KPI's was recommended as an effective usage monitoring mechanism. Tracking individual development through a proper performance management system is likely to result in better adoption and utilisation of GAS tools. Systematic processes to track GAS' progress towards its intended usage and scope objective ensure that it is visible to management whether GAS is delivering on results as per the performance expectancy (PE). Monitoring how GAS is utilised is crucial for continuous usage as "what is not working" can be resolved whilst that which is not going as planned can be improved or remediated. The researcher opines that when users are aware that there are some monitoring mechanisms in place to track GAS usage, they tend to put the effort in, to utilise the tool fully. Continuous monitoring also then becomes a benchmark that informs or drives the perception of how useful GAS is in the environment. This finding will be incorporated into the enhanced GAS post-adoption conceptual framework, as it had not been captured in the proposed preliminary conceptual framework.

5.7.3 Emerging Themes – Extension to the theoretical frameworks

Based on the literature review and the researcher's experience, user competency, user analytical ability, and electronic data sources were the additional constructs that were introduced to the preliminary conceptual GAS PA CU conceptual framework proposed at the end of Chapter 2 in Figure 2.5.

An emerging theme from the interview participant contributions to the area of study was that of pre-adoption factors. Pre-adoption factors had not been identified and included in the pre-liminary conceptual framework. The theme of pre-adoption referred to the considerations identified by interview participants as important drivers and pillars for the adoption of GAS technology at pre-adoption, which then set the foundation for the successful and sustainable usage of GAS post-adoption. The four considerations emerging from this theme were clear objectives, a thorough evaluation of GAS tool options, perceived buy-in by users, and management support at the EXCO level. The clear objectives concept was identified to have the most significant influence under the theme. Clear objectives provide direction and set expectancies on both the perceived usefulness and effort expectancy perspective. The researcher believes that this theme and concept need to be incorporated into the conceptual model.

The challenge regarding competency in GAS was identified by most participants as playing a critical role when it came to the ability of GAS users to utilise GAS efficiently and effectively. The challenge was also related to other identified challenges, namely "steep learning curve" and "easiness to forget without practice". Most participants attributed the lack of using the tool to the lack of know-how. These findings evidence the importance of the user competency construct already included in the preliminary conceptual framework. Therefore, this construct will be retained in the framework. Training, continuous usage, learning and practice, and frequently attending GAS user groups or workshops were some of the strategies proposed for increasing user competency and these are reflected in the enhanced framework in Figure 5.16.

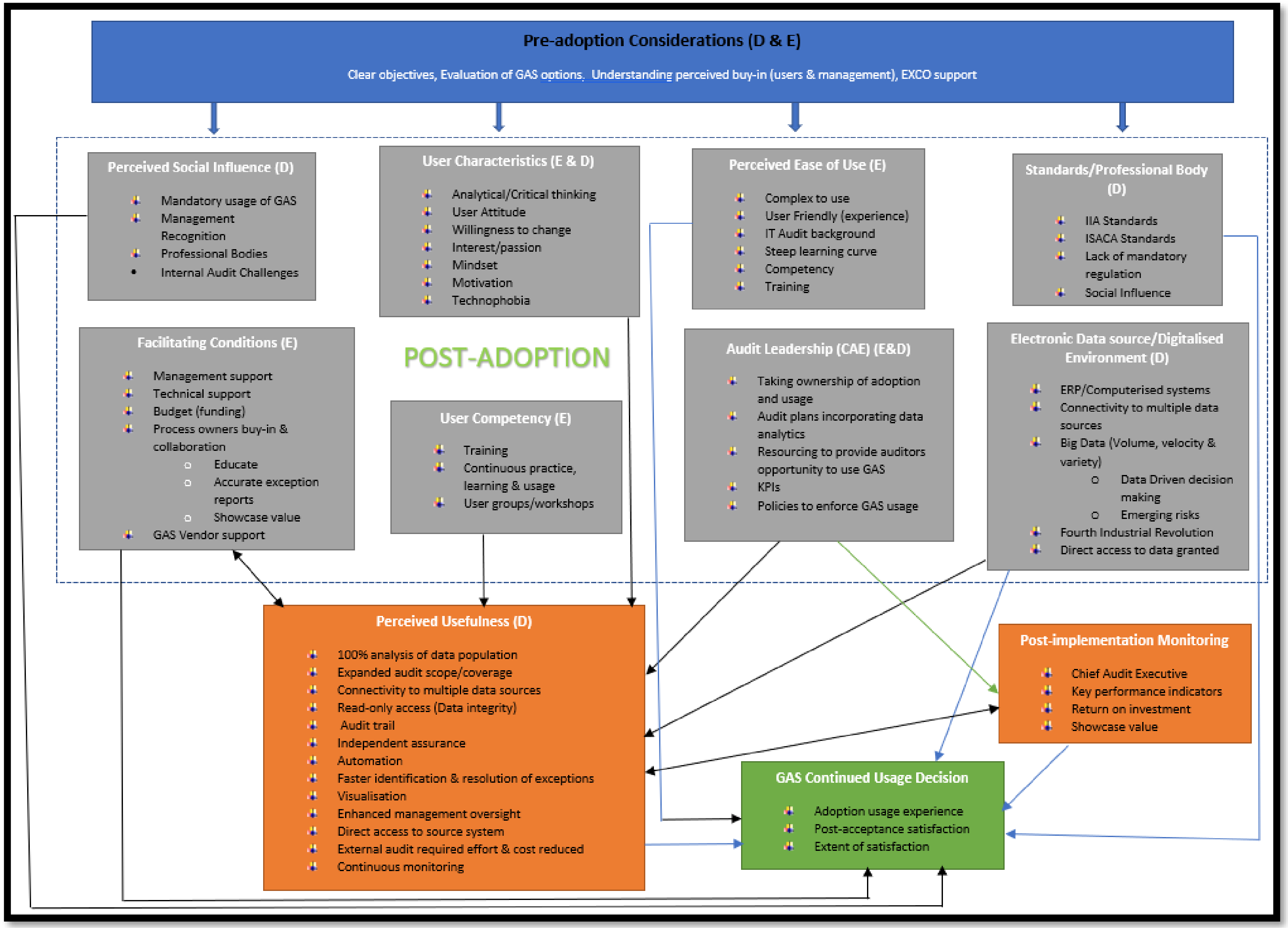
In addition to the importance of stakeholder and process owners' buy-in, their support and collaboration, an emerging concept under the leadership theme, focused on the significance of the role of the Chief Audit Executive (CAE) in the post-adoption usage of GAS. Most of the participants agreed that the CAE was an important role-player to promote the success of GAS at both pre- and post-adoption. The CAE holds the overall strategic leadership role to craft and implement the GAS vision in the organisation. Participants experienced that when the CAE lacked in taking ownership of the success of GAS, the probability of its uptake in the organisation was low. The CAE must exhibit high levels of commitment and drive for the successful adoption and sustainable usage of GAS technology. In taking ownership, the CAE can secure higher budgets for the GAS projects, lobby for support and collaboration at an executive level, and enforce and encourage the internal audit team to utilise GAS. The CAE should implement continuous monitoring measures and policies such as KPI metrics to drive usage of GAS. To illuminate the importance of the CAE role, the theme will be included in the GAS PA CU conceptual framework under the leadership construct. The importance of the CAE role was not highlighted in the preliminary conceptual framework proposed in Chapter 2.

