

## The application of analytical procedures in the audit process: A South African perspective

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### ABSTRACT

The application of analytical procedures has become an integral part of the audit process. It has the ability to increase audit quality and is an effective and efficient manner of gathering audit evidence. Indications are that the application of these procedures will increase in audits of the future. Numerous studies have been conducted in various countries to determine the auditor's application of analytical procedures in the audit process. However, little is known about how auditors in South Africa apply analytical procedures as part of their audit process. The objective of this study was to investigate the application of analytical procedures in the audit process by South African auditors. A qualitative research approach was selected, utilising three units of analysis, and data was collected through interviews with senior audit managers at large audit firms in South Africa. The findings of the study revealed that auditors in South Africa do perceive that analytical procedures add value to the audit and that their use enhances audit efficiency and effectiveness. Auditors in South Africa apply analytical procedures in all phases of the audit process. Factors were identified that have an effect on the use of analytical procedures: the business risk methodology; accelerating advancements in technology, and the growing use of non-financial information to assess the reasonableness of financial data.

**Key words:** analytical procedures, audit process, business risk methodology, technology, non-financial information, South Africa

### Introduction

“The auditing field is at a critical juncture” (Lombardi, Bloch & Vasarhelyi 2014: 21). The global financial crises and corporate failures raise questions about the value

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added by audits, the trust that can be placed in auditors, the relevance of audits in the current business environment and the quality of audits (Holm & Zaman 2012: 51; Francis 2011: 127; European Commission 2010: 3). Advances in information technology (IT) have led to the automation of business processes (Omoteso 2013: 1) and have enabled businesses to operate without having to acknowledge geographic boundaries. In addition, IT has increased the availability and accuracy of financial and non-financial information, benefitting investors with timely and reliable information for business decisions (Kuenkaikaew & Vasarhelyi 2013: 39). The aforementioned developments pose a threat to the viability of the traditional audit function that only provides assurance on financial statements, as investors now have access to real time information, which has led to a decline in the importance of financial statements to investors (Lombardi et al. 2014: 22; Chan & Vasarhelyi 2011: 153). If the auditing function is to remain relevant, audit methodologies need to change so that the auditor can obtain deeper and more pertinent insights into the client's financial position and operations (Liddy 2014: 1). The application of analytical procedures is one method available to auditors that can afford them deeper insights into the client's organisation (Bell, Peecher & Solomon 2005: 13), thus enabling them to add value to the client's business (Khalifa, Sharma, Humphrey & Robson 2007: 833) and to improve audit quality (Houck 2003: 69). The competitive nature of the audit market is placing auditors under pressure to perform audits more efficiently and effectively in order to reduce audit fees (Curtis & Turley 2007: 445; Suddaby, Cooper & Greenwood 2007: 340), and the considered application of analytical procedures could assist auditors to achieve this goal (Trompeter & Wright 2010: 684; Lin & Fraser 2003: 153; Cho & Lew 2000: 435).

Numerous studies have been conducted in various countries to understand the extent and nature of the auditor's application of analytical procedures in the audit process. These studies have reported on the ways in which analytical procedures are used by auditors, and the factors influencing such application (Abidin & Baabbab 2015; Pinho 2014; Samaha & Hegazy 2010; Trompeter & Wright 2010; Lin & Fraser 2003; Cho & Lew 2000; Mulligan & Inkster 1999; Smith, Psaros & Holmes 1999; Mahathevan 1997; Hirst & Koonce 1996). Some studies have shown that increasing the use of analytical procedures enhances the efficiency and effectiveness of an audit (Trompeter & Wright 2010: 684; Lin & Fraser 2003: 153; Cho & Lew 2000: 435). However, in South Africa little is known about why or how auditors apply analytical procedures as part of their audit processes.

This study therefore aims to address the aforementioned gap by providing a South African perspective. It reports on the application of analytical procedures by South African auditors. By using a qualitative approach, this study investigates why and

how South African auditors at the high end of the audit landscape apply analytical procedures. The study contributes to the existing body of knowledge by not only providing a perspective of why and how South African auditors apply analytical procedures, but it also places these perspectives in the context of the global practices reported in the literature.

The remainder of the article is structured as follows: in the next section, the literature review is presented. This is followed by a discussion of the research methodology and the selection of the units for analysis. Thereafter, the findings of the study regarding the application of analytical procedures are presented, and these South African audit practices are discussed within the context provided by studies performed in other countries. The article's concluding section addresses the limitations of the study and makes suggestions for further research.

## Literature review

Analytical procedures are defined as "... evaluations of financial information through analysis of plausible relationships among both financial and non-financial data" (International Auditing and Assurance Standards Board (IAASB) 2016b: ISA 520 par. 4). The performance of an analytical procedure consists of two parts: firstly, it is a consideration of comparisons and relationships in order to create an expectation; and secondly, it is an investigation of any identified fluctuations or inconsistencies (IAASB 2016b: ISA 520 par. 5; Pinho 2014: 27). The more precise the expectation is, the more assurance can be obtained from the results of analytical procedures (Messier, Simon & Smith 2013: 147).

The research conducted by Hirst and Koonce (1996) was the first study to provide descriptive findings of audit practices relating to the use of analytical procedures (Messier et al. 2013: 147; Trompeter & Wright 2010: 672). This seminal study has served as the benchmark for subsequent researchers, practitioners, standard setters and educators (Trompeter & Wright 2010: 672). Many studies have been conducted subsequently, examining the auditor's application of analytical procedures in the audit process. Studies have been conducted in the United States of America (USA) (Trompeter & Wright 2010), Egypt (Samaha & Hegazy 2010), the United Kingdom (UK) (Mulligan & Inkster 1999), Canada (Lin & Fraser 2003), Singapore (Mahathevan 1997), Hong Kong (Cho & Lew 2000), Australia (Smith et al. 1999), and more recently in Portugal (Pinho 2014) and Yemen (Abidin & Baabbad 2015). Little is known, however, of how auditors in South Africa apply analytical procedures in the audit process – a gap that this study attempts to fill.

Table 1 provides a summary of key studies on the application of analytical procedures. It shows the year and country in which the study was conducted, and includes the objectives of each study, the data collection method used, and a description of the participants/respondents in the studies. The findings of these studies are referred to in the remainder of this article.

