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USING MODERN DATA TECHNOLOGY TO ENHANCE THE EFFECTIVENESS OF LIFESTYLE AUDITS IN THE FIGHT AGAINST CORRUPTION AND TAX EVASION

by

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ABSTRACT

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Background:

Tax administrations have traditionally used manual processes, which are costly and time-consuming, to conduct lifestyle audits. This study investigates the use of modern data technology – such as Big Data, data analytics, artificial intelligence, and social media analysis – to improve the effectiveness of lifestyle audits and of tax administration.

Main purpose of study:

The study's main purpose is to establish to what extent lifestyle audits can be enhanced by using modern information technology in the fight against corruption and tax evasion in South Africa.

Method:

A mixed method approach was followed: a literature review was conducted on various modern technologies to obtain a clear and simple understanding thereof; responses to a questionnaire were obtained to understand the public's view on the use of modern technology by SARS and the effectiveness thereof; and the potential sources of data for use by SARS were surveyed.

Results:

Various modern technologies are discussed, and cases in which global tax administrations have applied these technologies with success are identified. Respondents to the study's questionnaire expressed that SARS may not be utilising modern technology to its full

extent, and respondents agreed that these technologies could significantly improve the effectiveness of SARS.

Conclusions:

Modern data technology can significantly improve the effectiveness of lifestyle audits and of tax administration and collections in the fight against corruption and tax evasion.

Keywords:

- Lifestyle audits
- Corruption
- Tax evasion
- Big Data
- Data analytics
- Artificial intelligence
- Social media analysis

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CHAPTER 1:
INTRODUCTION

1.1. INTRODUCTION

South African President, Cyril Ramaphosa, emphasised the need for lifestyle audits in his response to debate on the State of the Nation Address in 2018:

> "It is time that we implement our resolutions on the conduct of **lifestyle audits** of all people who occupy positions of responsibility, starting with members of the Executive.
>
> As we indicated in the State of the Nation Address, we are equally determined to tackle **corruption** and other economic crimes in the private sector.
>
> Institutions like SARS, the Reserve Bank, the Financial Intelligence Centre and our law enforcement agencies work together to detect and prosecute **tax evasion**." (Ramaphosa, 2018; own emphasis)

Similarly, on 9 December 2021, the Public Service Commission, in a media statement, highlighted the importance of lifestyle audits in restoring ethics, integrity and transparency in the public sector (Public Service Commission, 2021), and The Department of Public Service and Administration's *Guide to implementing lifestyle audits in the public sector*, which is effective from 1 April 2021, likewise describes that fraud and corruption can be prevented and addressed by conducting lifestyle investigations (Department of Public Service and Administration, 2021). This guide defines a lifestyle audit as the creation of the financial profile of a person to assess declared income against observed assets and to detect undeclared sources of income where the person's expenses exceed declared income.

Lifestyle audits are seen as the panacea to tax evasion in South Africa (McIntyre-Louw & De Villiers, 2020:12). According to Ensor (2021), Judge Dennis Davis, who headed up the Davis Tax Committee, recently called for lifestyle audits to target high net-worth individuals. The annual tax gap is projected to be between R50 billion and R100 billion, and the Davis Tax Committee suggests that one of the ways to reduce the tax gap is to

focus on tax collection from high net-worth individuals. Judge Davis highlights that these individuals are typically invested in lavish real estate and drive expensive vehicles and that, through a comprehensive analysis, this could be low-hanging fruit in improved tax compliance for the South African Revenue Service (SARS) (Ensor, 2021).

1.2. BACKGROUND / RATIONALE FOR THE STUDY

In South Africa, SARS regularly applies lifestyle audits as an instrument to collect taxes and to identify potential tax evasion (Transparency International, 2021:8,16). In the private sector, some professional services firms, such as KPMG, institute lifestyle audits for all partners to identify non-compliance with internal policies and processes (Niven, 2021). According to Attila (2011:3), corruption has a negative effect on public tax revenues and generally leads to an increase in tax evasion; furthermore, the secondary effect of corruption and tax evasion is an adverse impact on economic growth, as corruption attracts higher taxes and penalties, which reduce available consumption capital (Attila, 2011:23).

Lifestyle audits are a proactive anti-corruption tool that is used to identify and root out corruption (Odeku, 2019:1). The outcomes from an investigation aid in deterring those who might find themselves under investigation (Transparency International, 2021:3). After identifying unexplained wealth, a suspect's assets can be legally attached to preserve the assets whilst concluding a full investigation (Niven, 2021:3). Lifestyle audits can also aid authorities in recovering the proceeds of crime through early detection.

There are, however, certain risks that need to be considered when relying on the outcomes of conducting these audits (Niven, 2021:2). McIntyre-Louw and De Villiers (2020:13) highlight that a lifestyle audit is often a manual process, where the auditor collects information from a variety of sources. Accessing records manually can be very time-consuming and expensive. Manual lifestyle audits can also be manipulated or weaponised to target political opponents. Further, managing the outcomes of an audit can be sensitive, as the audit might signal certain assets as doubtful when they have in fact been acquired through legal means. Additionally, organisations could overemphasise the value of lifestyle audits when they should, in fact, be used in conjunction with other anti-corruption methods (Niven, 2021:2).

Gillespie (2014:124) notes that investigators must acquire evidence by complying with the law and rules of evidence, as found in section 205 of the Criminal Procedure Act (51/1977). However, the integrity of the evidence gathered by investigators may be corrupted, contaminated, compromised, manipulated or tarnished through human error. Furthermore, investigators may illegally acquire information by means of conducting inappropriate searches or by purchasing information. Considering these issues, Gillespie (2014:125) emphasises that the privacy rights of individuals need to be respected. Golden, Skalak and Clayton (2006:331) warn that relying on the information found on the internet without considering the source of that information is not advisable and that both the subject and the sources providing information on the subject may need to be explored (Golden *et al.*, 2006:331).

The effectiveness of lifestyle audits can be undermined by limitations in the transparency and availability of data, personal rights related to the collecting and processing of data, and resource constraints (McIntyre-Louw & De Villiers, 2020:13). The Organisation for Economic Co-operation and Development (OECD) reports that in 2019, the functions charged with audit, investigation and other verification activities comprised 30%, on average, of global tax administration staff (OECD, 2021:102). The use of modern technology can assist in automating these otherwise manual processes and could provide tax administrations with deeper insights into the information collected.

In 2013, Dobre and Xhafa (2014:2) calculated that 2.5 quintillion bytes (exabytes: 2.5 x 10^{18} bytes) of data were estimated to be created on the internet daily and that 90% of global data had been created in just the preceding two years. The daily production of data is now forecast to increase to 463 quintillion bytes (exabytes: 463 x 10^{18} bytes) by 2025 (Vuleta, 2021) – a staggering 185 times increase in twelve years with no signs of slowing down. According to Sivarajah, Kamal, Irani and Weerakkody (2017:263), these data consist of text and multimedia (images, videos and audio) on multiple platforms, such as banking systems, social media and Internet of Things devices. These data can be structured, unstructured or semi-structured. Sivarajah *et al.* (2017:263) assert: “With this overwhelming amount of complex and heterogeneous data pouring from **any-where**, **any-time**, and **any-device**, there is undeniably an era of **Big Data**…”.

In 1965, Intel Co-founder, Gordon Moore, defined a term known as “Moore’s law”, which refers to an observation that the number of transistors on a processor doubles about every two years and that the cost of computers halves over the same timeframe (Shankland, 2021). Shankland (2021) reports that the current Intel Chief Executive Officer, Pat Gelsinger, has predicted that Intel will maintain, or even exceed Moore’s law over the next ten years. Moore’s Law has more or less held true since the 1970s (Shankland, 2021).

According to the Inter-American Center of Tax Administrations (CIAT) (2020:492), significant leaps in processing and storage technologies enable the use of modern technology concepts such as Big Data, machine learning algorithms and artificial intelligence. CIAT (2020:143) further claims that modern technology can drastically improve the ambit, scale and reliability of risk management processes, such as lifestyle audits.

This study is part of a larger study focussing on lifestyle audits, and this mini dissertation focusses on using modern data technology to enhance the effectiveness of lifestyle audits in the fight against corruption and tax evasion. Other parts of the larger study address whistleblowers and the protection that they enjoy, as well as the impact of personal rights on the effectiveness of lifestyle audits. The part on whistleblowers takes into consideration any data access limitations imposed on SARS by regulations such as the Protection of Personal Information Act (4/2013) – which is locally linked to the European Union’s General Data Protection Regulation (2016/679) – and possible concerns regarding whether the automatic exchange of taxpayers’ information, as prescribed by the OECD in the sharing of information between South Africa and other countries, will breach the stipulations of the Protection of Personal Information Act (4/2013). It further investigates the weight that whistleblowers carry in the practice of lifestyle audits and in the fight against corruption. The protection that whistleblowers enjoy in South Africa is discussed in terms of various legislation.