Once an organisation invests in GAS technology, licenses are allocated to individual users to utilise the software. Therefore, the utilisation and continuous usage of GAS become highly dependent on the user's competency and characteristics. The preliminary conceptual framework captures two (2) user characteristics as factors that drive the continued usage of GAS. The two (2) factors are user competency and user analytical abilities. Based on the interview participants contribution, the user-characteristic theme emerged as a very important theme which ranked fourth (4th) out of the ten (10) identified themes. The themes of benefits, challenges, perceived usefulness, and facilitating conditions were the ones that ranked ahead of the user-characteristic theme and were all going to be incorporated into the conceptual framework. Given the importance of the user-characteristic theme, the researcher thinks that this theme should be captured as a standalone theme in the framework with the constructs of analytical ability, user attitude, willingness to learn, interest, mindset, motivation, and technophobia reflected under the theme. The construct of willingness to change was found to be the most important under the theme. It was defined as the cognitive and emotional buy-in by users, which should be sufficient to drive them to work towards the adoption of GAS and the changes that it brings.

The enhanced conceptual framework also reflects the association between user characteristics, user competency and audit leadership (CAE) with perceived usefulness. This association was not reflected in the preliminary conceptual framework. The theme of audit leadership is also reflected to have an association with the post-implementation construct, as the CAE is the one responsible for introducing policies and strategies to ensure the adoption of GAS is continuously monitored to ensure it achieves the envisaged benefits and, if not, the CAE will need to drive the decision to continue or discontinue its usage.

The theme of a digitalised electronic environment is retained in the enhanced conceptual model as a crucial driver for the use of GAS. Big data and the fourth industrial revolution were found to be the biggest drivers resulting in the automated and computerised environment internal auditors find themselves working in, which necessitate the need for audit to use CAATs to remain relevant through the delivery of value. The computerised and automated environment result in new emerging risks that need to be managed by computerised internal controls, as well as feeding into the process of data-driven decision making based on new insights surfacing from data analytic capability. The association between electronic data sources and perceived usefulness, and the decision to continue using GAS are reflected in the enhanced GAS PACU conceptual framework visualised in Figure 5.16.

__Figure 5.16__ The enhanced GAS PA CU Conceptual Framework



Legend (*Figure 5.16*):	
→	: Direction flow of association to perceived usefulness
→	: Direction flow of association to GAS continued usage decision
→	: Direction flow of association to post-implementation monitoring
→	: Direction flow of association from pre-adoption considerations to the post-adoption constructs.
GAS	: Generalised Audit Software
ERP	: Enterprise Resource Planning
IIA	: Institute of Internal Auditors
ISACA	: Information Systems Audit and Control Association
D	: Driver
E	: Enabler

The findings from the interviews suggest that the intention to continue GAS should not only be based on the confirmation, perceived usefulness and user satisfaction as suggested in ECM theory and UTAT factors of EE, SI, PE, FC. Constructs related to user competency, user characteristics, the role of leadership (CAE), post-implementation and pre-adoption considerations should not be neglected in understanding the drivers and enablers of post-adoption usage of GAS.

5.8 Summary of Chapter

This chapter provided insight into how the interview data was analysed, analyses the emerging ten themes and related constructs, and culminates in the refinement and finalisation of the preliminary conceptual GAS PA CU framework proposed on completion of the literature review, basing it on the data analysis findings.

Findings from participant interviews did not reflect any noticeable differences between perceptions of internal auditors using GAS software based on their different countries or sectors. Observable differences emanated from different SOEs, which meant the specific organisational internal environment, which is characterised by leadership and facilitating conditions, influenced the post-adoption usage and perception of GAS. In addition, the user characteristics also influenced the individual usage adoption and usage of experience of GAS.

The ten (10) emerging themes emanating from the analysis of the interviews were benefits, challenges, pre-adoption factors, perceived usefulness, perceived ease of use, user competency, facilitating conditions, leadership, user characteristics and social influence. Each of the themes had several constructs identified under it, which were analysed further to provide context to the emerging themes. The benefits theme was most referred to by participants during interviews which suggested the significance of GAS benefits in driving the continued use of GAS post-adoption. Facilitating conditions and user characteristics ranked second and third, respectively, in significance in influencing the usage of GAS at post-adoption. Perceived ease of use was the least common of the emerging themes, followed by social influence. A high-level summary of some noteworthy findings is provided next.

Under the theme of the benefits, a hundred per cent (100%) analysis was the frequently mentioned benefit by interview participants, which demonstrated how valuable this benefit was to the internal audit profession. A common challenge of GAS, according to the participants, was that they viewed it to be complex to use and required a steep learning curve. This implied that users needed to invest in the necessary skills and experience to be competent enough to use GAS to achieve valuable and tangible outcomes. The clear objectives construct under the pre-adoption theme was crucial for the future adoption levels and usage of GAS. Clear objectives provide direction and set expectations on both the perceived usefulness and effort expectancy perspective. The researcher found that most participants attributed the low usage and adoption of GAS to the challenge faced by internal auditors of unlearning and letting go of traditional ways. Most of the participants had positively experienced the usefulness of GAS due to the tangible benefits it was providing, and this was despite some of the challenges there were encountering. Continuous monitoring of the performance and usage of GAS post-adoption was identified as a crucial factor to track and take corrective actions to ensure GAS has been used in line with set expectations. It was also noteworthy how the participants illuminated the importance of the role of CAE when it came to the successful adoption and usage of GAS.

To refine and finalise the proposed GAS conceptual framework, the researcher incorporated the user characteristic, leadership (CAE), post-implementation monitoring, and pre-adoption factors as crucial considerations ultimately enabling and driving the continued or discontinued usage of GAS at pre-adoption. The identified concepts from the UTAUT and ECM-IS theoretical frameworks were retained in the model as important considerations for the successful adoption of GAS at post-adoption.

The next and final chapter will summarise the findings from the study, draw conclusions, provide answers to the research questions, and make recommendations based on the data analysed and emerging findings. Ethical considerations and strategies to ensure trustworthiness are depicted.

Chapter 6 – Main Findings, recommendations, and conclusions

The previous chapter provided a detailed description and analysis of the data collected from the interviews. Emerging themes and findings from the data analysis were used to refine the preliminary GAS PA CU framework. This chapter summarises the research journey, objectives, and research questions in the context of the research findings and contributions. The chapter concludes with a summary of the study limitations and recommendations for future studies.

6.1 Thesis Overview

This study sought to assess the post-adoption user experience of GAS, to identify factors that are necessary for its successful adoption and continued usage, and from these findings create a framework for its continued usage. Research participants were internal auditors employed in State-Owned Enterprises in Southern Africa and were users of GAS technology adopted by their organisations. The thesis was systematically structured into six chapters, sequentially arranged from Introduction, Literature Review, Research Methodology, Data Analysis and Interpretation, Refinement of the Preliminary GAS PA CU Conceptual Framework and Main Findings, Recommendations and Conclusions. The chapter summaries are as follow:

Chapter 1 contextualises the significance of the study by providing background to the research problem. GAS technology is defined, and technology adoption concepts are introduced. The research problem, objectives, and questions are formulated, which become the guiding framework for the rest of the study. The theoretical and practical significance of the thesis are illustrated in this chapter.

Chapter 2 presents an in-depth review of literature relevant to the study. In this chapter, key concepts are defined in the context of GAS technology and internal auditing. Previous studies of internal auditing and technology are reviewed to illuminate and discuss knowledge gaps and limitations. Theoretical frameworks on the UTAUT and ECM-IS models are explored in greater detail. Lastly, findings from the review of literature are used to propose a preliminary conceptual framework.

Chapter 3 discusses the qualitative research methodology adopted in this study extensively. The chapter describes the research approach, strategy, target population, sampling technique, and data collection approaches.