**Table 1:** Previous studies on the application of analytical procedures

<b>Study</b>	<b>Country</b>	<b>Objective</b>	<b>Method</b>	<b>Participants/ respondents</b>
Abidin & Baabbad (2015)	Yemen	To investigate the extent to which Yemeni auditors use analytical procedures	Questionnaire survey	External auditors with offices in Yemen (Sanaa, Aden, Ta'izz and Al Mukalla)
Pinho (2014)	Portugal	To evaluate the extent to which analytical procedures are used during a financial audit engagement in Portugal, throughout the different phases involved in auditing	Questionnaire survey	Working auditors in Portugal
Samaha & Hegazy (2010)	Egypt	To examine differences in the auditors' perceptions of the use of analytical procedures in audit engagements across all types of firms and experience levels, and the particular techniques used	Questionnaire survey	Audit partners, managers and seniors from Big 4 and non-Big 4 audit firms in Egypt
Trompeter & Wright (2010)	USA	To investigate how the use of analytical procedures has changed in recent years in response to significant drivers and enablers in the audit environment	Interviews	Audit partners, managers and seniors from Big 4 audit firms in the USA
Lin & Fraser (2003)	Canada	To understand Canadian audit practice in the area of analytical procedures, as well as the role of auditing standards in an analytical procedures context	Questionnaire survey	Audit partners, managers and seniors from Canadian accounting firms of different sizes

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Cho & Lew (2000)	Hong Kong	To provide insight into analytical review applications among big accounting firms in Hong Kong	Questionnaire survey	Partners, managers, seniors, audit intermediates and juniors from seven big audit firms in Hong Kong
Mulligan & Inkster (1999)	UK	To investigate the usage of analytical procedures by auditors in the UK	Questionnaire survey	Audit partners from Big 6, and large, medium and small audit firms
Smith et al. (1999)	Australia	To provide evidence on the use and perceived usefulness of analytical procedures by auditors in Australia	Questionnaire survey	Experienced auditors from Big 6 and non-Big 6 audit firms in Australia
Mahathevan (1997)	Singapore	To examine Singapore-based auditors' use and perceptions of analytical procedures	Questionnaire survey	Audit partners, managers, seniors from Big 6 and non-Big 6 audit firms in Singapore
Hirst & Koonce (1996)	USA	To describe how auditors perform analytical procedures at the planning, substantive testing, and overall review stages of the audit	Interviews	Audit partners, seniors and managers representing the USA's Big 6 audit firms

Source: Abidin & Baabbab (2015); Pinho (2014); Samaha & Hegazy (2010); Trompeter & Wright (2010); Lin & Fraser (2003); Cho & Lew (2000); Mulligan & Inkster (1999); Smith et al. (1999); Mahathevan (1997); Hirst & Koonce (1996).

Although some of these studies were published in the past two decades, they are all still relevant to this study as their findings contribute to an understanding of the changes auditors have effected in the application of analytical procedures in the audit process during this period. In all of these studies, the authors indicate that the demand for the use of analytical procedures is growing in response to numerous factors, of which technological advancements (Abidin & Baabbad 2015: 23; Samaha & Hegazy 2010: 903) and changes in audit methodologies (Pinho 2013: 11; Trompeter & Wright 2010: 671) are the most significant. In addition, the extant literature highlights the usefulness of analytical procedures when used during each of the phases of the audit process (Abidin & Baabbad 2015: 22; Pinho 2014: 30; Samaha & Hegazy 2010: 895; Trompeter & Wright 2010: 678; Lin & Fraser 2003:

158; Cho & Lew 2000: 433; Smith et al. 1999: 69; Mahathevan 1997: 238; Hirst & Koonce 1996: 481), and also shows that by increasing the application of these procedures, the efficiency and effectiveness of the audit is enhanced (Trompeter & Wright 2010: 684; Lin & Fraser 2003: 153; Cho & Lew 2000: 435).

### The use of analytical procedures

The performance of analytical procedures has become an integral part of the audit process; they are used in the planning of the audit, in the fieldwork and in the conclusion, evaluation and reporting phases of an audit (Abidin & Baabbad 2015: 22; Pinho 2014: 30; Messier et al. 2013: 140; Samaha & Hegazy 2010: 895; Trompeter & Wright 2010: 678; Glover, Prawitt & Wilks 2005: 200). During the planning phase of the audit, analytical procedures are performed as risk assessment procedures to assist the auditor in identifying the risk of material misstatement at the financial statement level and the assertion level (IAASB 2016a: ISA 315 par. 6). During the fieldwork phase (also referred to as obtaining audit evidence phase), analytical procedures can be used as substantive procedures to obtain relevant and reliable audit evidence, and during the conclusion, evaluation and reporting phase, analytical procedures can assist the auditor to form an overall conclusion as to whether the financial statements agree with the auditor's understanding of the entity (IAASB 2016b: ISA 520 par. 3). International Standards on Auditing (ISA) 315 and ISA 520 (IAASB 2016a; IAASB 2016b) provide guidance to auditors on the appropriate application of analytical procedures as part of the audit process. ISA 315 (IAASB 2016a) provides guidance on the use of analytical procedures as risk assessment procedures during the planning of the audit phase, and ISA 520 (IAASB 2016b) addresses the application of analytical procedures during the fieldwork phase, as well as when drawing an overall conclusion on the financial statements. Both these standards mandate the use of analytical procedures in the planning of the audit and in the conclusion, evaluation and reporting phases of the audit process, stating that the auditor "shall" perform analytical procedures during the planning of the audit and when drawing an overall conclusion (IAASB 2016a: ISA 315 par. 6; IAASB 2016b: ISA 520 par. 6). The performance of analytical procedures as a substantive procedure, however, is optional: the auditor's substantive procedures at the assertion level "may" be tests of details, substantive analytical procedures, or a combination of both these procedures (IAASB 2016b: ISA 520 par. A4).

The literature reports that analytical procedures used by auditors range from relatively simple comparisons to more sophisticated and mathematically complex techniques, including advanced statistical techniques (Koskivaara 2007: 337; Lin &

Fraser 2003: 164; Cho & Lew 2000: 437; Mahathevan 1997: 238). Vuchnich (2008: 38) believes that IT makes it easier for auditors to develop their expectations because it automates complex calculations and comparisons, leaving the auditor to focus on the evaluation of the relationships so determined. There is thus an expectation that auditors would almost automatically utilise these sophisticated techniques and technologies, but more recent studies show that auditors still perform the simpler, judgemental techniques, using them more frequently than they do the sophisticated analytical procedures now available (Abidin & Baabbad 2015: 22; Samaha & Hegazy 2010: 899; Trompeter & Wright 2010: 689). Table 2 provides a summary of the techniques or methods that respondents in previous studies have used when performing analytical procedures. The results are ranked in order of frequency of use, where 1 indicates the most frequent application and 5 indicates the lowest end of the scale.

**Table 2:** Types of analytical procedures most frequently used by auditors

	<b>Abidin &amp; Baabbad (2015)</b>	<b>Samaha &amp; Hegazy (2010)</b>	<b>Lin &amp; Fraser (2003)</b>	<b>Cho &amp; Lew (2000)</b>	<b>Mulligan &amp; Inkster (1999)</b>	<b>Smith et al. (1999)</b>	<b>Mahathevan (1997)</b>
Comparison	*	*	*	1	1	*	1
Scanning analysis	1	2	1	*	2	1	*
Trend analysis	2	4	2	*	4	*	3
Ratio analysis	3	1	4	3	3	2	2
Reason-ableness test	4	3	3	2	*	*	*
Regression analysis	4	5	5	4	5	3	4

Note: lower value indicates greater frequency of use.

Source: Abidin & Baabbad (2015); Samaha & Hegazy (2010); Lin & Fraser (2003); Cho & Lew (2000); Mulligan & Inkster (1999); Smith et al. (1999); Mahathevan (1997).

Key: \* not included in the study.

Table 2 indicates that respondents in the above-mentioned studies performed the simpler techniques more frequently than the more sophisticated ones. These studies also confirm that a gap exists between academics' views and auditing practitioners' views when assessing the potential usefulness of technology in the performance of analytical procedures: academics are greater proponents of sophisticated analytical procedures than are auditing practitioners (Cho & Lew 2000: 437).