1.3. RESEARCH PROBLEM

An effective lifestyle audit is a sound indicator that matters are not what they purport to be (Odeku, 2019:10). However, one concern with using lifestyle audits as the only tool to detect corruption is that fraudulent or corrupt taxpayers might not exhibit any of the

expected traits or sudden changes in lifestyle (Odeku, 2019:11). According to Odeku (2019:11), other methods, together with lifestyle audits, should thus be considered for lifestyle audits to be effective in fighting corruption and fraud.

Another concern with lifestyle audits is that, as a mechanism to drive tax administration and compliance, they may, in practice, have a limited effect due to the inherent risks in their design and application. A lifestyle audit is a critical and legitimate tool that is used in a tax department's risk management system (Transparency International, 2021:15). However, organisations that are overly reliant on lifestyle audits to fight against corruption run the risk of the gathered evidence's not being sufficiently conclusive to prove that illicit activities are being conducted (Niven, 2021:3). In certain cases, even political interference can abuse lifestyle audits in targeting political opponents or preventing the investigation of political allies (Transparency International, 2021:13).

An additional concern when it comes to lifestyle audits is that access to reliable and adequate quality financial data is critical in the performance of such audits, but the required access to data may be subject to laborious and resource-intensive processes which limit the scale of these investigations to a limited number of taxpayers (McIntyre-Louw & De Villiers, 2020:13). As has been established in an earlier section, the use of modern technology can thus assist in automating these otherwise manual processes and could provide tax administrations with deeper insights into the information collected.

Another concern to consider is that the incredible growth in data created over time renders it increasingly harder to manually trawl through enormous volumes of information to perform lifestyle audits (Dobre & Xhafa, 2014:2); the sheer scale of data would, of necessity, cast manual lifestyle audits aside and relegate them a mere tool limited to specific circumstances. But the modern dramatic increase in storage and computing power presents a possible solution to this, as it enables computers to find relationships in data which may not otherwise be manually detectable or applied at scale. This study thus aims to gather insights into various modern data technologies and how they can be applied to enhance the fight against corruption and tax evasion.

A final concern is highlighted in the literature reviewed in this study, which makes it clear that the effectiveness of lifestyle audits could be inhibited by legitimate legal challenges regarding privacy concerns and the processing of personal information.

This study seeks to address the above-mentioned concerns by using established research methodologies, such as a questionnaire and a literature review of academic journals and textbooks.

1.4. RESEARCH QUESTION

The research question of this study is: to what extent can lifestyle audits be enhanced by using modern information technology in the fight against corruption and tax evasion in South Africa?

This study is part of a larger study where the research question is the following: can lifestyle audits be enhanced to act as an effective deterrent method in the fight against corruption and tax evasion in South Africa?

1.5. RESEARCH OBJECTIVE

The research objective of this study is to evaluate the impact of modern information technology on the effectiveness of lifestyle audits of individuals.

This study is part of a bigger project that also includes the following objectives:

- to determine whether individuals in South Africa view lifestyle audits as an effective deterrent method;
- to determine whether whistleblowers enjoy adequate protection in South Africa and the impact of inadequate protection of whistleblowers on lifestyle audits;
- to review how the protection of the rights of individuals limits SARS in obtaining vital information in order to successfully conduct lifestyle audits;
- to identify and assess the risks and limitations of placing reliance on lifestyle audits; and
- to examine any adverse factors of lifestyle audits in the fight against tax evasion and corruption.

1.6. CHAPTER OUTLINE

1.6.1. Chapter 1 – Introduction and background to the research

In this chapter, the focus has been on the introduction and background of this study. The introduction provides a brief overview of lifestyle audits, of their inherent benefits and limitations, and of the effective use of lifestyle audits by tax administrations to drive tax compliance.

1.6.2. Chapter 2 – Literature review

This chapter presents the literature review done for this study. A preliminary literature review was undertaken to analyse various resources, such as the UP Library, Google Scholar, ProQuest and SabiNet websites, in order to address the research question. A more in-depth, traditional literature review was then performed based on the key technology themes identified during the preliminary literature review. Select technologies are each discussed under separate subsections in Chapter 2.

The general perception of the effectiveness of lifestyle audits is considered in subsection 2.1. The various risks and limitations applicable to the performance of lifestyle audits are then discussed in subsection 2.2. Subsection 2.3 provides an overview of the public's view of lifestyle audits. This is followed in subsection 2.4 with a general overview of modern technologies, and some of these technologies are then elaborated on individually in subsections 2.4.1 to 2.4.4.

Subsection 2.4.1 provides an overview of the concept of Big Data, its characteristics and the various use cases of Big Data by tax administrations. The concept of data analytics is unpacked in subsection 2.4.2, which describes the different types of data analytics that can be applied by tax administrations. It also focusses on the use cases for each of these types of data analytics and identifies real-life examples for their practical use. Subsection 2.4.3 on artificial intelligence provides the reader with a reasonable understanding of the principles of artificial intelligence and machine learning. It also considers the extent to which artificial intelligence can improve the effectiveness of tax administrations in identifying and conducting lifestyle audits. The final subsection, 2.4.4, explores social network technologies, such as graph technology, to determine their potential application by tax administrators to, for example, identify relationships between taxpayers or between a

taxpayer and undisclosed assets or income. This subsection also surveys taxpayers on whether they consider the use of social media to be an effective mechanism for conducting lifestyle audits on individuals.

1.6.3. Chapter 3 – Methodology

This chapter discusses the mixed method approach to the research, which consists of a survey and a focussed literature review. Both the quantitative and qualitative aspects of the methodology are considered, and the parameters of the survey are explained, covering topics such as sampling and ethical considerations.

1.6.4. Chapter 4 – Data analysis and review

This chapter provides an analysis of the research data collected and highlights the significant research findings. The survey findings are also analysed and discussed, and a further literature review is performed to investigate the application of modern data technology in addressing challenges with lifestyle audits.

1.6.5. Chapter 5 – Conclusion

The concluding chapter addressed the manner in which the literature review and questionnaire have been able to address the research objective. It then concludes on the research question, determining whether lifestyle audits are an effective tool to enhance the fight against corruption and tax evasion.

CHAPTER 2:
LITERATURE REVIEW

For this study, a literature review was conducted by performing relevant keyword searches on websites such as UP Library, Google Scholar, ProQuest and SabiNet. The available literature on various aspects of the research topic is outlined in the sections that follow.

2.1. EFFECTIVENESS OF LIFESTYLE AUDITS

A lifestyle audit is the study of a person's lifestyle to assess if it is consistent with their declared income (Odeku, 2019:5). Lifestyle audits are triggered by reports, whistleblowing, financial disclosure and random sampling. (Transparency International, 2021:16). Random sampling considers the target's profile in terms of its characteristics and opportunism indicators, such as recent promotions (Department of Public Service and Administration, 2021:12).

Lifestyle audits are used as a monitoring tool or to identify potential red flags that require further investigation. They also aid in identifying previously undeclared income and assets (Transparency International, 2021:3). The outcomes of implementing an effective lifestyle audit can aid the public and private sectors in fighting against corruption, promoting public and private sector accountability, identifying incongruous wealth, and flagging fraud and tax evasion (Niven, 2021:3).

2.2. RISKS AND LIMITATIONS OF CONDUCTING LIFESTYLE AUDITS

There are risk factors that need to be considered when relying on the evidence gathered from lifestyle audits. One of these is that investigators may not know how to conduct a lifestyle audit, which may result in an innocent person's unexplained wealth being seen as suspicious in situations where, for example, that person has obtained wealth through the legitimate means of careful saving or inheritance. The purpose and expectations of a lifestyle audit may also be misunderstood by investigators (Niven, 2021:3).

An extravagant or flamboyant lifestyle is one of the triggers used in identifying a suspect whose lifestyle needs to be investigated further (Odeku, 2019:6). But in some instances, a change in lifestyle is not sufficiently conclusive in identifying a financial crime, as certain

individuals have multiple streams of income (Sihanya & Ngumbi, 2020:109), or some may, for example, have received an inheritance (Gillespie, 2014:123).

According to Sihanya and Ngumbi (2020:109), lifestyle audits alone may not meet the standard of evidence required to be admissible to court, as investigators are faced with certain challenges. Some of these challenges are legal considerations, such as the target's constitutional right to privacy, or the fact that lifestyle audits could intrinsically only indicate potential wrongdoing instead of providing conclusive evidence (Sihanya & Ngumbi, 2020:106, 109). Such challenges can, however, be addressed by framing the lifestyle audit as an investigation to obtain evidence rather than merely to demonstrate the presence of excess.