Chapter 4 provides a detailed analysis of the participating SOEs and interview participants. Interview participants are profiled in relation to age, gender, qualification level, job level, position, years of experience in internal audit, years using GAS, IT Expertise, and in-depth analysis from the perspective of GAS usage.

Chapter 5 presents an in-depth analysis of participant contributions during the interviews. Ten emerging themes are identified and discussed comprehensively. The chapter concludes with the synthesis of findings that culminate in the refining of the preliminary GAS PA CU conceptual framework developed in Chapter 2.

Chapter 6 provides a review of the thesis, a discussion of the main research findings specific to the research questions, limitations of the study, recommendations for improvement, and suggestions for further research.

6.2 Study Outcomes

This study investigated internal audit GAS users' post-adoption usage behaviour and user experience perceptions, and from these findings, a conceptual framework for its continued usage was proposed. The primary research question driving the study was based on understanding why GAS was underutilised by internal auditors' post-adoption, despite the heightened awareness of the importance and value of audit analytics by the audit profession. Appropriate data collection methods were applied to gather relevant research information. The data was fundamental in determining which factors influence the continued usage of GAS, and, in turn, these informed the development of the conceptual framework proposed in this study.

Findings from participant interviews did not reflect any noticeable differences between perceptions of internal auditors using GAS software based on different countries or SOE sectors. Observable differences emanated from the different SOEs internal organisational environment, which was characterised by leadership and facilitating conditions, which was found to influence the post-adoption usage and perception of

GAS. In addition, the user characteristics also determined the individual usage adoption and usage of experience of GAS.

The review of literature evidenced that prior studies on GAS focused on its initial adoption with little or no attention given to its post-adoption usage, notwithstanding the consensus that technology cannot improve performance if it is not consistently and continuously utilised. This study sought out to fill this gap in the literature by focusing on the post-adoption experience, as opposed to motivational factors driving the initial adoption of GAS. The outcome of the research questions is summarised in the following subsections.

6.2.1 What are the factors driving the continued usage of GAS technology by internal auditors at the post-adoption phase for SOEs in Southern Africa?

The study found the constructs from the UTAUT and ECM-IS theoretical theories relevant as they influenced and determined the continued or discontinued usage of GAS. The constructs of perceived usefulness, satisfaction, confirmation, perceived facilitation conditions, perceived social influence, and effort expectancy adopted from UTAUT and ECM-IS were incorporated into the proposed GAS PA CU conceptual framework.

Emanating from the review of literature and analysis of interview data, several emerging themes were integrated into the proposed conceptual framework as they were found to be significant constructs that needed to be considered as impacting the continued usage of GAS. User competency, user characteristics, leadership, nature of data source, post-implementation monitoring, and pre-adoption constructs were found to be representative of the set of complex factors interacting to enable and drive the adoption and utilisation of GAS. Emanating from the identified themes or constructs were several factors characterising each of the themes, which were described in greater detail at the data analysis phase.

The findings suggest that the perceived usefulness of GAS plays a dominant role in the determination of how satisfied internal auditors are with GAS technology, which was found to be an imperative determinant of the conscious or unconscious decision to continue or discontinue the usage of GAS. This is evidenced in the study by the emerging benefit theme, which was represented by the greatest number of factors, as well as the highest number of interview phrases referenced as relating to the theme. Most of the interview participants had formulated pre-adoption benefit expectations to be derived from GAS usage prior to adoption, which became a benchmark of assessing the perceived usefulness of GAS post-adoption. In this study, the capability of GAS to achieve a hundred per cent (100%) analysis of large data populations was the highest mentioned benefit of GAS, which suggests how important this benefit is in determining the perception of how valuable GAS is. It is also noteworthy that the determination of the usefulness of GAS was not only important from the user's perspective, but other stakeholders' perceptions of GAS had to be considered, such as those from business process owners and executives of other departments.

Pre-adoption factors, such as having clear objectives, a thorough evaluation of GAS tool options and securing user and management buy-in at onset (pre-adoption) of GAS, were found to impact the adoption journey and continued usage of GAS significantly. Clear objectives (the most significant construct under this theme) provide direction and set expectations upon which GAS users evaluate the perceived usefulness of the technology.

Under the leadership construct, the role of the CAE was found to be central to championing the "vision" of GAS within the department and fundamentally driving its successful adoption and utilisation at a strategic level. This entails the CAE exhibiting high levels of commitment and drive to take ownership for the successful adoption and sustainable usage of GAS technology. In addition to providing oversight for the use of GAS, the role of the CAE should include implementation and monitoring of the policy and targets pertaining to GAS usage and achievement. Given the importance of continuous post-implementation monitoring of GAS, it was included in the proposed GAS PA CU conceptual framework as a standalone construct that directly impacts the perceived usefulness, satisfaction, and continued usage decision of GAS. The use of key performance indicator (KPI) metrics to measure and monitor how internal auditors are using GAS tools was recommended as an effective measure to drive higher utilisation of GAS in alignment with the departmental goals.

Although perceived ease of use was found to influence the continued usage of GAS, it was found to have the weakest influence of all the constructs identified in the conceptual model. This signifies that, though it is important to make GAS software much more user friendly, it was unlikely to be a decisive factor for users not to engage with GAS if other constructs are providing adequate support and facilitating conditions. This finding contradicts earlier studies by Shamsuddin *et al.* (2015) and Ahmi (2012), who found EE as a significant factor influencing the usage level of GAS but agrees with an earlier study by Bierstaker *et al.* (2014), which found effort expectancy to have an insignificant impact on actual GAS usage.

Constructs in the preliminary conceptual framework are further categorised as either drivers or enablers of GAS usage. Enablers of GAS technology are factors that make it possible for GAS technology to be adopted and used, whilst drivers encourage and motivate users to adopt and use GAS technology.

The findings from the study are that there are several diverse and complex factors interacting that inform the decision to continue or discontinue the usage of GAS.

6.2.2 What challenges with GAS usage in SOEs have been encountered by internal auditors?

A total of twelve (12) challenges encountered by internal auditors when using GAS was identified from the study. Most of these had been identified in the review of literature from previous GAS studies, except for stakeholder frustration from false positives, resistance by process owners to accept GAS reports, data quality from source systems, and lack of adequate buy-in from the audit leadership and management team.

The most frequently referred to challenges were associated with the perceived difficulty and complexity of using GAS tools. The challenges were identified as a steep learning curve, non-IT auditors struggling with its usage, the need for frequent use to be comfortable to navigate on the platform, and a lack of competency to utilise the software effectively and efficiently. The experience of most GAS users was that it required a great amount of effort and a longer timeframe to get to a point where users can achieve valuable outcomes from the software due to the steep learning curve.

The challenge of insufficient budgets to support the adoption and continued usage of GAS was found to be amongst the top five prevalent challenges affecting the continued usage of GAS in SOEs. The factor of budgets was classified and highlighted in the GAS PA CU conceptual framework under the facilitating conditions construct. This factor is highlighted in the conceptual framework given its significance to inhibit or enable the usage of GAS in an organisation. The significance of the factor is that it can hinder the ongoing usage of the software, even in the event of other factors working in the favour of continued usage of GAS. Without a budget, the internal audit department cannot address the financial element of renewal, maintenance, and support of licenses. The challenge of a steep learning curve and lack of skills by internal auditors to use GAS competently impacts the ROI that can be yielded from GAS, which, in turn, further negatively impacts the securing of continued or additional budget for its maintenance.

The challenges found in the study are summarised in Table 6.1.