As explained earlier, analytical procedures entail the creation of an expectation, and, after the investigation, an explanation for any deviation from the expected amount. Messier et al. (2013: 147); Chan and Vasarhelyi (2011: 155) and Hirst and Koonce (1996: 474) emphasise the importance of applying professional judgement

and professional scepticism when performing analytical procedures. If the auditor identifies a difference between their expectation and management's representation, he or she has to determine whether the difference is acceptable, and this decision is influenced by materiality and the level of assurance desired from the procedure (IAASB 2016b: ISA 520 par. A16). If the difference is not acceptable, the auditor has to investigate the difference; by asking management to provide reasons, and by obtaining additional audit evidence themselves, auditors then have the information required to corroborate (or successfully challenge) the validity of management's original representation (IAASB 2016b: ISA 520 par. 7). Furthermore, Peecher, Schwartz and Solomon (2007: 473) suggest that auditors should revise their initial expectation to determine whether the difference highlighted by the analytical procedure is caused by a misstatement (due to fraud or error) or a non-misstatement. It is clear from the literature that auditors are generally unwilling to investigate these differences (Knechel, Krishnan, Pevzner, Shefchik & Velury 2013: 395; Trompeter & Wright 2010: 691; Hirst & Koonce 1996: 476).

### Factors impacting the use of analytical procedures

The auditor's use of analytical procedures is dependent on factors such as client and audit firm size (Abidin & Baabbad 2015: 23; Samaha & Hegazy 2010: 896; Lin & Fraser 2003: 159), the auditor's experience (Abidin & Baabbad 2015: 21; Trompeter & Wright 2010: 678; Cho & Lew 2000: 434), the auditor's perceptions of the usefulness of these procedures (Abidin & Baabbad 2015: 24; Mulligan & Inkster 1999: 115), and the availability (and reliability) of information provided by management (Knechel et al. 2013: 395). The literature shows that auditors from Big 4 audit firms use analytical procedures to a greater extent than do auditors from non-Big 4 audit firms (Abidin & Baabbad 2015: 23; Samaha & Hegazy 2010: 896). This has been ascribed to differences in client bases. Larger audit firms tend to have larger clients that have reliable accounting systems and strong internal controls in place, which is a situation conducive to the use of analytical procedures (Abidin & Baabbad 2015: 23; Samaha & Hegazy 2010: 896; Lin & Fraser 2003: 159; Mahathevan 1997: 231).

In their respective studies, Abidin and Baabbad (2015: 23), Samaha and Hegazy (2010: 897) and Mahathevan (1997: 230) all found that the reliance on analytical procedures correlates with the auditor's audit experience, and that auditors in the higher ranks tend to use analytical procedures more frequently than those with less experience. This corresponds with the results of a study by Knapp and Knapp (2001: 27), which showed that an auditor's performance of analytical procedures may be affected by his or her post level, which is an indicator of his or her experience. They



(Knapp & Knapp 2001: 33) found that audit managers are able to identify more misstatements than audit seniors, and they are more adept at providing explanations for the misstatements than their audit seniors. They ascribed this to audit managers' knowledge of the client and industry, and their ability to apply professional judgement (Knapp & Knapp 2001: 35). According to Trompeter and Wright (2010: 678), auditors with more experience are able to perform more effective analytical procedures as they consistently focus more attention on using disaggregated data (data broken down into smaller components or units) for analytical procedures. The researchers identified the fact that auditors (below manager level) generally lack the ability to use disaggregated data, and suggested that greater emphasis should be placed on developing competence to analyse disaggregated data as part of auditors' university studies (Trompeter & Wright 2010: 678).

Auditors' confidence in their application of analytical procedures and their perceptions (understanding) of analytical procedures impact on the use (or otherwise) of these procedures during the course of an audit (Abidin & Baabbad 2015: 23). Auditors with limited knowledge of the use and interpretation of analytical procedures are least likely to use these procedures during audits (Abidin & Baabbad 2015: 24). However, Abidin and Baabbad (2015) did report that the majority of Yemeni auditors participating in their study still believed that analytical procedures are useful tools to obtain audit assurance (Abidin & Baabbad 2015: 22). ISA 520 (IAASB 2016b: ISA 520 par. A6) recommends the use of analytical procedures where large volumes of data are involved, because they lend themselves to prediction. Hirst and Koonce's (1996: 469) earlier study on analytical procedures found that the stability of relationships between financial and non-financial information over time, for example, affects the extent to which auditors rely on substantive analytical procedures to gather audit evidence. When the expected relationships are stable, auditors are more inclined to apply analytical procedures; they deem them sufficient, as the correlative of stability is predictability. In addition, employing analytical procedures reduces the amount of detail testing, which in turn improves the cost-effectiveness of the audit (Abidin & Baabbad 2015: 17) and makes it less time-consuming (Houck 2003: 74).

Numerous studies conducted during the past three decades have found an increase in the use of analytical procedures (Abidin & Baabbad 2015: 23; Pike, Curtis & Chui 2013: 1414; Pinho 2013: 3; Samaha & Hegazy 2010: 902; Trompeter & Wright 2010: 669; Lin & Fraser 2003: 162; Mulligan & Inkster 1999: 118; Hirst & Koonce 1996: 458). The main factors identified by these researchers favouring the increased use of analytical procedures in audits include the adoption of a business risk audit methodology, accelerating advancements in technology, and the increased focus on non-financial information in financial reporting (Abidin & Baabbad 2015: 23;

Pinho 2013: 13; Trompeter & Wright 2010: 671; Samaha & Hegazy 2010: 902; Lin & Fraser 2003: 162; Mulligan & Inkster 1999: 112). These factors enable auditors to develop expectations that are more precise as the starting point for the performance of their analytical procedures (Trompeter & Wright 2010: 681). These are elaborated on below.

### *Business risk methodology*

The application of analytical procedures is an integral part of the business risk audit methodology (Knechel et al. 2013: 395). Bell et al. (2005: 23) describe an audit as a recursive process of risk assessment in which the auditor uses analytical procedures to continuously develop and revise expectations, which can then be compared to management's representations. The application of analytical procedures as risk assessment tools affords the auditor an opportunity to see the whole of the organisation (Knechel 2007: 394), reduce the extent of further procedures (Eilifsen, Knechel & Wallace 2001: 205) and develop more sophisticated expectations (Chan & Vasarhelyi 2011: 159; Trompeter & Wright 2010: 681; Koskivaara 2004: 219–220).

### *Advancements in technology*

Advancements in technology that have led to the automation of business processes have also enabled auditors to use computerised tools and techniques to improve the quality of their audits (Omoteso 2013: 2), and to create proactive, predictive audits (Kuenkaikaew & Vasarhelyi 2013: 63). These tools and techniques include the use of real time information in continuous auditing (Kuenkaikaew & Vasarhelyi 2013: 43) and the use of audit support systems (Hunton & Rose 2010: 298). Both assist the auditor to alter the traditional audit methodology, thereby enabling the performance of more sophisticated analytical procedures and the development of more precise expectations (Chan & Vasarhelyi 2011: 159; Koskivaara 2004: 219–220).