Audits are better suited to exposing political corruption, which involves huge sums of money, than to uncovering small currency transactions, particularly since the auditing of financial crimes is a complex and expensive exercise in that it requires specialised resources and investigation skills to uncover things like offshore assets (Sihanya & Ngumbi, 2020:109).

2.3. THE PUBLIC'S VIEW OF LIFESTYLE AUDITS

According to Tax Consulting South Africa (n.d.), there is a public view that lifestyle audits may not have the desired effect due to the low number of successful prosecutions. A possible reason for the low prosecution rates is the length of time taken to conclude an audit. SARS does not disclose the facts of an audit until the investigation has been finalised, and in other cases, the matter may be resolved before the taxpayer is prosecuted.

2.4. OVERVIEW OF THE IMPACT OF MODERN TECHNOLOGY ON CONDUCTING LIFESTYLE AUDITS

McIntyre-Louw and De Villiers (2020) highlight that a lifestyle audit is often a manual process where the auditor collects information from a variety of sources. These sources include bank statements; public data searches, such as through the Companies and Intellectual Property Commission; external lists, such as wealth ranking lists; and newspaper articles. The extensive labour and resource costs involved in manual

processes limit the scale of these investigations to a limited number of taxpayers (McIntyre-Louw & De Villiers, 2020:13). The OECD (2021:162) reports that in 2019, the functions charged with audit, investigation and other verification activities comprised 30% of global tax administration staff on average, which indicates the high number of costly resources involved in these functions.

Besides the costs of labour and resources, another issue with manual processes is that they can be vulnerable to political interference. Lifestyle audits can be abused to target political opponents or even to prevent the investigation of political allies (Transparency International, 2021:13). The use of modern technology can assist in negating the issues of cost and abuse by automating these otherwise manual processes and could provide tax administrations with deeper insights into the information collected.

Modern technologies include the use of Big Data analytics, artificial intelligence, machine learning and social network analysis. Significant technological advances in recent years have made existing concepts such as artificial intelligence and advanced data analysis on large datasets possible (Collosa, 2021). The dramatic increase in processing power and storage capabilities, the high availability of communication networks, and effective algorithms have made the aforementioned technologies viable tools to enhance the conducting of lifestyle audits (Collosa, 2021).

According to CIAT (2020:491), modern technology allows society to leap-frog from a lower technology to a higher form in a significantly shorter time frame and at a lower cost than traditional technology evolution processes. It often takes nations generations to develop and advance. CIAT (2020:491) highlights the adoption of mobile telecommunication by sub-Saharan African states as a key enabler to transcend the costly deployment of copper-line networks used by legacy fixed-line operators such as Telkom in South Africa.

The Institute for Electrical and Electronic Engineers forecasted that by 2022, Africa would have one billion mobile phones, which would lead to an increase in engineering capacity on the continent (Strickland, 2019). Furthermore, mobile money solutions, such as M-Pesa, are solving the lack of access to traditional banking infrastructure and the need for cash transactions in Africa (Strickland, 2019). These technologies can enable tax

administrations to improve information exchange and control through the provision of more electronic services (CIAT, 2020:491).

2.4.1. Big data

There are probably as many definitions of Big Data as the number of people you ask, according to Emerging Technology from the arXiv (2013) on the *MIT Techonology Review* website. Perhaps one of the more descriptive definitions is provided by the leading global solution provider, SAP Insights (n.d.):

> "Big Data is the ocean of information we swim in every day – vast zettabytes of data flowing from our computers, mobile devices, and machine sensors. This data is used by organisations to drive decisions, improve processes and policies, and create customer-centric products, services, and experiences. Big Data is defined as "big" not just because of its volume, but also due to the variety and complexity of its nature. Typically, it exceeds the capacity of traditional databases to capture, manage, and process it. And, Big Data can come from anywhere or anything on earth that we're able to monitor digitally. Weather satellites, Internet of Things (IoT) devices, traffic cameras, social media trends – these are just a few of the data sources being mined and analysed to make businesses more resilient and competitive."

Politou, Patsakis and Alepis (2019:306) point out that Big Data involves the combining of huge and otherwise separate data sets into a larger knowledge construct, often referred to as a "data lake". In a tax administration context, the data sets could consist of, for example, taxpayer data from SARS's internal database, public databases, exposés such as the Panama Papers, and even social media, such as Facebook, Twitter and Instagram. Public databases – such as company and director data from the Companies and Intellectual Property Commission, motor vehicle data from eNatis, title deed data from the Deeds Office, and exchange control data from the South African Reserve Bank – could be referenced as informational sources in the conduct of lifestyle audits by tax administrators.

Global competitor to SAP Insights, SAS Insights (2022a), suggests that Big Data consists of five dimensions, known as "the five Vs of Big Data":

- Volume: the enormous quanity of data generated and processed;
- Velocity: the speed at which data are generated by businesses and which must be handled in a timely, near real-time manner;

- Variety: the different formats in which data are presented, whether structured (such as traditional numeric data), unstructured (such as images or video), or semi-structured (such as emails);
- Variability: the fact that data flows vary from time to time, such as when the need to manage peaks when an event is trending on social media; and
- Veracity: the fact that the quality of data from a variety of sources needs to be linked, cleansed and transformed to be reliable.

Tools such as *Apache Hadoop*, *MapReduce*, *Spark* or *Cassandra* are used to prepare collected data to unlock the potential of data within organisations (CIAT, 2020:492). These tools turn raw data into insightful information with unrivalled speed and accuracy (SAP Insights, n.d.). Big Data functions as the base upon which technologies such as data analytics and artificial intelligence can thrive (CIAT, 2020). Advanced technologies such as deep learning demand the use of Big Data to detect hidden patterns and correlations, as a greater amount of high-quality data leads to better outcomes (SAS Insights, 2022a).

CIAT describes an example where billions of electronic tax invoices comprise a dataset which is stored on geographically distributed nodes or servers using the *Hadoop* distributed file system (CIAT, 2020:493). The data processing tool, *MapReduce*, can process thousands of tax invoices with great efficiency, in parallel, at near real-time speeds (CIAT, 2020:493). Fraud scoring models can be applied to the resulting information to assist with false tax invoice detection (CIAT, 2020:493). The information could then be linked to other databases to prepopulate VAT returns or customs and excise declarations (CIAT, 2020:493).

In Spain, the tax administration entity, *Agencia Estatal de Administración Tributaria*, relies on Big Data technology to identify wealthy taxpayers who reside abroad for tax purposes. This move was triggered by a number of Spanish YouTube celebrities' moving their residency to Andorra, a low tax jurisdiction (Pelaez-Fernandez, 2021). The tax administration entity processes over seventy information sources to select taxpayers, with assets, who could be evading tax (Pelaez-Fernandez, 2021).

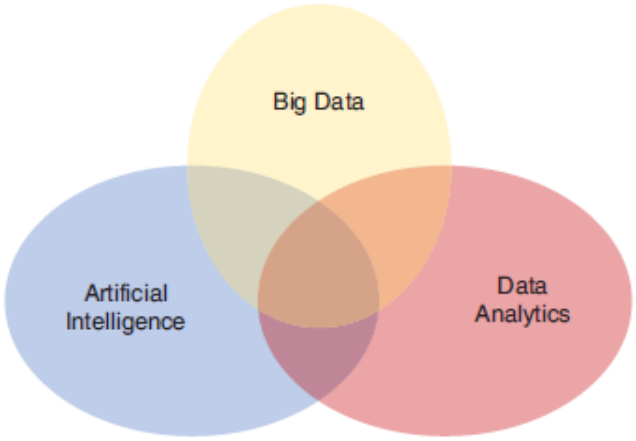
Her Majesty's Revenue and Customs (HMRC) IT department in the United Kingdom received an award for the United Kingdom's Best Big Data Project in 2014 for its *Connect* system, and it is continually upgrading its capabilities (Rigney, 2016). *Connect* combines

more than 30 departmental and commercial databases and crossmatches one billion third party and internal data items to provide the HMRC with a comprehensive system-wide view of a taxpayer's affairs (SAS, 2013). The system uses Big Data solution provider, SAS's technology to identify an individual, a family unit and a company as separate entities, and it looks at commonalities that link these entities together (Rigney, 2016). Rigney (2016) describes how *Connect* allows the HMRC to analyse tax data, information from credit agencies, social networks (to detect lifestyle information), information from driver and vehicle licensing agencies, eBay and Autotrader listings, information from insurance companies and hospitals, and ticket sales from airline companies (Rigney, 2016). Through this approach, the HMRC has managed to reduce the number of staff involved in risk and audit operations by 40%, attributable to greater efficiency and increased tax collections (SAS, 2013).