Challenges identified from data analysis of participant interviews
1. Steep learning background
2. Complex – suitable for auditors with IT background
3. Require frequent usage (users struggle with grasping/remembering basic concepts)
4. High costs (lack of budgets)
5. Competency challenge
6. Stakeholder frustration from false positives
7. Knowledge of data sources & tables
8. Resistance by process owners to accept analytic results
9. Direct access to data
10. Manual data
11. Data quality from source system
12. Buy in from audit leadership and management

Table 6.1 *Summary of challenges from participant interviews*

6.2.3 What is the extent of internal auditor's confirmation of GAS achievement of performance expectations (expected usefulness vs perceived usefulness)?

According to Oguma *et al.* (2016), the level at which the pre-adoption expectations meet the post-adoption perceived performance will determine the level of satisfaction, with satisfied customers formulating a decision to repurchase or continue usage of the service or product, while dissatisfied customers discontinue subsequent usage. It was on this basis that the researcher gauged the level of satisfaction of participants with GAS and predicted their intention to continue using the tool.

Most of the participants stated that they were having a positive experience with GAS tools and realising tangible value, despite some of the challenges they were encountering in their different internal organisational environments. A typical example given by participants was how difficult and daunting the task of analysing data was prior adoption of GAS and how much time it took them to work on just a sample of the data population. As evidenced by this study, the capability of GAS to achieve a hundred per cent (100%) analysis of large data populations was a common perceived benefit of GAS by users; therefore, users experiencing this benefit perceived GAS to be useful.

Most participants could relate to the helpfulness of GAS in the detection of irregular transactions and identification of inconsistencies in the data, which resulted in internal audit driving the improvement of business processes and accuracy of the data capturing process. As a result of the capability of GAS to read data from other systems, internal auditors found themselves with better insight and visibility into control inefficiencies that their organisational systems had.

Another emerging perspective from the interview participants was that, although GAS was to a larger extent matching their initial expectations, there was an even stronger and higher expectation from users of its greater potential to deliver more value to the internal audit profession. This increased expectation resulted from users' increased awareness, appreciation, and acknowledgement of the larger scope that GAS could be applied to in their environment emanating from the practical experience with using GAS post-adoption. The researcher observed that there was a shift in GAS expectations from pre- to post-adoption. As a consequence of this shift, it was found that users were accepting of the view that they were currently underutilising GAS and were adamant that overcoming challenges, such as that of competency and increased buy-in and support, would enable them to achieve a greater ROI from GAS.

6.2.4 Why are internal auditors slow to adopt or decide not to adopt GAS?

The review of literature found that despite recommendations for internal auditors to adopt technology to remain relevant and add more value, the adoption and usage of GAS by internal auditors was not at the expected rate. Debreceny *et al.* (2005), Janvrin *et al.* (2008), Smidt *et al.* (2014), Mahzan & Lymer (2014), Alles (2015), Coderre (2015), Ahmi *et al.* (2016), Li *et al.* (2018), Al-Hiyari *et al.* (2019), Daoud *et al.* (2021) and other earlier researchers found that GAS acceptance was fairly low.

All the research participants agreed with the findings that internal auditors were slow to adopt GAS, with several of them deciding not to adopt GAS at all. The participants attributed age as a factor that contributed to the slow or non-adoption of GAS technology. They felt that the older generation that was used to traditional ways of auditing was resistant to change mainly due to fear of the unknown and preference to continue auditing in the manner they had been doing for many years. CAE positions were mostly occupied by older internal auditors; therefore, given the importance of the CAE role in driving the adoption of GAS, consequently, their resistance to adopting new technologies would have a larger impact on the adoption levels within the internal audit profession.

Another reason cited by most of the interview participants as an explanation for the low adoption of GAS was related to the cost implication of procuring and maintaining GAS software. The price of the software was viewed as expensive and a significant barrier to the adoption and ongoing use of the software. Several of the participants felt that the cost constraint was the largest reason why some of the organisations had not adopted GAS tools to date.

The fear or discomfort of technology, earlier defined as technophobia, was another accepted reason, according to participants, why GAS adoption and utilisation was not at the expected level, despite internal auditors being educated and aware of its benefits for several years now. Some internal auditors feared that technologies like GAS were a threat to their jobs, hence, the scepticism by some internal auditors to adopt it.

Although all the organisations participating in this study had adopted GAS, it was found that at the individual user level, it was common to find some internal auditors who were not utilising the tool. Most of the interview participants had used GAS for several years, averaging seven (7) years, however, despite the many years using GAS, these participants believed that they underutilised the technology. The lack of adequate skills, the steep learning curve of GAS, and lack of management support were the most common reasons provided for the slow adoption of GAS at an individual user level.

The target population of this study was limited to internal auditors employed in SOEs that had already invested in GAS. Subsequently, the study population did not provide for a large enough sample size and participant population to comprehensively address the question of why internal auditors are slow to adopt GAS technology. Further research in this area is recommended to focus on both adopters and non-adopters of GAS across different sectors to provide further insight into this question.

6.2.5 What is the state of adoption of GAS by internal auditors in SOEs in Southern Africa?

SOEs participating in this study had all adopted GAS for their internal audit departments. It was a common occurrence across the different countries and sectors that the internal auditors who were employed at the target SOEs have been employed at other parastatals that were also using GAS. This suggests that at an organisational level, the adoption of GAS tools across territories was at a moderate level, although at the individual user level, the adoption and utilisation of GAS were found to be low. Further research is also recommended in this area to adequately establish the state of GAS adoption by SOEs in Southern Africa. A larger population of SOEs will need to participate in the study for this to be accurately established.

It was established that at the individual user level, IT auditors within the internal audit units of the SOEs participating in this study, mostly played the “data-analytic champion” role. This role entailed being the technical expert responsible for providing internal support to other internal auditors when it came to the adoption and utilisation of GAS technology. They were, in turn, found to have the greatest usage and higher utilisation of GAS technology when compared to other internal auditors. It was observed that when the "Data-Analytic Champion" role was demarcated clearly in the organisation, internal audit teams tended to benefit more from the use of GAS and the adoption and utilisation tended to be higher.

The GAS tool mostly adopted by SOEs was ACL. It was the tool that was mostly utilised by the internal auditors who participated in the study and represented sixty-seven per cent (67%) of the data analytic tools that were being used by internal auditors to address their data-analytic work. Figure 6.1 summarises the adoption of GAS by type, based on the study population.

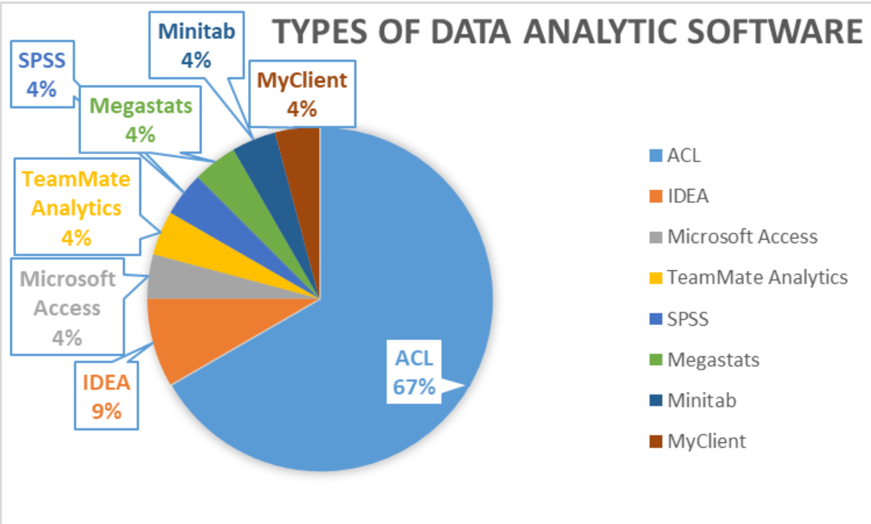


Figure 6.1 *Types of GAS adopted by interview participants*

According to a report by AuditNet (2012), based on a survey done to assess internal auditors' experience with data-analytic software, the most used data-analytic software was ACL. Five hundred and fifty (550) auditors participated in this survey from a cross-section of industry sectors. Fifty-seven per cent (57%) of the auditors used ACL, with IDEA being the second most commonly used data-analytic software at a percentage of twenty-four per cent (24%). This finding is similar to the findings of this study, where most of the participants used ACL and IDEA was the second most used data-analytic software.