### *Use of non-financial information*

Trompeter and Wright (2010: 671) report an increase in the use of non-financial information in analytical procedures because technological advancements have made it easier for auditors to gather and access a broader array of non-financial information. This is in line with ISA 520, which requires auditors to compare non-financial information with financial information as part of their performance of analytical procedures, in order to assess the reasonableness of the financial data (IAASB 2016b: ISA 520 par. 4). The inclusion of non-financial information in the

performance of analytical procedures enables auditors to gain insight into their clients' business models, and to assess how they control their businesses; this has enabled auditors to create more precise expectations (Trompeter & Wright 2010: 671; Hirst & Koonce 1996: 462–463).

## Research method

Achieving the objective of the research commenced with a literature review, performed to obtain insight into the application of analytical procedures by auditors in other countries. This insight provided the foundation on which the present research was built (Saunders, Lewis & Thornhill 2012: 73). This was followed by an empirical research project using a qualitative approach to obtain a deeper understanding (Creswell 2009: 8) of why and how South African auditors apply analytical procedures. A qualitative research approach can be described as one in which the researcher focusses on a phenomenon that occurs in the “real world” and then investigates that phenomenon in order to understand it (Leedy & Ormrod 2005: 133). The goal thereof is to describe and understand, rather than to explain and predict (Babbie & Mouton 2009: 646). This approach thus enabled the researchers to gain an in-depth understanding of the application of analytical procedures by auditors in the audit process, rather than to provide them with explanations and enable them to make predictions.

Large audit firms in South Africa were specifically selected for this study because evidence from the literature review suggested that auditors from large audit firms apply analytical procedures to a greater extent than do auditors from smaller audit firms (Abidin & Baabad 2015: 23; Samaha & Hegazy 2010: 896). The Independent Regulatory Board for Auditors (IRBA) classifies a “large” audit firm in South Africa as one having more than 20 partners (IRBA 2015). In response to the researchers' request, the IRBA provided a list of all active audit firms registered in South Africa. The list revealed that there are 11 audit firms registered in South Africa with more than 20 audit partners. The researchers then divided the 11 firms into two units of analysis, namely Big 4 audit firms, and the so-called second-tier audit firms. The researchers included the Auditor-General of South Africa (AGSA) as the third unit of analysis.

The researchers intentionally included the Big 4 audit firms as a unit of analysis because, from the literature, it is evident that auditors from Big 4 audit firms apply analytical procedures to a greater extent than the auditors from non-Big 4 audit firms do (Abidin & Baabbad 2015: 23; Samaha & Hegazy 2010: 904). In addition, Big 4 audit firms have been recognised as important breeding sites from which new audit

practices emerge (Cooper & Robson 2006: 415). The researchers therefore selected one practice from each of the Big 4 audit firms.

Second-tier audit firms were included as the second unit of analysis, as these audit firms are competing with the Big 4 audit firms for market share. This has become increasingly prevalent because of regulatory changes, audit firm rotations, and clients' need for high-quality audits (Gebhardt 2013: 1). Boone, Khurana and Raman (2010: 350) found that the quality of audits conducted by Big 4 audit firms and by the second-tier audit firms is similar, and that these second-tier audit firms can serve large clients just as effectively as the Big 4 audit firms can. Three second-tier audit firms were therefore selected for inclusion in the research. Firm 1 was selected as this firm has been described as an emerging competitor to the Big 4 audit firms (Sibanda 2012: 1) and because it audits many large companies, including companies listed on the Johannesburg Stock Exchange (JSE) (BDO 2015). Firm 2 was selected as this audit firm is the largest black-owned accounting and auditing firm in South Africa, and has been recognised by the Advancement of Black Accountants of South Africa (ABASA) for having produced the highest number of black chartered accountants in the second-tier audit firm category (Sizwe Ntsaluba Gobodo 2015). Firm 3 was selected as it is in a growth phase, having grown by 30% in 2013, predominantly through mergers (Gebhardt 2013: 1). According to the list supplied by the IRBA, this firm, based on audit partners, is the fifth largest audit firm in South Africa. It renders services to organisations ranging from large JSE listed companies to small, owner-managed businesses (Mazars 2015).

The researchers included the AGSA as a unit of analysis because, in terms of the Constitution of the Republic of South Africa (RSA) (RSA 1996), the AGSA acts as the external auditor for all national and provincial state departments, public entities, municipalities, and all other institutions required by legislation to be audited by the AGSA (RSA 1996). It also conducts discretionary audits such as performance audits, special audits and investigations (AGSA 2014: 23). Finally, the AGSA is the only audit institution that is required by law to publically report on how its client (the government) is spending the South African taxpayers' money by providing an opinion on fruitless and wasteful expenditure among their auditees (AGSA 2014: 24).

The individual participants considered for inclusion in this research had all obtained first-hand experience of the phenomenon being investigated (Creswell 2009: 217), and had the most information about it (Leedy & Ormrod 2005: 145). The literature review indicated that the decision to perform analytical procedures is affected by the auditor's experience (Abidin & Baabad 2015:23; Samaha & Hegazy 2010: 897; Mahathevan 1997: 230); additionally, audit managers tend to have extensive knowledge of their clients and their clients' industries, which enables them to create

more precise expectations (Knapp & Knapp 2001: 33–34). The researchers thus purposefully (Creswell 2009: 178) targeted as participants those within the selected units of analysis who met all of the following criteria: were registered chartered accountants; were employed as senior audit managers and had more than seven years auditing experience, and were actively involved in all the phases of the audit process. Audit partners at audit firms (Big 4 audit firms, second-tier audit firms and the AGSA) were contacted via e-mail or telephone and requested to identify a senior audit manager at their respective firms who met the criteria and was available and prepared to participate. Eight senior audit managers from Big 4 audit firms, four from second-tier audit firms and three from the AGSA were then approached to participate in the study.

As the aim of the study was to understand the commonalities in auditors’ application of analytical procedures, it was decided to pursue 15 in-depth interviews as the basis of the research methodology. In their research, Guest, Bunce and Johnson (2006: 75) found that data saturation in qualitative studies generally occurs after 12 semi-structured interviews; thereafter, new themes from subsequent interviews emerge, at best, infrequently.

Table 3 presents the selected units of analysis, the number of selected practices and participants, and the references used for participants’ responses.

**Table 3:** Units of analysis, selected practices and participants, and references

Firm	Selected practices	Number of participants	References used for participants
Big 4 audit firms	4	8	B4-1 – B4-8
Second-tier audit firms	3	4	ST1 – ST4
AGSA	1	3	AG1 – AG3

All the selected audit firms have offices located in South Africa’s Gauteng Province. The researchers purposefully selected offices in Gauteng as this province contributes the highest percentage (34%) to the South African economy (Statistics South Africa 2014: 10). This choice is supported by the argument that larger audit clients, which – according to the literature – have better systems and stronger internal controls that are more conducive to analytical procedures (Abidin & Baabbad 2015: 23; Samaha & Hegazy 2010: 896; Trompeter & Wright 2010: 679; Lin & Fraser 2003: 159; Mahathevan 1997: 231), are situated in Gauteng, the heart of the South African economy.