Mexico's tax administrator, *Servicio de Administración Tributaria*, has similarly automated its control processes in dealing with a large number of taxpayers (CIAT, 2020:505). Approximately 74 processes have been developed, which encompass everything from calculation reperformance to the cross-checking of information (CIAT, 2020:505). This has enabled the SAT to perform electronic audits of over two million companies, a staggering contrast to the limited number of audits that could be processed manually (CIAT, 2020:505).

It is difficult to determine the boundaries of Big Data, data analytics and artificial intelligence, as artificial intelligence is employed as an interplay between Big Data and data analytics solutions (CIAT, 2020:494). The Venn diagram in Figure 1 shows this inter-relationship.

Figure 1: Relationship between Big Data, data analytics and artificial intelligence



Source: CIAT, 2020:494.

2.4.2. Data analytics

CIAT (2020:494-495) describes data analytics as the autonomous or semi-autonomous application of advanced methodologies and algorithms to turn data into in-depth knowledge and to make realistic predictions or to establish behavioural traits based on the data. Its scope of application generally goes further than traditional business intelligence tools and uses inductive statistics and concepts of non-linear regression to identify causality and relationships (CIAT, 2020:494). Large amounts of data are required for the use of advanced data analytical tools (CIAT, 2020:494). These tools can enable instantaneous decision-making, for example, in high fraud areas where prior government approval is required on electronic documents (CIAT, 2020:495). To implement instantaneous decision-making, Chile made it compulsory from 2018, onwards for all taxpayers to issue invoices electronically, enabling the Chilean government to run data analytical tools to review and approve these invoices (CIAT, 2020:503).

Four types of data analytics are used to provide the user with hindsight, insight and foresight:

- descriptive analytics;
- diagnostic analytics;
- predictive analytics; and
- prescriptive analytics (CIAT, 2020:495).

These are unpacked in the next four subsections to determine each type's effectiveness in the conduct of lifestyle audits by tax administrations. These subsections focus on the use cases for each type of data analytics and identify real-life examples for each type's practical use.

2.4.2.1. Descriptive analytics

Descriptive analytics is the foundational and most common data analytics method used by organisations (Morris, 2021). It assists organisations in understanding what has happened to date, but it does not dissect why or forecast what may happen in future. According to Morris (2021), descriptive analytics needs to be combined with other analytical methods to obtain better understanding of the data being analysed (Morris, 2021).

Organisations collect and combine high volumes of data, and it is often impossible to make sense of this data without further analysis. Descriptive analytics is the primary step in analysing raw data and uses simple mathematical operations to derive statistics, such as average revenue per taxpayer (Morris, 2021). Descriptive analytics is used in standard business intelligence applications to calculate key performance indicators and to track goal financial metrics. Raw data is aggregated, cleansed and summarised, and basic mathematical operations are applied, after which the data is presented. The information is typically visually presented in dashboards, charts or reports (Morris, 2021).

An example of the use of descriptive analytics is in measuring the level of revenue collected by tax administrations (CIAT, 2020:495).

2.4.2.2. Diagnostic analytics

The focus of diagnostic analytics is to identify the origin or causes of trends (Morris, 2021). Whereas descriptive analytics is concerned with what has happened, diagnostic analytics relates to why it has happened, locating the reason or possible causes of the occurrence (Morris, 2021).

Diagnostic analytics detects relationships between business data using analytical techniques, such as correlation analysis, data mining and data drilling (Morris, 2021). Drilling down into the data can unpack the data into detailed information to detect which variables are driving the observed trend (Holliday, 2021). The process of data mining involves discovering unknown patterns and trends through the orderly analysis of diverse

historical outcomes and anomalies (Rawat, 2021). Thereafter, methods such as regression, sensitivity and time-series analysis are used to identify correlations between the variables (Anand, 2022). Machine-learning logic, which is coded to rely on statistical probabilities, reinvents the concept of diagnostic analytics to enable the processing of the enormous volumes of data and complexities associated with Big Data (Rawat, 2021).

One area where diagnostic analytics has proven to be helpful is in the realm of short-term rentals, where, without such analytics, tax administrations can miss out on large amounts of tax revenue (Havich, 2021). According to Nick Del Pego, CEO of Deckard Technologies, four major platforms are important to the tracking of short-term rentals: AirBnB, Booking.com, Tripadvisor and Expedia (Havich, 2021). Data mining techniques are used to track the occupancy levels of properties listed on these sites, as the back-end databases of these sites are linked; if a property is rented on one platform, it is updated as no longer available across all of these platforms (Havich, 2021). The average nightly rate and how long a property has been rented for can be collected from information available to the public. The tax administration of the city of Big Bear Lake, California has used diagnostic analytics to detect taxpayers who are under-declaring their rental income and has managed to collect tens of thousands of dollars using this approach (Havich, 2021).

2.4.2.3. Predictive analytics

Predictive analytics builds on the solid foundations laid by descriptive and diagnostic analytics; it studies various hypothetical scenarios to forecast what might happen in the future (CIAT, 2020:495). A page on the SAS Insights website, entitled “Predictive analytics: what it is and why it matters”, describes it as the use of data, statistical algorithms and machine learning to determine the likelihood of future outcomes, based on historical data (SAS Insights, 2022b). The objective of predictive analytics is thus to provide a best assessment of future events (SAS Insights, 2022b).

Historical or known outcomes are used to construct a model which can forecast results based on new data (SAS Insights, 2022b). Classification and regression models are the two types of predictive model. Classification models project which class a data subject will be a member of, for example, whether a taxpayer will be a collection risk and which collection strategies will be optimal (SAS Insights, 2022b). Regression models forecast a figure, such as the aggregate corporate tax collections over the next year, based on

current economic indicators (SAS Insights, 2022b). The prediction techniques used most frequently for extremely complex relationships are decision trees, regression networks and neural networks (SAS Insights, 2022b).

Predictive analytics is used in fraud detection and in the reduction of risk (SAS Insights, 2022b). Tax administrations can predict fluctuations in tax collection or identify, in advance, taxpayers with the potential risk to default, depending on stress experienced in a particular sector of the economy (CIAT, 2020:495).

The HMRC, in the United Kingdom, has implemented predictive analytics to improve compliance levels in its debt management system. The system, called Analytics for DEbtor Profiling and Targeting (ADEPT), links debt information (such as whether payments are made or missed) with socio-demographic data (Capgemini, 2014). ADEPT's decision-rules engine predicts, for a specific debt, which sequence of collection efforts has a higher potential for successful collection, and the debt management system allocates cases to the appropriate contact channel for collection (CIAT, 2020:505). The system adapts based on the taxpayer's response, or lack thereof, to choose the most effective collection strategy at any stage of the collection cycle (CIAT, 2020:505). ADEPT has assisted the HMRC to collect over £3 million in additional debt (Capgemini, 2014).

Tax administrators could apply forecast modelling to evaluate taxpayer risks or to identify and investigate fraud and errors (Microsoft & PwC, 2018:12). Various countries' compliance strategies have been adapted to follow a risk-based approach in conducting audits using data analytics technologies (Microsoft & PwC, 2018:22). Under such strategies, tax administrations adapt their audit approach based on the risk profile of the taxpayer (Microsoft & PwC, 2018:22).

2.4.2.4. Prescriptive analytics

The field of prescriptive analytics determines recommendations on what an organisation should do in the future (CIAT, 2020:495). It prescribes the path to follow to achieve the desired outcome, and it differs from predictive analytics which focusses on what the outcome of various scenarios could be.

Predictive analytics functions using various "if" and "else" statements and algorithms, and it makes decisions based on a specified set of criteria (Cote, 2021). Cote (2021) notes that

although algorithms make recommendations, this is not a substitute for human ingenuity. Predictive analytics involves techniques such as complex event processing, simulation, and recommendation engines.

Fraud detection systems, used by banks and tax administrations, can leverage algorithms which have been trained using an individual's historical bank transactions. The algorithms can identify transactions with a specific counterparty which suddenly increase or decrease significantly (Cote, 2021). By analysing patterns and sequences, alerts can be raised, which then make recommendations for investigators to initiate an audit or to intervene at customs processing points.

2.4.3. Artificial intelligence

Artificial intelligence is described as the use of machines to analyse information, predict outcomes based on statistical probabilities, make decisions using logical rules, and evaluate those decisions critically (CIAT, 2020:496). The machines can then apply machine and deep learning to adjust their logical rules to further enhance their efficiency and accuracy. Artificial intelligence refers to systems that operate in the area generally considered part of human decision-making and in cognitive actions such as learning and problem solving (Greengard, 2019).