Ahmi & Kent (2013) found IDEA to be the most popular type of GAS adopted by external auditors. Lin & Wang (2011) concluded from their study that the GAS software preference was ACL, IDEA, and Focaudit. According to Alali & Pan (2011), the most prominent GAS tools are ACL, IDEA, and Panaudit Plus. ACL and IDEA GAS software were found to be consistently the most used GAS software according to both the review of literature and findings from this study.

6.3 Research relevance of the present study

As evidenced in the literature, many academics have recommended the adoption of GAS technology to the audit profession based on scientific evidence that it will add value to the process of audit. Despite these recommendations, the researcher found that the actual usage of GAS is not at the pace of technological advancements; hence, it is underutilised. According to Alali *et al.* (2011), Bierstaker *et al.* (2014), Mahzan & Lymer (2014), Tsai *et al.* (2015), and Kim *et al.* (2016), audit standards suggest that auditors should use GAS for testing data and evaluating risk. The development of a conceptual framework to support internal auditors to prepare for the effective adoption of GAS and encourage higher utilisation and continued usage of GAS is valuable and relevant to the internal audit profession.

As demonstrated by literature findings, there is a growing expectation and appreciation of the assurance, risk management and governance role of internal auditors globally. Understanding factors that drive continued usage of GAS technology will be valuable to both adopters and non-adopters of GAS from internal audit units, which should assist in making future informed decisions. Therefore, this study provides relevant and valuable information to software developers, consultants and the related professional bodies who seek to foster an improved environment for the continued use of GAS to improve the effectiveness and efficiency of the internal auditor's assurance role.

The review of literature evidenced the lack of knowledge of GAS adoption and utilisation in developing economies, such as in Africa. The focus of this study was developing countries in Southern Africa, targeting the SOE sector. The researcher did not come across any such GAS studies focused on this area. The significance of this study is that it provides new knowledge in the focus area, providing insight into how GAS technology is being adopted and utilised in the developing countries of focus. The findings across the three developing countries from where target participants for the interviews were nominated indicate findings from this study and the proposed conceptual framework can be generalised across developing economies, as no significant differences were found from the GAS user experience, driven by the different county economies and specific SOE sector. Future study to establish the applicability of the proposed conceptual framework across different sectors and economies is recommended.

As per Daoud *et al.* (2021), “IT has deeply permeated business organisations and has become an important component of conducting business. At present, it is considered as a decisive factor that determines the success of business organisations.” According to Zain & Hussin (2019), whilst initial acceptance of an IS is an important step towards the success of IS, the ultimate viability of IS pivot on its continuing use. It was found that existing literature on IT adoption has largely focused on the initial adoption decision of IT with lesser attention to the post-adoption decision in relation to continued or discontinued usage of IT. This study makes both practical and theoretical contributions to the field of post-adoption in technology, as well as extending the UTAUT theoretical framework to incorporate the ECM-IS Theory for an increased focus on post-adoption of technology.

The learning points from this thesis are expected to enrich future discussions by internal audit professionals, software developers, vendors, standards setters, academicians, and researchers to ensure GAS provides tangible value to the profession.

6.4 Researcher’s Self-Assessment of the Study Journey

The researcher is an experienced business development professional who has worked in the governance, risk, audit, and compliance professional space for over ten (10) years. Over the years they have developed a passion for software technology adoption and usage, especially for GAS, which is the focus of this thesis. It is this passion, that led the researcher to embark on the PhD journey, with a keen interest to positively contribute to the body of knowledge on technology adoption. This passion impacted significantly towards keeping the researcher motivated and focused throughout the research journey, as the expected outcomes and contribution of the study were of great value and meaning to the researcher.

The research topic was changed three times during the period of the study, as both the researcher and supervisor navigated literature, to focus the study to align to the gap in knowledge, where they believed the study would provide the greatest impact.

Initial thinking of the study was focused on technology adoption, which later transformed to post-adoption, largely driven by the literature review process and numerous brain storming sessions between the supervisor and the researcher.

The study journey timespan was extended by the impacts of the Covid-19 pandemic which the researcher had not foreseen during the research planning phase. The greatest impact was on the data collection phase, especially during the period of total global lockdown on travelling. Initially data collection was planned to be executed through onsite face to face interviews. Nonetheless, leveraging off technology for remote video conferencing addressed this challenge. However, it still took some time for research participants to adopt to the use of these technologies which impacted the data collection process.

The qualitative approach to the study aligned well with the researcher's personal strengths of interpersonal skills and the ability to build trust and rapport. This enabled participants to be comfortable to share their personal GAS experiences, views, and perceptions with the researcher. The researcher enjoyed the opportunity to directly engage with research participants during interviews.

Two of the greatest learnings accomplished by the researcher as a result of doing this PhD, was increased critical thinking skills, as well as learning to have an open mind to embrace positive criticism and constructive feedback. The researcher learnt how to approach problems systematically, identify relationships between ideas, determine new themes to analyse information, and draw conclusions. The numerous platforms to present and defend one's work to the supervisor and other academics provided an opportunity to improve one's work, particularly through considering new ideas and recommendations.

6.5 Suggestions for future research

This study was confined to internal auditors working in SOEs in Southern Africa that had adopted GAS technology. Future research may be done with the same objectives, but on a larger scale, to include more internal auditors in organisations represented by different sectors and a wider geographic representation across Africa. Further studies can also include internal audit departments that have not yet adopted GAS technology to get a more comprehensive view of the reasons and concerns behind the non-adoption of GAS technology and establish the level of GAS adoption in Africa more precisely. Expansion of the study to other sectors and developing economies in Africa will enhance the generalisability of the conceptual framework to a larger audience of internal auditors.

Additional research is suggested with respect to enhancing and validating the proposed GAS PA CU conceptual framework. This study relied largely on the qualitative methodology of data collection with a limited amount of quantitative methodology used to understand the characteristics of participants. More quantitative methodology of data collection methods should be undertaken in future research to provide a wider perspective to the present study. A quantitative research approach would be suitable for validating the predictive potential of the framework and its reliability when applied to attain the effective and sustainable continued usage and utilisation of GAS post-adoption.

The researcher found that the participant feedback on the effectiveness of GAS training was at times inconsistent and, therefore, recommends further research to critically analyse training participants' feedback during and post GAS training to identify areas of improvement and make it more impactful and effective for higher adoption of GAS tools. Further research to understand and provide further insight into this area will be valuable.

Given the nature of the study, which was a research study for a PhD, a cross-sectional approach was adopted as the most feasible; therefore, the study focused on a snapshot of a single point in time. Understanding the complex phenomenon of post-adoption may require a lengthier period to closely examine and appreciate the transition of usage of GAS from the point of adoption to the actual usage and utilisation in the work environment. Future longitudinal studies in this area are recommended to track a sample of internal auditors who have adopted GAS over a longer-term period to gather more insight into the usage and utilisation of GAS as it matures or deteriorates over time and the constructs influencing this progression. It is possible that the constructs under investigation can fluctuate over time, depending on factors, such as experience, age, training, change in technology, etc.