Data was collected by means of face-to-face, semi-structured interviews with the 15 participants. The interviews were conducted between May and July 2015, and each

interview lasted between 45 and 60 minutes. Based on the literature review, a list of open-ended interview questions was compiled, and this is set out in Annexure A. All interviews were recorded with a voice recorder, enabling the researcher-interviewer to concentrate on the facilitation of the interview, and to ensure that the conversation remained available for later analysis (Saunders et al. 2012: 394). To ensure the validity and credibility of the data (Creswell 2009: 191), the interviews were independently transcribed and were sent to participants to consider and confirm the accuracy thereof. To address research bias inherent in a qualitative study (Saunders et al. 2012: 381), the researchers obtained the views of various participants to strengthen the trustworthiness of the study. ATLAS.ti software was used as the main data coding tool for qualitative data analysis, and one researcher (author) analysed the emerging data. The second researcher (author) read and reviewed all coded quotations. Ethical clearance had been obtained from the University of Pretoria prior to commencing the research during May 2015. A list of interview questions was e-mailed to the participants before the interviews, and they were requested to sign letters of consent before participating in the research. While the study did achieve data saturation, it was, however, based on the views of only fifteen participants drawn from only eight audit firms in South Africa, and thus the findings cannot be assumed to have widespread applicability. The findings of the study should be considered against this limitation.

## Findings

The findings are presented in accordance with the themes identified in the literature, which relate to the objective of the study, namely to investigate the application of analytical procedures in the audit process by South African auditors.

### The use of analytical procedures

This study found no dissenting views by participants on whether to apply analytical procedures; all agreed that their use adds value to the audit and enables them to obtain a better understanding of the client. There was general consensus among participants that analytical procedures are performed, not only because it is mandatory, but also because they are perceived to promote audit quality, and because they are a cost-effective measure for the identification of risks. One Big 4 audit firm participant described the need to perform analytical procedures as follows: *“It is the way to audit; ... regulators want it, clients want it and it makes sense. It is the only way, in my view, that you can do a cost-effective, quality audit”* (B4-3). Some

participants perceived analytical procedures as being comforting for the auditor, and one participant from a Big 4 audit firm described it as providing the auditor with a “*warm and fuzzy feeling*” (B4-4). AGSA participants acknowledged using analytical procedures to “*audit smarter*” (AG1), as “*it speeds up the audit process*” (AG3).

The study found that participants from Big 4 audit firms started their investigation processes for differences between their own expectations and management’s representations by refining the assumptions used in the development of their own expectations. As one of these participants explained, “... *perhaps you should refine your expectation or maybe your expectation was wrong and you should get new information to adjust your expectation*” (B4-3). Participants from the Big 4 audit firms and second-tier audit firms indicated that explanations for differences were usually obtained by asking management and financial personnel (“*It is usually like the FM [financial manager] or the accountant or the FD [financial director]*” (ST4)). Participants from Big 4 audit firms, however, perceived the explanations received from financial personnel to be “*sugar coated*” (B4-4), and acknowledged that engaging with internal auditors and non-financial personnel was of greater value. One Big 4 audit firm participant explained this as follows: “*A lot of times [the most informative responses come from] the operational people, especially on analytical reviews, the people who don’t have anything to do with finance, because finance always have a story. The operational guy can tell you ‘that month the machine didn’t work, so our production was down’ or ‘there was no production’. And they don’t have an ulterior motive if they give you an answer*” (B4-8). Another participant’s response supported this view: he/she entered into discussions with the client’s internal auditors “*because they are independent (or they are supposed to be independent) from management or what is happening at the client*” (B4-4).

Some of the participants from second-tier audit firms expressed their concerns about trainee auditors’ reluctance to obtain corroborating evidence for explanations offered by clients. One of these participants explained as follows: “*So what they [trainees] do is they go ...chat with management, then they’ll document the enquiry but then they’re not taking that one additional step....where you then go and corroborate what was said*” (ST2). Participants from the AGSA held a contrasting view: they perceived analytical procedures to be unsuccessful in instances where there was a difference, and in such instances, these participants reverted to tests of details. The AGSA participants’ view is summarised in the following quote: “... *then we have to cancel the whole procedure, unfortunately; so then the procedure is unsuccessful and you have to do something else*” (AG1).

The study found that all participants perceived analytical procedures to be an integral part of the audit process, and they applied these during the planning, fieldwork and completion phases of the audit. However, variations in the details

of their application of these procedures were apparent in each of these phases; the seniority and experience of the people responsible for performing and reviewing these procedures, and the techniques or methods performed, were different across the participants' firms.

### *Planning phase*

All participants applied analytical procedures during the planning phase of an audit, mainly to identify the risk of material misstatement at financial statement level and assertion level, and they perceived the results obtained from their risk assessments to be useful for audit planning purposes. The majority of participants referred to analytical procedures as a “*risk identification tool*” (ST3). Their views are summarised in the following two quotes: “*During the planning phase we do risk assessment to identify if there are any specific balances, [or] financial statement line items that we need to focus on that are outside our expectations*” (B4-4). “*It is really just to look at unusual things*” (ST4).

High-level analytical procedures were performed by Big 4 audit firm and second-tier audit firm participants during the planning phase as the auditors' goal was to obtain an overview of the financial results. (“*During planning phase we are doing it at a very high level, financial statement level basically*” (B4-5)). At Big 4 audit firms and second-tier audit firms, analytical procedures performed during the planning phase were mainly performed and reviewed by members of the audit team with appropriate previous experience, as the auditor's ability to apply these procedures in a meaningful way is dependent on their knowledge of the client and client's industry. Thus, “*Planning usually gets done by your third year. Because they have a bit of experience on the client, they understand the client; they understand the environment so the figures start to make sense to them. On bigger clients, on some of our listed entities, the manager will do it*” (B4-8). One second-tier audit firm participant shared the view that, on smaller audits the responsibility for the performance of analytical procedures could be allocated to second year trainee accountants. AGSA participants reported that on their audits, second-year audit trainees performed analytical procedures during the planning phase of the audit, but that IT experts were also involved.

The degree of involvement of partners during the planning phase, however, varied, and it seems as though partners from Big 4 audit firms were more actively involved than were the partners from second-tier audit firms and the AGSA's audit managers. All participants preferred to use simple techniques such as comparisons, ratios and trends when performing analytical procedures during the planning phase. As budget allocations drive behaviour in the public sector (and as the auditor has



to provide an opinion on fruitless and wasteful expenditure), AGSA participants showed a preference for comparisons with budgets to guide their planning processes. One AGSA participant explained that in their environment, the public sector environment, *“government budget is so important”* (AG1).

### *Fieldwork phase*

The majority of the participants perceived the objective of the performance of analytical procedures during the fieldwork phase to be to obtain audit evidence, and to determine the extent of their tests of details. There were, however, diverse views on the extent to which analytical procedures were applied during the fieldwork phase. Participants from Big 4 audit firms applied substantive analytical procedures more extensively than did their second-tier audit firm and AGSA counterparts. Participants from second-tier audit firms and the AGSA ascribed their limited use of substantive analytical procedures to two situations: the shortage of reliable data (*“to find reliable base data or data that you can actually develop an expectation from [is challenging]”* (AG1)), and the limited guidance provided by their firms' methodologies on the assurance that analytical procedures were intended to provide. The majority of participants indicated that analytical procedures during this phase were used to predict an account balance (*“you can predict what the amount is going to be”* (ST1)), and Big 4 audit firm and second-tier audit firm participants emphasised the importance of testing the underlying assumptions and using disaggregated data in developing these predictions. The following two quotes are representative of statements made by participants on this aspect:

*“Go and test that underlying month that you are using as your base on a detailed testing base. And also go and test, because I mean there is usually a variable which says ‘okay but this year this changed’ or ‘this has changed’. That variable should also be tested very carefully and detailed testing should be done on that variable”* (B4-8).