Artificial intelligence learns through trial and error, and Big Data can provide the necessary iterations to train the learning model (Patrizio, 2018). Furthermore, the outcomes of diagnostic, predictive and prescriptive analytics can improve the algorithms and increase the speed of learning (Patrizio, 2018). These artificial intelligence systems can interpret the outcomes of their previous decisions and alter their behaviour to constantly improve their decision-making (Patrizio, 2018).

New Vantage Partners, a firm which specialises in data-driven business leadership, publishes an annual survey entitled "Data and AI leadership executive survey". The participants consist of C-level executives of large corporations who are canvassed for their views on their investment in artificial intelligence and the returns they are achieving (New Vantage Partners, 2022). In its 2022 edition, the survey highlights that 92% of companies report that they are achieving results from their artificial intelligence and data investments and that 92% of companies accordingly expressed their intentions to increase their

investments into these areas (New Vantage Partners, 2022:3). Twenty-six per cent of respondents to the survey reported that they have artificial intelligence systems in widespread production, and a further 70% reported that they have artificial intelligence systems in pilot phase or in limited production (New Vantage Partners, 2022:12).

Martin Fiore, Regional Managing Partner at Ernst and Young LLP, points out that, typically, a tax department spends 80% of its time on collecting data, with the remaining 20% on analysing the data (EY Global, 2019). It takes 75 hours, on average, for a human to process 10 000 lines of transaction data, whereas artificial intelligence needs just one minute (EY Global, 2019). These tools can therefore free up a tax department's time to add value in other parts of the organisation (EY Global, 2019).

In a study by González and Velásquez (2013), the authors constructed an artificial intelligence model to predict the presence of fraudulent tax invoices. They obtained tax data from the tax administrator of Chile, the *Servicio de Impuestos Internos*, on 582 161 enterprises. This data included electronic tax invoices, which have been mandatory in Chile since 2018 (CIAT, 2020:503). The data was split into two groups: a training dataset and a testing dataset (González & Velásquez, 2013). The training dataset represented 70% of the data (González & Velásquez, 2013). The artificial intelligence model was trained, using the training dataset, to detect variables which indicate a higher presence of fraudulent invoices (González & Velásquez, 2013). The variables are shown in the figure below.

Figure 2: Variables associated with fraudulent and non-fradulent behaviour in false invoices

MICRO AND SMALL				
Variable	Period	Concept	No Fraud	Fraud
Invoice Debits	t	VAT		↑
Issued invoices			↓	
VAT				↑
Ratio credits invoices/total credits	t	Ratio Income VAT	↓	↑
Ratio tax credit balances/ credit mean			↑	
Ratio costs/assets				↑
Stamping frecuency	t-2	Stamping		↑
Ratio issued invoices/stamping invoices			↓	↑
Crimes and irregularities	< t	Historical Behavior		↑
Negative previous audits			↑	↓
Positive previous audits				↑
MEDIUM AND LARGE				
Variable	Period	Concept	No Fraud	Fraud
Tax credit balances	t	VAT	↑	↓
Ratio credit invoices/total credits	t	Ratio Income VAT	↓	↑
Ratio costs/assets			↓	↑
Age of company	t	Characteristic		↓
Formalization of accounting				↓
Economic activities				↑
Amount of orders to pay	< t	Historical Behaviour		↑
Failures to answer notifications				↑
Irregularities with invoices			↓	↑

Source: (González & Velásquez, 2013:1434)

The biggest variable related to an increased fraud risk was found to be the percentage of tax credits to total credits generated by invoices. Meanwhile, the biggest variable related to a no fraud condition was a previous negative audit (no adjustments made) (González & Velásquez, 2013:1435).

For micro and small enterprises, González's and Velásquez's model accurately predicted fraudulent invoices in 92% of the cases, and for medium and large enterprises, the model accurately predicted fraudulent invoices in 89% of the cases (González & Velásquez, 2013:1435).

Mexico's tax administrator, SAT, has similarly used artificial intelligence to collect and process data from a high volume of electronic invoices (Collosa, 2021). Through this approach, SAT has managed to increase tax collections by 3% of GDP (Collosa, 2021).

In South Korea, the National Tax Service has developed an artificial intelligence system which analyses various invoices, cash receipts, and data of relatives and friends of the taxpayer being investigated (Sae-jin, 2020). The agency claims that the system is able to detect tax evasion even where borrowed accounts are used (Sae-jin, 2020). On a similar basis, the system can analyse keywords used in foreign exchange payments to combat offshore tax evasion (Sae-jin, 2020).

2.4.4. Social network analysis

A social media network consists of nodes which are linked together in a graph (Lismont, Cardinaels, Bruynseels, De Groote, Baesens, Lemahieu & Vanthienen, 2018:12). Each firm or individual is a node in the network. Should there be a connection or relationship (called edges) between nodes, they are connected with a link. Traditional relational databases can only connect one data point to another at any time; connecting to two or three levels deep exponentially increases the amount of data to be analysed (Avidon, 2021). The efficiencies enabled by graph technology, however, provide tax administrations with the ability to process between 15 and 20 connections deep (Hendry, 2021). This is vital, as fraudsters typically hide their actions beyond the realms of traditional database models – at between 8 and 20 connections deep (Hendry, 2021).

Lismont *et al*. (2018) studied the prediction of tax avoidance by means of social media analytics. Based on findings that companies obtain, through their directors and the skills required to execute corporate strategies, Lismont *et al.* (2018) investigated firm and director characteristics and their linkages in explaining tax avoidance (Lismont *et al*., 2018:1). Entities with directors in common are linked to each other and to the directors. Previous directors are still linked to their previous entities, but a decay factor has been built into the analysis rules to reduce the significance of the previous director variable (Lismont *et al.*, 2018:13). Where a director has existing linkages to entities classified as having a low effective tax rate, the risk for more low tax entities in the director's associated network increases (Lismont *et al.*, 2018:3). Based on the social media linkages of directors with low tax characteristics, Lismont *et al.*'s social media analytics system was able to increase the accuracy of prediction by 7% (Lismont *et al.*, 2018:27).

In recent years, social media has been used by various countries' tax administrations as a source of information for tax collection (Collosa, 2021). One example is that the United

States has used data mining of social media to recover $300 billion in taxes annually (Collosa, 2021). Another example is that the Australian Tax Office is constructing a graph database called the Automated Network and Grouping Identification Engine to help its tax evasion division to connect multi-level relationships between taxpayers, and these relationships could highlight patterns that may be of interest to tax administrators (Hendry, 2020).

Graph algorithms, such as those used by Netflix to recommend films to its viewers based on common tastes, could also be used to identify tax defrauders who share similar characteristics (CIAT, 2020:154). Similarly, the strategies and technologies used to visualise and control the spread of pandemics, such as COVID-19, could be used to monitor how fraud is being perpetuated (CIAT, 2020:154). Furthermore, taxpayer networks allow for the analysis of wealth through ownership relationships and the interaction between related business (CIAT, 2020:154).

2.5. CONCLUSION

The harnessing of Big Data and the connecting of various data sources is the foundation of modern technologies in today's complex and data-rich environment. This enables a single view of a taxpayer's affairs across multiple systems and improves efficiencies. Data analytics can be applied in order, from descriptive analytics to diagnostic, predictive and ultimately prescriptive analytics, and the information dividend unlocked increases significantly, if not exponentially, at each level implemented. These analytics can then be upscaled through the integration of artificial intelligence and machine learning. Social network analysis provides another new dimension to analytics and interconnects taxpayers to provide a holistic view of a taxpayer's affairs and linkages with related entities.

The CIAT recommends that tax administrations invest in information technology, application systems, transaction processing, and data mining (CIAT, 2020:164).

CHAPTER 3:
RESEARCH DESIGN AND METHODOLOGY

3.1. RESEARCH DESIGN

Gay, Mills and Airasian (2009:483) describe a mixed method research design as a study which combines both qualitative and quantitative research methods in a unitary ecosystem. The purpose is to leverage the strengths and synergies present in qualitative and quantitative research to establish an improved understanding of the research subject versus using each of these methods solitarily (Gay *et al.*, 2009). Additionally, according to literature, mixed method studies demand considerable time and resources from researchers (Gay *et al.*, 2009:483).

Gay *et al.* (2009:483) explain that qualitative research methods are inductive in nature, whereas quantitative research methods are deductive. Participants' perspectives are analysed by qualitative researchers, whilst quantitative researchers focus on the objective reality there to be discovered. Furthermore, in qualitative studies, the focus is on describing and understanding relationships, whereas in quantitative studies, the focus is on cause and effect.

A qualitative research method focusses on words instead of numerical data. It involves studying the quality of the different occurrences and the context in which a research observation appears (Busetto, Wick & Gumbinger, 2020:1). A qualitative research method is further described as the use and collection of empirical data, such as case studies, interviews, or surveys (Gillespie, 2014:8). Quantitative research methods, however, focus on collecting and analysing numerical or statistical data.