6.6 Recommendations

Several recommendations that organisations need to consider for the successful adoption and continued usage of GAS were made by interview participants. The researcher views these recommendations as practical and align with the proposed conceptual framework. The recommendations are summarised below and ranked according to the most identified or referred to, to the least:

1. GAS should be implemented to achieve continuous auditing and monitoring to attain the greatest value. The continuous monitoring aspect indicates that GAS tools can be adopted at an enterprise level, not only to address internal audit's requirements but also to monitor business processes that concern other stakeholders.
2. It will be instrumental for internal audit units to appoint "Data-Analytic Champions" to drive and support the technical aspect of adoption and usage of GAS.
3. Internal audit departments must endeavour to demonstrate tangible value obtained from the use of GAS at every opportunity. This is important to get buy-in from other stakeholders and GAS users and appreciate the return of investment derived from the GAS investment.
4. GAS developers and vendors ought to invest in making the software more user friendly to accommodate the non-technical internal auditors. This recommendation came from most interview participants having the perception that GAS tools are complex to use and have a steep learning curve.
5. GAS service providers should strive to provide online GAS training, which is usually readily available around the clock, cost-effective and convenient, to enable internal auditors to afford and access frequent training to support the usage of GAS. This recommendation comes on the back of most of the interview participants raising concern over the lack of adequate and frequent training to get them to an acceptable level of competency to be comfortable to utilise GAS effectively.
6. GAS developers must consider incorporating machine learning into the capabilities of GAS to enhance its functionality and value addition. Machine learning will enable GAS to perform intelligent analytics through learning

patterns from the historic analysis without being programmed every step of the way. This capability will broaden the scope of analysis provided by GAS. According to Lippolt & Kozina (2020), "machine learning algorithms can be very helpful to identify hidden patterns and abnormal observations in the data and therefore the riskiest elements in a given audit area, increasing efficiency, effectiveness and overall risk coverage in the Internal Audit process."

7. GAS service providers should explore the provision of licenses to academic institutions providing an internal audit curriculum to facilitate the transferring of GAS skills and competency at the tertiary education level to support the internal audit profession. Such an initiative will facilitate the adoption of GAS by internal auditors from the onset of their professional career, as they will already have the know-how to utilise the technology.
8. Key performance indicators (KPIs) must be formulated by CAE to manage and monitor the adoption of GAS towards individual performance and quality of the internal audit function. "What gets measured, gets done!" is a favourite saying in many management textbooks and is the underlying theme of this recommendation.
9. Considerations should be given by organisations to adopt GAS for a wider scope of user cases across multiple departments in addition to the internal audit unit. Examples of departments that can benefit from GAS are compliance, risk, IT, revenue assurance, etc.
10. GAS service providers should include big data capabilities to GAS functionalities to incorporate analysis of external structured data as part of the assurance process. Today's business technological environment is increasingly being characterised by data that contains greater variety, larger volumes and is generated with more velocity. Organisational data and systems are increasingly integrated with the cloud, the Internet of Things, and external data sources, such as social media.

In addition to the recommendations listed above, the researcher makes the following additional recommendations from work experience and reviewed literature:

1. Findings from the study suggest that for the SOEs that had the "Data-Analytic Champion" role clearly defined, those internal audit teams tended to benefit

more from the use of GAS and the adoption and utilisation tended to be higher. The role of the Data Analyst Champions was to be technically competent to develop tests or scripts that the rest of the team could leverage off and play the first line support role for the other team members within the organisation. Based on this finding, it is recommended internal audit departments must identify and appoint a competent Data-Analytic Champion to drive and support the adoption and utilisation of GAS.

2. The researcher found that the feedback on the effectiveness of GAS training was inconsistent and would recommend service providers to critically analyse training participants' feedback during and post the training to identify areas of improvement to make it more impactful and effective for higher adoption of GAS tools. Further research to understand and provide further insight into this area will be valuable.

6.7 Conclusion

In the light of the increased focus on IT systems to achieve organisational objectives, the accelerated volume of information flow, the increased prominence of the role of internal auditors as enablers of business performance, and the low adoption of GAS by internal auditors, this study set out to explore and identify the factors driving the continued usage of GAS by internal auditors' post-adoption in SOEs in a Southern African context. The primary objective of this study was to develop a conceptual framework for the continued usage of GAS based on the findings and learnings of post-adoption usage behaviour and user perceptions of internal auditors. The focus of this study shifts from the prevalent research area of understanding the motivation and behavioural intentions of GAS adoption to the actual usage of GAS by adopters.

The SOE sector is studied because it plays a significant role in developing critical economic infrastructure, managing state assets, creating equality, and supporting economic growth for the benefit of society. According to Sultan Balbuena (2014), SOEs are at the centre of most of Southern Africa's economies' national development strategies. Despite this critical role, SOEs have been associated with inefficiencies, incompetence, and rampant corruption. With the increasing expectation for SOEs to adopt better governance standards, they stand to benefit from effective internal audit departments leveraging off automation from tools like GAS to deliver better assurance.

The study was completed with a substantial degree of success as greater insight into user adoption and usage of GAS post-adoption was identified and was adequate to enable the development of the proposed GAS PA CU conceptual framework. The researcher also believes that the research questions were answered to a larger extent, with future research suggested to address the identified gaps in knowledge.

The developed conceptual framework provides insight into the factors at play that influence the continued usage of GAS post-adoption. The GAS PA CU conceptual framework will be valuable to both adopters and non-adopters of GAS from internal audit units, which should assist in the future to make informed decisions. It is expected that the conceptual framework will provide valuable information to software developers, consultants, and the related professional bodies to drive and support the increased adoption and utilisation of GAS, which was confirmed from both the literature review and interview analysis to be below expected levels of adoption.

This study is focused on internal auditors working for SOEs based in Southern Africa. The potential limitation is the generalisability of findings and the proposed model to other sectors as well as other geographical settings outside Southern Africa. None of the participants were selected from South Africa, which is a large economic player in the Southern African region, and this was identified as a shortcoming of the study. The replication of the study at different sectors and geographical locations would enable better generalisability of the findings of the study. However, the researcher did not observe any significant differences from the interview participant's GAS experiences, which could be attributed to the differences in countries or the SOE sector.

In conclusion, the findings from the study suggest that factors for the continued usage of GAS should not only be based on the confirmation, perceived usefulness and user satisfaction as suggested in ECM theory and UTAT factors of EE, SI, PE, FC. Constructs related to user competency, user characteristics, the role of leadership (CAE), post-implementation and pre-adoption considerations should not be neglected in understanding the drivers and enablers of post-adoption usage of GAS. Perceived usefulness of GAS was identified as having a significant influence on the level of satisfaction that internal auditors have with GAS technology. In turn, this satisfaction level influenced the decision to continue or discontinue usage of GAS. The perception of how useful GAS is, was not only crucial from the user's perspective, but also influenced how other stakeholders such as business process owners and executives of other departments supported the continued usage of GAS.

The role of the CAE, which characterised the leadership construct, was found to play a pivotal role in crafting and implementation of the GAS "vision" within the internal audit department. The CAE's role is therefore instrumental to the successful adoption and continued usage of GAS. The conceptual framework recommends the CAE to implement key performance indicator (KPI) metrics to measure and monitor how internal auditors are using GAS tools. This was found to be an effective measure to drive higher utilisation of GAS in alignment with the departmental goals. Another top challenge that was identified was insufficient budget allocations to support the adoption and continued usage of GAS. Lack of budget compromised user training, acquisition, and maintenance of adequate GAS user licenses for internal audit team members. Insufficient budget was highlighted as an inhibitor to post-adoption usage of GAS in the conceptual framework.