*“.....some people like to do it across the entire group. I like to do it per product, and will get sales and cost of sales per product”* (ST3).

In general, participants perceived the application of analytical procedures to be more successful on the statement of profit or loss and other comprehensive income balances than on the statement of financial position balances; but all cautioned that it depends on the assertion under consideration. A second-tier audit firm participant explained this as follows: *“It is more towards the income statement than it is on the balance sheet, because the balance sheet is a balance at the end of the year while when you test the income statement it is throughout the period. So then the substantive analytical*

*procedures sort of works much better because it is an easy and effective way of testing the transaction that occurred throughout the year” (ST1).*

The majority of study participants indicated that the analytical procedures required during the fieldwork phase could be performed by lower level staff. The allocation of analytical procedures to lower level staff is, however, dependent on the staff member’s competence in the use of general audit software (e.g., Audit Command Language (ACL)), and on the auditors’ risks assessment. There was consensus among participants that lower level staff required guidance in the performance of analytical procedures, as they had not yet mastered the necessary skills to perform analytical procedures, and lacked the experience to exercise professional judgement effectively. A Big 4 audit firm participant commented as follows: *“Fieldwork is [performed by] every trainee on the job. So if the section allocated to you requires analytical you will perform that analytical, obviously with guidance from the “in charge” or the third year or the supervisor or the manager. Especially when it’s a first year or a second year, at the beginning of their second year, they don’t always know the purpose of analyticals or how to use their professional judgement” (B4-7).* An AGSA participant explained that analytical procedures during this phase could not be performed by first-year trainees, as *“it is a bit complicated” (AG1).*

Participants from the Big 4 audit firms and the AGSA acknowledged the value that was added when IT experts were included on the audit team for the performance of substantive analytical procedures. An AGSA participant provided the following practical example of how an IT expert would assist them in applying substantive analytical procedures: *“[IT experts] reconcile it [data] in such a way to enable the [auditor] to perform an audit. [IT experts] ensure that the population is complete, before [the auditor] can draw his samples and before he can start doing his work” (AG3).*

The majority of participants preferred to perform analytical procedures during the fieldwork phase on accounts that lend themselves to prediction and comparison, and that have a fixed cost element. These accounts mainly relate to the statement of profit or loss, and of other comprehensive income. Big 4 audit firm participants reported that they use audit software to test all the transactions in a business cycle, and favour the use of sophisticated regression analysis.

### *Conclusion, evaluation and reporting phase*

Nearly all participants perceived the objective of using analytical procedures at the conclusion, evaluation and reporting phase to be similar to that pertaining to the planning phase. Such procedures were performed to enable the auditor to obtain an overview of the financial statements (*“So the completion has an overall analytical*

*review. We put all the different pieces in together and see if it makes sense overall” (B4-3)* and to reassess earlier risk and going concern assessments (“*[during] the completion phase we will look at mostly the same ratios as we looked at in the planning phase and we will look at whether they still talk to each other and if it is in line to what we expect” (ST3)*). The majority of participants indicated that analytical procedures during the conclusion phase were performed at a high level (much as was done at the planning phase). Illustrating the point, a participant in each of the units of analysis observed that the procedures were performed “*...at a very-very high level” (B4-8)*; that “*... partners also do high level review and if need be then he does a more detailed review” (ST2)*; and that it is something that should be done: “*... it is just basic (AG2)*”.

The study also showed that there was no agreement as to which level of seniority the audit team member should hold in order to perform analytical procedures during the conclusion phase. At Big 4 audit firms this is apparently done by managers and partners (“*Completion phase I think is partner level, not do, but review. The manager does it and the partner reviews it. Seniors can do it but if it is at the end of your audit, where you use your judgement about the overall, all over your audit process and the results. So I will say partners. They are the ones that sign off anyway” (B4-5)*). In the case of the AGSA and second-tier audit firms, analytical procedures in the final phase were most often performed by the same individuals that performed them during the planning phase. Thus, “*the senior will definitely do that [perform analytical procedures] as well; because of the fact that they did that at the beginning, they will also know what need[s] to happen. It will trigger their memory again and then you will, as a manager, just review it again” (ST1)*. There was consensus that the auditors performing the analysis had to have appropriate levels of experience and knowledge of the client, as they needed to exercise judgement when coming to conclusions. Again, the majority of participants indicated that they preferred to perform simple techniques (such as comparisons and ratio analysis) in their performance of analytical procedures during the conclusion phase. As described by a participant, this is “*a combination of movement analysis and ratios” (B4-7)*.

### Factors impacting on the use of analytical procedures

Participants identified various internal and external factors that have an effect on the extent of their use of analytical procedures. The interviews revealed that most participants perceived the auditor’s assessment of risk of material misstatement as the main determinant of the extent to which analytical procedures were used. Participants also made reference to other, more general factors that were influential in their particular decision-making processes. These included the availability, quality

and reliability of data; client's size and the sophistication of their internal control and accounting systems; and the availability of audit support systems. The final consideration was the auditor's competence to utilise these audit support systems. A Big 4 audit firm participant, for example, stated: "*The maturity of our client base makes a big difference in how much we can use it*" (B4-3), while a second-tier audit firm participant explained: "... *we have a lot of small clients where it is actually a full blown detail substantive testing audit because they don't have internal controls*" (ST1).

Some participants were of the opinion that the extent to which analytical procedures were used was dependent on the auditor's knowledge of the business, and on the overall level of experience and knowledge of the audit team members. Other participants indicated that it was the auditor's perception on the usefulness of such procedures that had an impact on the extent to which they were used. Irrespective of these internal and external factors, the extent to which analytical procedures are used remains a judgement call, most frequently exercised by audit partners. Summarising, and presenting an overview, a Big 4 participant observed, "... *if our risk of material misstatement is let's say high we'd ... not do substantive analyticals, we'd rather do tests of details or a combination of substantive analyticals and tests of details. But I think the essential thing here is that the extent is a judgement call, professional judgement by the partner; but that's the way we decide on how much to do*" (B4-7).

Participants perceived the application of analytical procedures to have increased over the past years, a trend that they ascribed to development of their firms' own business risk audit methodologies, advancements in technology and the increased use of non-financial information. In general, participants predicted that the application of analytical procedures would continue to increase.

### ***Business risk methodology***

The majority of participants perceived the application of analytical procedures to be an extremely effective risk assessment tool. One participant shared the following view: "*It [analytical procedures] shows immediately where there was a disconnect between data sets that are supposed to give you a correlation for a specific period of time*" (B4-3). This view underpins the increased use of analytical procedures for the identification of risks and fraud. Most participants perceived the effectiveness of analytical procedures as risk assessment procedures to be dependent on the auditor's knowledge of the entity and its industry. Again, the view of a Big 4 participant sums up the situation: "... *I think your knowledge of the industry and the environment is very important*" (B4-8).