In addressing the research problem of this study, focus was placed on analysing and investigating factors which could enhance the effectiveness of lifestyle audits. This was done by researching and reporting on existing data and by collecting new data through a questionnaire. The questionnaire mainly follows a quantitative approach but includes two questions with a qualitative approach.

The methods and procedures used in the research are defined in the sections that follow.

3.2. SAMPLING

There are two types of sampling methods used when conducting research: non-probability sampling, defined as a non-random sampling technique that is based on convenience or other criteria; and probability sampling, which is based on random selection (McCombes, 2022). In this study, a non-probability sampling technique was employed in investigating specific topics to address the research problem.

When applying non-probability sampling, there are four types of sampling method a researcher may choose from: convenience sampling, voluntary response sampling, purposive sampling and snowball sampling. The purposive sampling method was applied in this study. This method involves using the expertise of the researcher to select the most useful sample data to fulfil the purpose of the research (McCombes, 2022).

To achieve a reasonable level of representativity in this study, the sampling focussed on individuals who were older than 18 years old and who had entered the workforce. A diverse group of individuals of different sexes, from demographically different age groups, and falling within various tax brackets were approached to complete the questionnaire.

3.3. DATA COLLECTION AND ANALYSIS

In this study, primary data was sourced from voluntary participants by distributing a questionnaire to address specific questions which assisted in addressing the research objective. Secondary data, which is also referred to as existing data, was collected from Google Scholar and ProQuest to address the research objective and was used in conjunction with the primary data collected.

The data that was collected by means of the questionnaire was captured on Survey Monkey and then analysed qualitatively and quantitatively using *Microsoft Excel*. The quantitative data collected was analysed statistically to uncover common patterns, and the qualitative data was classed by theme and analysed thematically.

3.4. TRUSTWORTHINESS

The data for this study was collected from reputable and reliable databases, such as Google Scholar, ProQuest and eBooks which were accessed from the University of

Pretoria's Department of Library Services website. Peer-reviewed academic journals, books and websites were also analysed for credibility.

3.5. ETHICAL CONSIDERATIONS

The research proposal for this study was submitted to the University of Pretoria's Faculty of Economic and Management Sciences Ethics Committee for ethics approval before data could be collected. Ethical clearance was obtained on 13 May 2022.

3.6. QUESTIONNAIRE

To determine the willingness of South Africans to partake in the practice of whistleblowing and the public's general opinion on lifestyle audits, a questionnaire was designed that consists predominantly of multiple-choice questions and includes two open-ended questions. Thus, while this approach typically falls under quantitative research, there is also a qualitative element to the questionnaire.

The survey was conducted on an anonymous cloud platform, Survey Monkey. The aim was to have between 80 and 120 participants in this study. Exactly 100 responses were ultimately collected. The respondents were all over the age of 18 and had entered the workforce. The aim was to make sure that the respondents were demographically varied insofar as age category, annual income, and sex. The questionnaire, as given to the participants, is presented in Annexure A.

The link to the questionnaire was distributed by the team members of the larger research project into lifestyle audits on business-oriented platforms such as LinkedIn, Facebook and WhatsApp, as well as via email. Select questions pertaining to the use of modern technology to conduct lifestyle audits were analysed as part of this study; these are question numbers 3, 4, 5, 6, 10, 11 and 12.

CHAPTER 4:
DATA ANALYSIS AND REVIEW

4.1. QUESTIONNAIRE FINDINGS

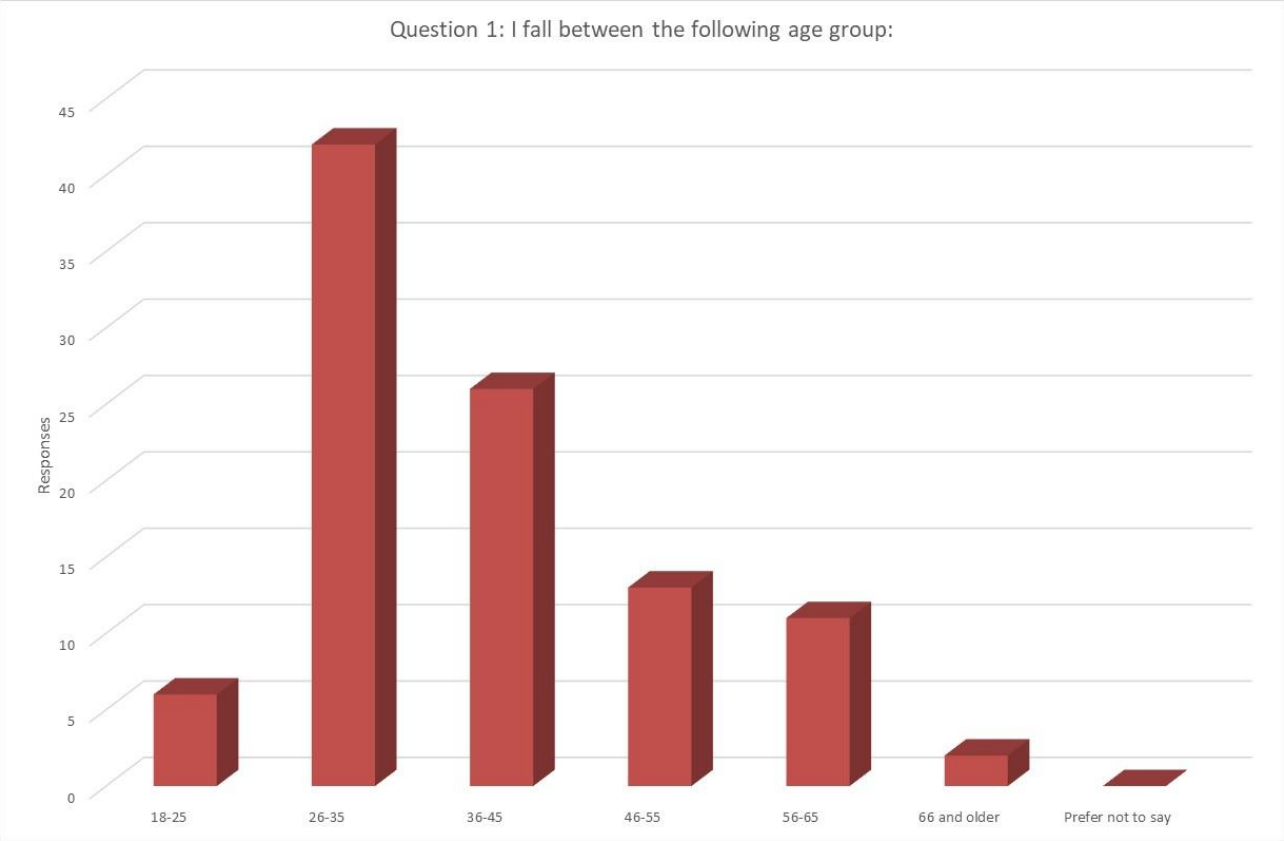
The questionnaire was electronically designed using a paid subscription on Survey Monkey. It was configured for responses to be captured anonymously, removing any identifying fields from respondents' personal and sensitive information. The team members of the larger research project distributed the link from 22 May 2022, using emails and WhatsApp messages to colleagues, acquaintances and family members. The link was also posted on the team members' individual LinkedIn and Facebook profiles.

The survey remained open for completion for one month – until 22 June 2022. Responses were exported to *Microsoft Excel* and then categorised and analysed qualitatively and statistically. The responses are analysed and discussed for generic profiling questions and then specifically for the select questions pertaining to the use of modern technology to conduct lifestyle audits: question numbers 3, 4, 5, 6, 10, 11 and 12. These questions were re-numbered on Survey Monkey as questions 8, 9, 10, 11, 15, 16 and 17, respectively, as the general demographical questions on Survey Monkey were numbered as questions 1 to 5.

4.1.1. General profile of respondents

Responses were collected from 100 respondents, of which 80% were employed, 13% were entrepreneurs or business owners, 4% were retired, and 3% were unemployed. Female respondents represented 64%, males 35%, and 1% preferred not to give their sex. Representation was obtained across a wide age spectrum, as shown in Figure 3, with the majority of the respondents' being of working age, between 18 and 65 years old.