Future research was recommended to focus on internal audit departments that have not yet adopted GAS technology to get their views, perspectives and concerns resulting in the non-adoption of GAS technology. Additional research is also suggested to validate the proposed GAS PA CU conceptual framework by adopting a quantitative approach. This will enable follow up work to implement the conceptual framework in an actual internal audit environment for further testing.

Recommendations were made for organisations to consider achieving increased utilisation and continued usage of GAS. The recommendations that were proposed to likely provide the greatest value was the adoption of GAS for continuous auditing and monitoring, as well as the appointment of "Data-Analytic Champions" within internal audit teams to drive and support the technical aspect of adoption and usage of GAS.

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Annexure A: Interview Guide

MK CHIHANDE - INTERVIEW SCHEDULE

A POST-ADOPTION FRAMEWORK FOR CONTINUED USE OF GENERALISED AUDIT SOFTWARE IN SOUTHERN AFRICAN SOEs

The Interview schedule is divided into two sections, namely Section A (background information) and Section B (open ended interview questions). The expected length of the interview will be 40 minutes and the interview will be recorded.

SECTION A: BACKGROUND INFORMATION

NAME AND SURNAME	
ORGANISATION	
POSITION	
GENDER	
AGE	
EDUCATIONAL LEVEL & QUALIFICATION	
JOB LEVEL	
YEARS OF EXPERIENCE AS AN INTERNAL AUDITOR	
YEARS USING GENERALISED AUDIT SOFTWARE	
USE OF AUDIT SOFTWARE IN OTHER ORGANISATION OF EMPLOYMENT	
NAME OF GENERALISED AUDIT SOFTWARE USED	
UNDERTAKEN ANY FORMAL GENERALISED AUDIT SOFTWARE TRAINING	
IT EXPERTISE (Basic/Intermediate/Expert)	

SECTION B: INTERVIEW QUESTIONS

1. What is your perception on Generalised Audit Software?
2. What has been your experience using Generalised Audit Software?
3. What benefits, if any, have you derived since adoption of Generalised Audit Software - how has it impacted the effectiveness and efficiency of your role and output of your work?
4. What challenges have you encountered using Generalised Audit Software?
    a. What steps if any have you taken to address these challenges?
        i. Did this yield any results?

5. To what extend has the use of Generalised Audit Software impacted how your peers, colleagues or management view you and the output of your work?

    a. To what extend has it impacted how they also work and their views on Generalised Audit Software?

    b. Explain how other stakeholders (e.g. IT, CAE, Process Owners, Management etc) who you need to interact with in order to optimally use GAS cooperate and support you?

6. To what extend has the use of Generalised Audit Software lived up to your initial pre-adoption expectation?

7. In your view what are the critical success factors and skills that ensure Generalised Audit Software is optimally used?

8. Previous studies have found that internal auditors are slow to adopt or decide not to adopt GAS. What is your view on this statement?

9. Do you intend to continue using GAS in the foreseeable future?

    a. Explain your reason for the above.

10. What would be your recommendation to other users who intend to invest in the usage of GAS?

11. Would you like to add anything further to this discussion?

Annexure B: Ethics Clearance Certificate

Graduate School of Business Leadership, University of South Africa, PO Box 392, Unisa, 0003, South Africa
Cnr Janadel and Alexandra Avenues, Midrand, 1685, Tel: +27 11 652 0000, Fax: +27 11 652 0299
E-mail: sbl@unisa.ac.za Website: www.unisa.ac.za/sbl

SCHOOL OF BUSINESS LEADERSHIP
RESEARCH ETHICS REVIEW COMMITTEE (GSBL CRERC)

13 September 2019

Ref #: 2019_SBL_DBL_016_FA
Name of applicant: Mr MK Chihande
Student #: 79307973

Dear Mr Chihande

Decision: Ethics Approval

Student: Mr MK Chihande, 79307973@mylife.unisa.ac.za, 083 981 6649

Supervisor: Prof JA Van der Poll, vdpolja@unisa.ac.za, 011 652 0316

Project Title: A post-adoption framework for continued use of generalised audit software in Southern African SOEs

Qualification: Doctorate in Business Leadership (DBL)

Expiry Date: August 2023

Thank you for applying for research ethics clearance, SBL Research Ethics Review Committee reviewed your application in compliance with the Unisa Policy on Research Ethics.

Outcome of the SBL Research Committee:
Approval is granted for the duration of the Project

The application was reviewed in compliance with the Unisa Policy on Research Ethics by the SBL Research Ethics Review Committee on the 05/09/2019.

The proposed research may now commence with the proviso that:

1) The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2) Any adverse circumstance arising in the undertaking of the research project that is

45 years Building leaders who go beyond

SBL GRADUATE SCHOOL OF BUSINESS LEADERSHIP UNISA

Annexure C: Informed consent letter

Graduate School of Business Leadership, University of South Africa PO Box 392 Unisa 0003 South Africa
Cnr Smuts and First Avenue Midrand 1685 Tel: +27 11 652 0000 Fax: +27 11 652 0299
Email: sbl@unisa.ac.za Website: www.sblunisa.ac.za

Informed consent for participation in an academic research project

A POST-ADOPTION FRAMEWORK FOR CONTINUED USE OF GENERALISED AUDIT SOFTWARE IN SOUTHERN AFRICAN SOEs

Dear Respondent

You are herewith invited to participate in an academic research study conducted by Michael Chihande, a student in the Doctor of Business Leadership at UNISA's Graduate School of Business Leadership (SBL).

The purpose of this study is to assess the post-adoption internal auditor's user experience of Generalised Audit Software (GAS) to identify factors that are crucial for its successful adoption and continued usage, and from the findings create a conceptual framework for its ongoing usage.

All your answers will be treated as confidential, and you will not be identified in any of the research reports emanating from this research.

Your participation in this study is very important to us. You may however choose not to participate and you may also withdraw from the study at any time without any negative consequences.

If you agree to participate, you will be interviewed by myself for approximately forty-five minutes. The focus of the interview is to get your perceptions, personal views and experiences using GAS technology.

The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings on request.

Please contact my supervisor, Professor John Andrew Van Der Poll on vdpolja@unisa.ac.za and +27 11 652 0316 if you have any questions or comments regarding the study. Please sign below to indicate your willingness to participate in the study.

Yours sincerely

Michael Chihande
UNISA DBL Student No. 79307973

I, [REPONDENT NAME], herewith give my consent to participate in the study. I have read the letter and understand my rights with regard to participating in the research.

Respondent's signature **Date**

First in Leadership Education in Africa

Annexure D: Participant Information Sheet

Graduate School of Business Leadership, University of South Africa PO Box 392 Unisa 0003 South Africa
Cnr Janadel & Alexandra Avenue Midrand 1685 Tel: +27 11 652 0000 Fax: +27 11 652 0299
Email: sbl@unisa.ac.za Website: www.sblunisa.ac.za

PARTICIPANT INFORMATION SHEET

29 June 2019

Title: **A POST-ADOPTION FRAMEWORK FOR CONTINUED USE OF GENERALISED AUDIT SOFTWARE IN SOUTHERN AFRICAN SOEs**

Dear Prospective Participant

Student research project

My name is Michael Chihande doing a Doctor of Business Leadership (DBL) degree at the University of South Africa's School of Business Leadership. I am doing research with my supervisor Professor John Andrew Van Der Poll, who is a Professor in ICT Management. I am a student at this university with my student number as 79307973. We are inviting you to participate in a study entitled, "A post-adoption framework for continued use of Generalised Audit Software in Southern African SOE".