The majority of participants indicated that by performing analytical procedures as risk assessment procedures, an auditor could save on audit costs and time because

he/she could reduce the need for and extent of further tests. One Big 4 participant explained this as follows: *“if you’ve got areas that’s lower risk, often if you have a properly designed analytical procedure you would possibly be able to get sufficient audit evidence by just doing that, where in the past you would have just gone in and audited everything”* (B4-6). Two second-tier audit firm participants, however, were of the opinion that the implementation of business risk methodologies had an effect on the performance of analytical procedures during the planning and conclusion phases, but that the implementation thereof did not impact on the extent of substantive analytical procedures because the firm had used substantive analytical procedures before. The participant shared the following: *“I don’t think the execution phase of it so much...it is not like you know you will do more substantive analytical procedures just because it is a high risk client. It will be more towards the planning phase and completion phase”* (ST1). One AGSA participant was of the opinion that auditors rely too heavily on IT experts for the identification of risks: *“An audit is supposed to be risk-based. Most people forget this the moment they work with data. Suddenly [the auditor] does not [identify] a risk: there are no objectives and [the IT experts] are now going to miraculously fix it [the oversight]. It does not work like that: you still have to start with the requirement, pulling it through and checking whether the data can support it”* (AG3).

#### **Advancements in technology**

The study found that developments in IT have increased the use of analytical procedures, specifically data analytics (*“IT will lead to more data analytics to be used... ..we are trying to move towards it”* (B4-5)), and that this trend will continue into the future. In general, participants ascribed the increased application of analytical procedures to their audits to the use of audit software, which makes it easier to *“use computers to audit smart”* (AG2), and to manipulate large volumes of data in order to perform more sophisticated analytical procedures. *“So I think just the way it [audit software] becomes easier for use and accessible, we’ll start using it even more—to actually do, like intelligent predictions, and not just stupid ratios”* (B4-1).

Some Big 4 audit firm participants suggested that audit firms are investing increasing amounts of time and money in the development of audit software to enable them to perform more analytical procedures. *“We are busy to develop them [software] at the moment; it is a very big part of my job. We have been having software for years and we have many specialists in the firm writing queries on a data set. ....we invest more and more in the tool part because you can get 100% of your population in it which is higher quality audit evidence than to do sampling”* (B4-3).

Although participants from Big 4 audit firms and second-tier audit firms agreed that IT experts added value to an audit, these participants also recognised the cost

implications associated with involving IT experts. According to one participant, the practice of involving IT experts would only be feasible for high budget audits: *“I mean, you can imagine a third of our budget for the client went to the IT, so we don’t do it on our smaller jobs”* (B4-7).

Big 4 audit firm participants all believed that the involvement of in-house IT experts in an audit was dependent on client size and organisational complexities, as well as on client expectations. It is an interesting finding that when second-tier audit firms did not have in-house IT expertise, outsourcing arrangements were made to obtain such expertise. One second-tier audit firm participant shared the following: *“We give that electronic data to them. They perform the CAATs [computer assisted audit techniques] for us and we get it back and we filter and evaluate and do what we then need to do”* (ST1).

In general, participants referred to data analytics as “the audit of the future”, and some Big 4 audit firm participants indicated that their firms were making high value investments in this area. Some participants predicted that advancements in IT would make it possible for control testing and substantive analytical procedures to be replaced by data analytics. One participant made reference to the use of “big data” in future, which would entail the integration of financial and non-financial information for the identification of risks and fraud. Most participants, however, cautioned that the use of data analytics would not be without challenges.

#### *Use of non-financial information*

IT has provided participants from all three units of analysis with a broader array of financial and non-financial information than was previously possible, and the majority of participants indicated that such information is already being subjected to analytical procedures. This was supported by the following view expressed by one of these participants: *“It is easily accessible, where five or ten years ago it was very difficult to get the information and trends. So I just think it makes the whole process easier”* (B4-5). In general, participants perceived non-financial information to be valuable for the identification of fraud, and participants from the AGSA acknowledged the value contributed by IT experts in the identification of fraud. One AGSA participant described the IT expert’s work as *“where they use non-financial information to compare databases to each other to identify conflicts of interest”* (AG1).

Big 4 audit firm participants and second-tier audit firm participants all indicated that they “mostly” obtained non-financial information on clients and the market from the internet, as it is easily accessible. Participants from the AGSA acknowledged making use of information from external sources (such as Statistics South Africa,

the Human Sciences Research Council and the South African Social Security Agency) to provide them with a reliable, holistic view of their clients' operations. Some Big 4 audit firm participants perceived social media to be a valuable source of information about the client's industry and business, but other Big 4 audit firm participants expressed concern about the credibility of such information. As one of these participants cautioned, "... you always need to assess the reliability of the underlying information that you're using. So I think social media is potentially a problem because everyone has comments but you don't know how valid that is" (B4-6).

## Discussion

The aim of this study is to provide a South African perspective on the application of analytical procedures in audits by investigating the application of analytical procedures in the audit process by South African auditors. By interviewing 15 senior managers at large South African audit firms (Big 4 audit firms, second-tier audit firms and the AGSA), their perceptions on the use of analytical procedures and on the factors impacting their use, were obtained and considered. The study's contribution to the literature lies in the fact that it has now provided a perspective of how South African auditors apply analytical procedures in the audit process. The following section relates these applications to the global practices reported on in the literature.

### The use of analytical procedures

The study found that participants believe they need to apply analytical procedures because it adds value to the audit, enables auditors to gain a better understanding of the client, is a mandatory requirement, has the ability to improve audit quality, and is a cost-effective method for the identification of risks. This is in line with findings of studies performed elsewhere, which also suggest that the use of analytical procedures could result in more effective and efficient audits (Trompeter & Wright 2010: 684; Lin & Fraser 2003: 153; Cho & Lew 2000: 435).

This study indicates that participants perceived analytical procedures to be an integral part of the audit process, and that they applied analytical procedures during the planning, fieldwork, and conclusion, evaluation and reporting phases of the audit. The findings support previously reported results of studies performed in Yemen (Abidin & Baabbad 2015: 22), Portugal (Pinho 2014: 30), Egypt (Samaha & Hegazy 2010: 895), the USA (Trompeter & Wright 2010: 678) (Hirst & Koonce 1996: 481), Canada (Lin & Fraser 2003: 158), Hong Kong (Cho & Lew 2000: 433),

Australia (Smith et al. 1999: 69) and Singapore (Mahathevan 1997: 238). All of these studies found that auditors in these countries rely on analytical procedures during all three of these phases of an audit. Variations, however, exist (both at firm level and between countries) in the use of analytical procedures in each of the phases in the audit process.

The study also confirmed the validity of results from previous studies (Abidin & Baabbad 2015: 22; Samaha & Hegazy 2010: 899; Trompeter & Wright 2010: 692; Lin & Fraser 2003: 160; Cho & Lew 2000: 436; Mulligan & Inkster 1999: 118; Smith et al. 1999: 68; Mahathevan 1997: 238; Hirst & Koonce 1996: 465). That is, auditors perform simple techniques such as comparisons, ratio analysis and trend analysis, more frequently than sophisticated ones when performing their analytical procedures. In addition, auditors from larger audit firms apply analytical procedures more extensively than do their smaller firm counterparts (Abidin & Baabbad 2015: 23; Samaha & Hegazy 2010: 896; Lin & Fraser 2003: 159; Mulligan & Inkster 1999: 111; Smith et al. 1999: 66; Mahathevan 1997: 237).