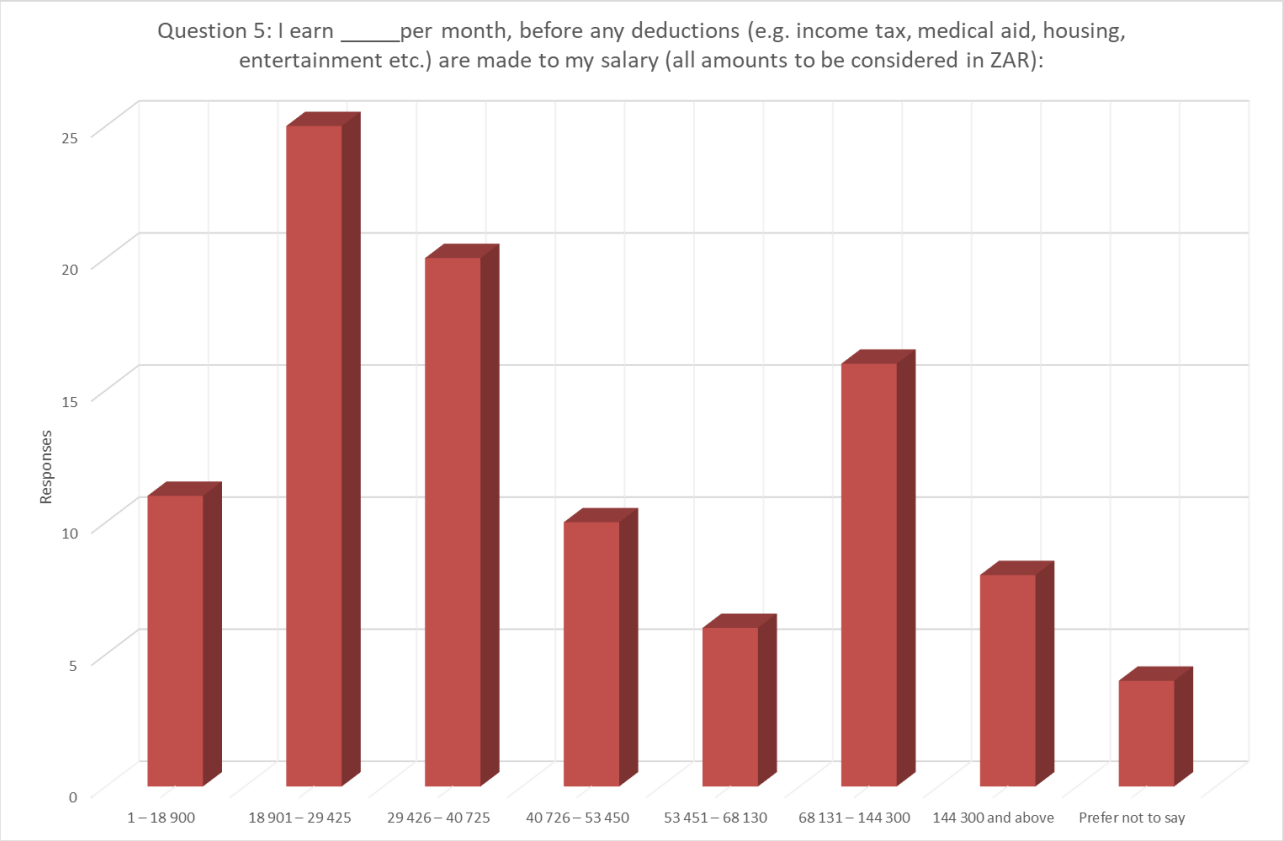
Figure 3: Age distribution of respondents



Source: Created by author.

Income brackets were based on individuals' income tax brackets converted to a monthly figure. Respondents from the various salary brackets participated, covering middle and higher income categories, with a bias towards the middle income range (the second and third income tax brackets, ranging from R18 901 to R40 725 per month). High income categories are considered those earning R40 726 per month and above. Figure 4 shows the income distribution of respondents across the various monthly income tax brackets.

Figure 4: Reported monthly salary classification of respondents

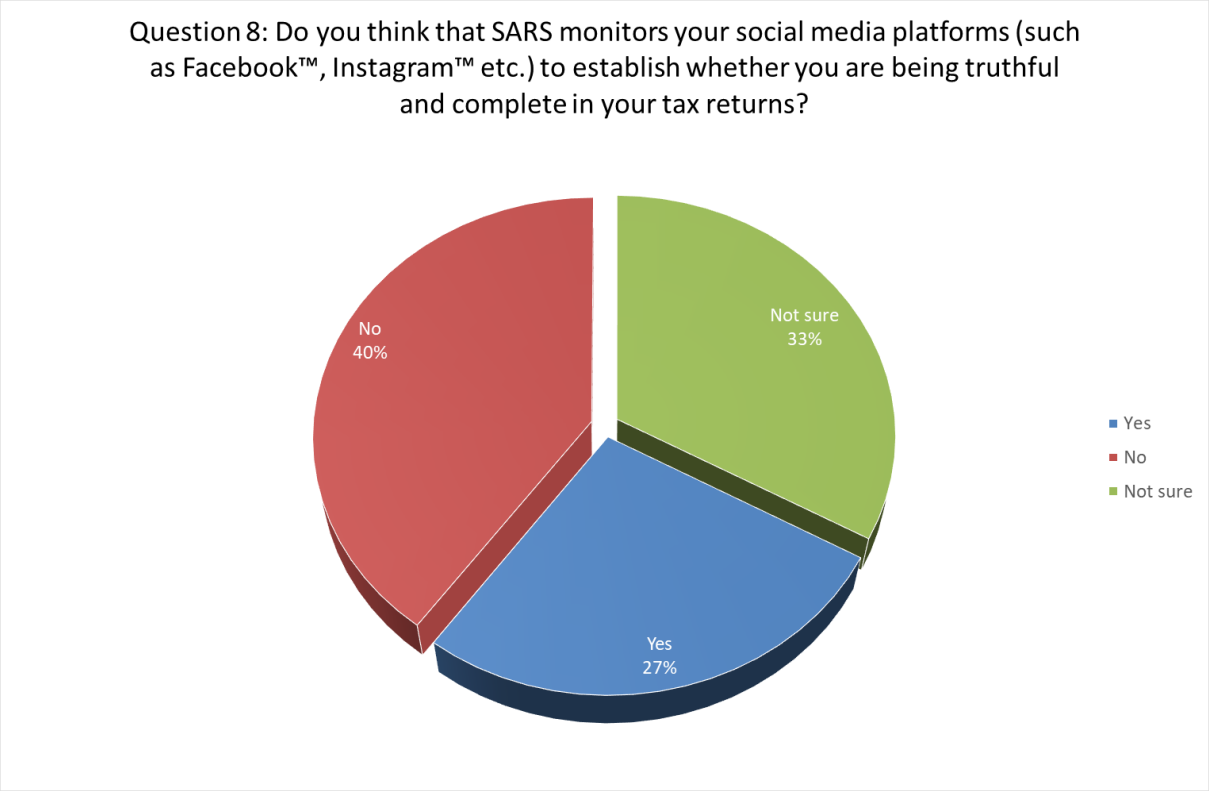


Source: Created by author.

It is clear from Figure 4 that the responses received represent a diverse sample and, therefore, that the conclusions made are valid and contribute value to society.