WHAT IS THE AIM/PURPOSE OF THE STUDY?

The aim of the study is to assess the post-adoption internal auditor's user experience of Generalised Audit Software (GAS) to identify factors that are crucial for its successful adoption and continued usage, and from the findings create a conceptual framework for its ongoing usage. Generalised Audit Software refers to data analytic software used by internal auditors to analyse transactional data.

WHY AM I BEING INVITED TO PARTICIPATE?

As an internal auditor working for a state-owned enterprise your participation to this study will be very valuable. Your experiences and perceptions towards GAS technology will assist in better understanding the usage of GAS technology.

First in Leadership Education in Africa

Graduate School of Business Leadership, University of South Africa PO Box 392 Unisa 0003 South Africa
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Email: sbl@unisa.ac.za Website: www.sblunisa.ac.za

I have been granted permission by to conduct this study at your organisation. I have received your details from the Head of Internal Audit department (CAE) to receive your consent to participate in the study. An estimated fifteen (15) people will participate through interviews for this study.

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY /WHAT DOES THE RESEARCH INVOLVE?

If you agree to participate, you will be interviewed by myself for approximately forty five minutes. The focus of the interview is to get your perceptions, personal views and experiences using GAS technology.

The interview can be conducted either face to face or through web conferencing means, which ever means you prefer and is comfortable for you. The interview will be audio recorded.

CAN I WITHDRAW FROM THIS STUDY?

Being in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

The benefits of this study is to provide internal auditors with insight into how to leverage off data analytic technology to remain relevant in providing assurance and safeguarding organisations from inefficiencies and fraud. While GAS holds the promise to improve audit effectiveness and efficiency in this increasingly digitalised world characterised by large volumes of transactional data, studies have found that the audit profession is either slow to adopt GAS technologies or infrequently use GAS once adopted. The conceptual framework that will be developed from this study is meant to serve as a best practice framework to guide internal auditors to derive a higher return from their GAS investment.

WHAT IS THE ANTICIPATED INCONVENIENCE OF TAKING PART IN THIS STUDY?

Besides allocating the time to participate in the interview there in no expected or inconvenience above everyday norm that you will experience from participating in this study.

WILL WHAT I SAY BE KEPT CONFIDENTIAL?

The researcher will ensure confidentiality and anonymity of the respondents and your organisation. The name of your organisation and the participants will not be identified in any reports and publication. Your answers will be given a pseudonym and you will be referred to in this way in the data, any publications, or other research reporting methods such as conference proceedings.

Your answers may be reviewed by people responsible for making sure that research is done properly, including a transcriber, external coder, and members of the Research Ethics Committee. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

HOW WILL INFORMATION BE STORED AND ULTIMATELY DESTROYED?

Audio recordings of the interview will be stored on a computer and backed up on a hard drive by the researcher for a period of 5 years in a locked cupboard for future research at the researchers place of residence. Access to the computer and the hard drive will be password protected. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. After the 5 year period the information will be permanently deleted from both devices.

WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?

There will be no payment, gifts, rewards or any other incentives for your participation.

HAS THE STUDY RECEIVED ETHICAL APPROVAL?

This study has received written approval from the Research Ethics Committee of the College of Economic and Management Sciences, Unisa. A copy of the approval letter can be obtained from the researcher if you so wish.

HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS?

If you would like to be informed of the final research findings, please contact Michael Chihande on +27 83 981 6649 or 79307973@mylife.unisa.ac.za . The findings are accessible for 5 years from the date of this letter. Please do not use home telephone numbers. Departmental and/or mobile phone numbers are acceptable.

Should you require any further information or want to contact the researcher about any aspect of this study, you can contact me on the above provided contact details. Should you have concerns about the way in which the research has been conducted, you may contact my supervisor Professor John Andrew Van Der Poll on vdpolja@unisa.ac.za and +27 11 652 0316.

Thank you for taking time to read this information sheet and for participating in this study.

Thank you.

Michael Chihande

UNISA DBL Student No. 79307973

Annexure E: Researcher's Profile

Michael Kudakwashe Chihande Profile

Location: Johannesburg, South Africa

Telephone: +27 83 981 6649

Email: mikkechihande@gmail.com

PROFESSIONAL PROFILE

I am an experienced business development, account and partner management professional who has successfully grown business across Africa. For the last ten (10) years of my career, my focus field has been driving software sales and account retention, for governance, risk, audit, and compliance professionals across the Southern African region. I have developed a passion for software technology adoption and usage, especially for generalised audit software (GAS), which is currently the focus of my PhD thesis. I am also an ACL Certified Data Analyst (ACDA), which is a certification for a type of GAS.

I have delivered multiple presentations at Institute of Internal Auditor's conferences across Southern Africa (Botswana, Zambia, Malawi, Zimbabwe), with a focus on internal audit software and how it impacts the efficiency and effectiveness of internal audit's role. I am a holder of a Master's degree in Business Leadership (MBL) with over seventeen (17) years of working experience within the corporate space. The focus of my thesis at Master's level was on post-adoption of cloud computing technology. I am motivated by my drive for success and excellence.

PUBLICATIONS

- Published a conference paper at the 2017 Conference on Information Communication Technology and Society (ICTAS) on "Post cloud computing implementation benefits and challenges realised for a south African technology company". - http://ieeexplore.ieee.org/abstract/document/7920661/

EDUCATION & QUALIFICATIONS

1. **Doctorate in Business Leadership (DBL)**

UNISA Graduate School of Business Leadership (*Current Study – expected completion 2021*)

Thesis Title – Post-adoption Framework for continued use of generalised audit software in Southern African SOEs.

2. **Master of Business Leadership (MBL)**

UNISA Graduate School of Business Leadership (2013-2015)

Thesis Title – Post cloud computing implementation benefits and challenges realised for a South African technology company.

3. **Honors degree in Business Studies majoring in Marketing**

University of Zimbabwe (2000-2004)

SAQA EVALUATED – NQF Level 7

4. **High School Education - Advanced Level and Ordinary Level**

University of Cambridge Examination Syndicate

5. **ACL Certified Data Analyst**

ACL Services Limited - 2014

CAREER SUMMARY

1. **CQS GRC Solutions (SOUTH AFRICA) (Jan 2011 to current)**
   Business Development Manager: Southern Africa
2. **OMNICOR (SOUTH AFRICA) (Jan 2009 to December 2010)**
   Senior Business Development Consultant
3. **GLOBAL PROSPECTUS (SOUTH AFRICA) (July 2007 – Dec 2008)**
   Sales and Marketing Executive (Team Leader)
4. **TRUWORTHS (January 2005 – May 2007)**
   Branch Manager (Flagship branch Topics)
5. **CFI HOLDINGS – CFI RETAIL (January 2004 – December 2004)**
   Graduate Trainee Business Administration
6. **LINTAS ADVERTISING (January 2002 – December 2002)**
   Account Executive

Annexure F: Turnitin Report

Final Thesis - Michael Chihande - 13 December 2021

ORIGINALITY REPORT

20%	17%	8%	9%
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Annexure G: Certificate of Editing

Certificate of Editing

This is to certify that the dissertation

POST-ADOPTION FRAMEWORK FOR CONTINUED USE OF GENERALISED AUDIT SOFTWARE IN SOUTHERN AFRICAN SOEs

by

MICHAEL KUDAKWASHE CHIHANDE

has been proofread and edited for English language usage.

Date: 28 November 2021

LHugo

Lianne Hugo

Language Practitioner
B.A. (HMS)
PGCE

Email: liannehugo79@gmail.com