The study found that Big 4 audit firm participants started their investigation processes for differences between their own expectations and management's representations with the refinement of assumptions used in the development of their own expectations. Participants indicated that they mainly obtained explanations for differences from management and financial personnel; engaging with internal auditors and having discussions with non-financial personnel were techniques that were used less frequently. Auditors in the USA found that client enquiry is the most frequently used source of information, followed by questioning other audit team members, self-generation (doing their own research) and by referencing prior years' working papers (Trompeter & Wright 2010: 690; Hirst & Koonce 1996: 465).

### Factors impacting the use of analytical procedures

Participants identified various internal and external factors that have an effect on the extent to which they use analytical procedures. The auditor's assessment of risk of material misstatement was seen as the main determinant of the extent of their use of analytical procedures. Other factors impacting the use of analytical procedures identified by South African auditors (as well as in studies performed in other countries), include the following: availability, quality and reliability of client data (Samaha & Hegazy 2010: 902; Lin & Fraser 2003: 162; Mulligan & Inkster 1999: 111); the sophistication of the client's internal control and accounting systems (Pinho 2013: 11; Samaha & Hegazy 2010: 902; Trompeter & Wright 2010: 678; Mulligan & Inkster 1999: 115); the availability of audit support systems and the auditor's competence to utilise these support systems (Abidin & Baabbad 2015:



23; Pinho 2013: 11; Samaha & Hegazy 2010: 902; Trompeter & Wright 2010: 682; Mulligan & Inkster 1999: 117); the auditor's knowledge of the business (Trompeter & Wright 2010: 682, Hirst & Koonce 1996: 469); the audit team members' level of experience and knowledge (Abidin & Baabbad 2015: 23; Samaha & Hegazy 2010: 897; Trompeter & Wright 2010: 678; Cho & Lew 2000: 434; Mahathevan 1997: 236); and the auditor's perception of the usefulness of such procedures (Abidin & Baabbad 2015: 23; Samaha & Hegazy 2010: 904; Trompeter & Wright 2010: 684; Lin & Fraser 2003: 160; Cho & Lew 2000: 434; Mulligan & Inkster 1999: 115; Mahathevan 1997: 238).

Based on the views expressed by participants in this study, it is clear that the extent of the application of analytical procedures has increased in recent years due to changes in business risk audit methodology, advancements in technology, and the availability of non-financial information. This is in line with findings in the literature, which indicate that there has been an increased use of analytical procedures globally (Abidin & Baabbad 2015: 23; Pinho 2013: 3; Samaha & Hegazy 2010: 902; Trompeter & Wright 2010: 669; Lin & Fraser 2003: 162; Mulligan & Inkster 1999: 118; Hirst & Koonce 1996: 458). Auditors in Portugal describe the risk-based audit methodology as the most important driver of the increased use of analytical procedures (Pinho 2013: 11), while auditors in Yemen (Abidin & Baabbad 2015: 23) and Egypt (Samaha & Hegazy 2010: 903) perceive advancements in technology to be the biggest enabler of change. Auditors in the USA (Trompeter & Wright 2010: 689; Hirst & Koonce 1996: 462) report an increased use of non-financial information in their application of analytical procedures.

## Conclusion, recommendations and suggestions for further research

This study provides a South African perspective on auditors' application of analytical procedures, and relates such application to global practices reported on in the literature. Having employed a qualitative approach in this South African research, the results indicate that there seems to be much agreement between the way in which South African auditors apply analytical procedures and those who have participated in other studies around the world. The findings of the study indicated that the use of analytical procedures could add value to the audit, has the ability to improve audit quality, and is an integral part of the audit process.

It is recommended that scholars use the findings of this study to perform further research on the application of analytical procedures in the audit process. In order to increase the quality of audits, the study recommends to practitioners that they integrate more analytical procedures into their performance of audits. It is also recommended that practitioners use the results of this study to relate their practices

on the application of analytical procedures to global practices. The application of analytical procedures provides the auditor with a deeper knowledge of the client, which creates an opportunity to report in more detail to the audit committee and the client. The extent to which the auditor can apply analytical procedures, however, depends on the strength of a client's internal control system and the availability and reliability of the client's data. It is recommended that management of audit clients should be made aware of the advantages in the application of analytical procedures, and that they are available when client data is readily available and reliable.

This study is not without limitations, however, which create avenues for future research. Thus: the study's scope is limited in that it solicited the views of only large audit firms (Big 4 audit firms, second-tier audit firms and the AGSA), and thus its results cannot be generalised to include small, medium or other large audit firms. The researcher purposefully selected large audit firms because the literature review suggested that auditors from large audit firms apply analytical procedures to a greater extent than do auditors from smaller audit firms (Abidin & Baabbad 2015: 23; Samaha & Hegazy 2010: 896; Lin & Fraser 2003: 159). An opportunity thus exists to investigate the application of analytical procedures by small and medium sized audit firms in South Africa.

This study was restricted to the views of senior audit managers because of their extensive knowledge of their clients and their ability to develop more precise audit expectations (Abidin & Baabbad 2015: 23; Samaha & Hegazy 2010: 897; Mahathevan 1997: 230). An opportunity therefore exists to compare the views of senior audit managers against those of audit team members with other levels of experience. In addition, the scope of the study was limited to the application of analytical procedures in the audit process, and not to the application of these procedures in independent review engagements. An opportunity thus exists to investigate the application of analytical procedures by auditors performing independent review engagements.

In conclusion, the study confirms that South African auditors' application of analytical procedures agrees with practices followed by their global counterparts. More extensive application of analytical procedures requires a better understanding of creating an expectation and interpreting differences, as well as an enhanced ability to use IT's ongoing developments. Future studies should investigate the competencies and necessary IT skills that are required to perform analytical procedures (including data analytics). The results of such studies can be used to inform universities, audit firms and professional bodies on how they should adjust their curricula, training initiatives and in-house/firm methodologies to obtain the necessary skills to perform analytical procedures.

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## ANNEXURE A

### INTERVIEW QUESTIONS

1. Why do you need to apply analytical procedures?
2. How do you perform analytical procedures during the
  - planning phase;
  - obtaining audit evidence phase; and
  - conclusion phase of an audit?
3. How do you decide on the extent of analytical procedures?
4. Who is mainly responsible for performing these analytical procedures and reviewing the results during the
  - planning phase;
  - obtaining audit evidence phase; and
  - conclusion phase of an audit?
5. How do you decide on the types of analytical procedures to be performed?
6. How has your application of analytical procedures changed over the past years?
7. What has driven the change in your use of analytical procedures?
8. How did the emphasis on risk-based audit methodologies impact on your application of analytical procedures?
9. How will developments in technology change analytical procedures of the future?
10. How do you believe that non-financial information such as industry knowledge will be integrated in analytical procedures of the future?
11. How do you treat material differences for analytical procedures?
12. What do you consider to be the main advantages of analytical procedures?
13. What are the challenges experienced in applying analytical procedures in practice?