4.1.2. Response to question 3 (question 8 on Survey Monkey)

Figure 5: Taxpayer perception of social media monitoring by SARS

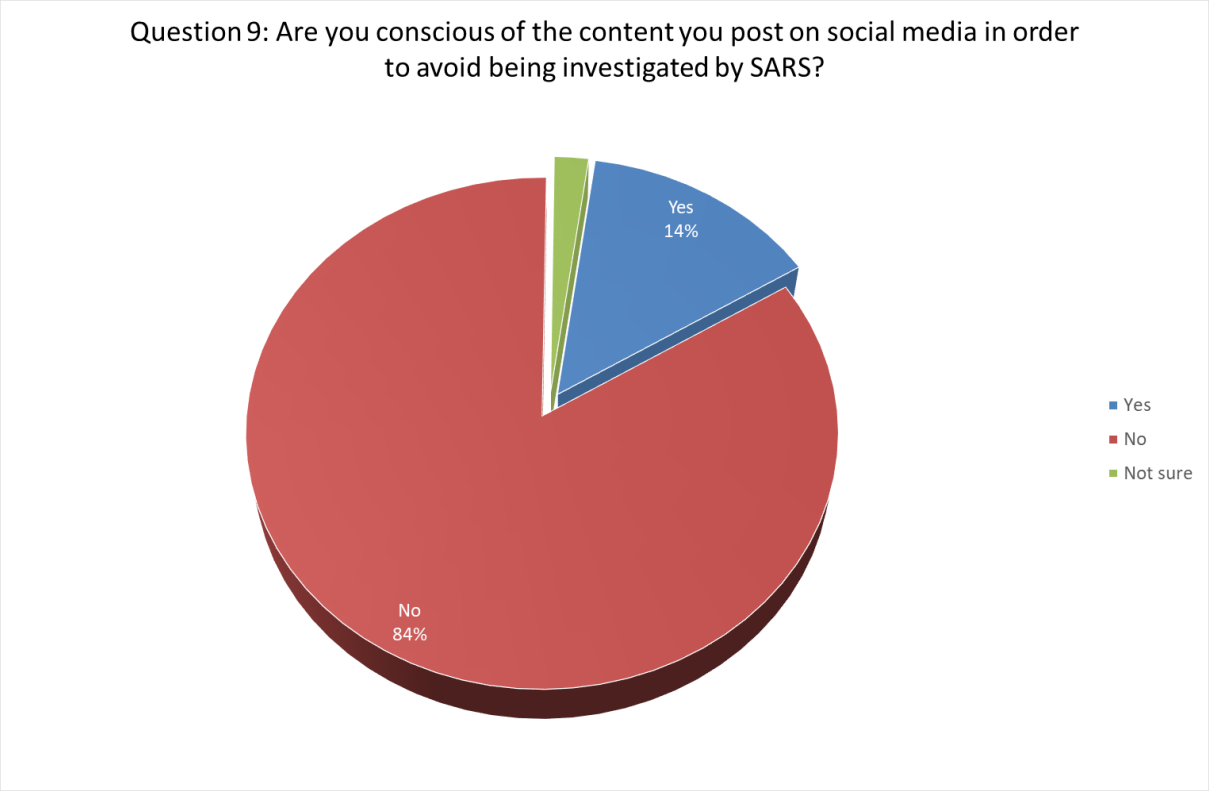


Source: Created by author.

Figure 5 shows that 40% of respondents did not think that SARS monitors social media such as Facebook and Instagram; 27% thought that SARS does monitor social media; and 33% were unsure. This demonstrates either that SARS may not utilise social media to its full potential, such as through the application of social media analysis, or that taxpayers are unaware of SARS's actions. Greater publicity may thus be required to increase awareness and therefore to act as a deterrent to potential tax fraud.

4.1.3. Response to question 4 (question 9 on Survey Monkey)

Figure 6: Awareness prior to posting on social media

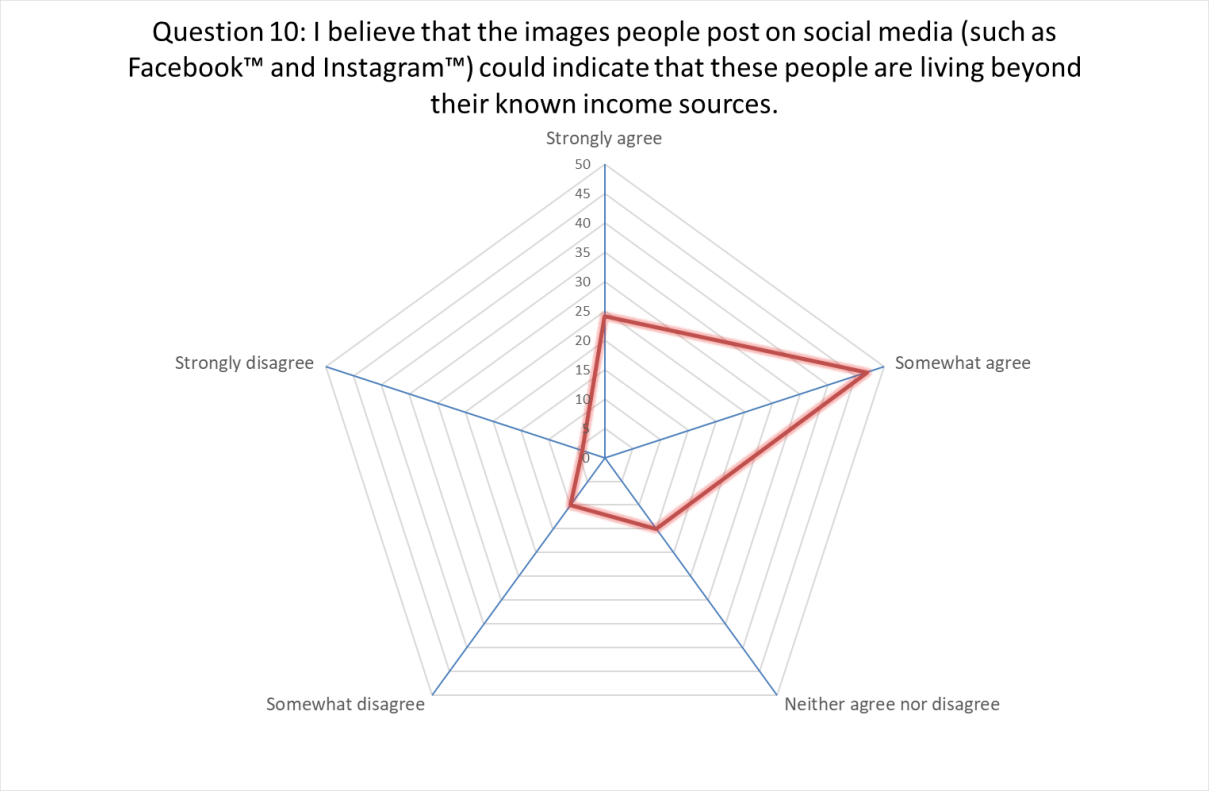


Source: Created by author.

Figure 6 shows that a resounding 84% of respondents were not conscious of the content they post on social media, to avoid a tax investigation; 14% were conscious of their content for this reason; and 2% were unsure of how to respond to the question. This further indicates that taxpayers do not perceive monitoring or the lack thereof to be a threat.

4.1.4. Response to question 5 (question 10 on Survey Monkey)

Figure 7: Images posted on social media may indicate excessive lifestyles



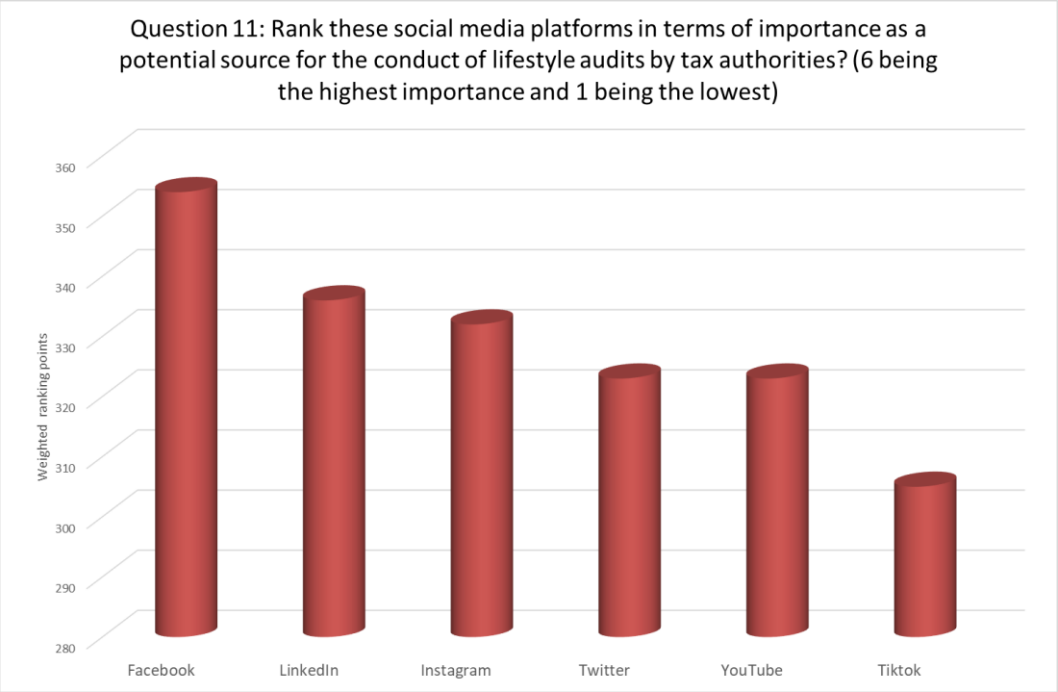
Source: Created by author.

Figure 7 shows that 71% of respondents agreed that the images people post on social media could indicate that they are living beyond their known income sources (24% strongly agreed, and 47% agreed to some extent); 15% of respondents neither agreed nor disagreed; 10% somewhat disagreed; and 4% strongly disagreed. This demonstrates that taxpayers feel that individuals are, at times, less than modest about their lifestyle assets and that these images could be a useful source for SARS to monitor, which may suggest the need to conduct a lifestyle audit. Although taxpayers have the right to spend their hard-earned wealth according to their personal preferences, taxpayers also have a duty to declare their income and capital gains and first pay their fair share of tax.

4.1.5. Response to question 6 (question 11 on Survey Monkey)

The respondents of the survey ranked various social media platforms in terms of importance as a source in the performance of lifestyle audits by tax administrations, as shown in Figure 8.

Figure 8: Ranking of social media platforms as source for lifestyle audits



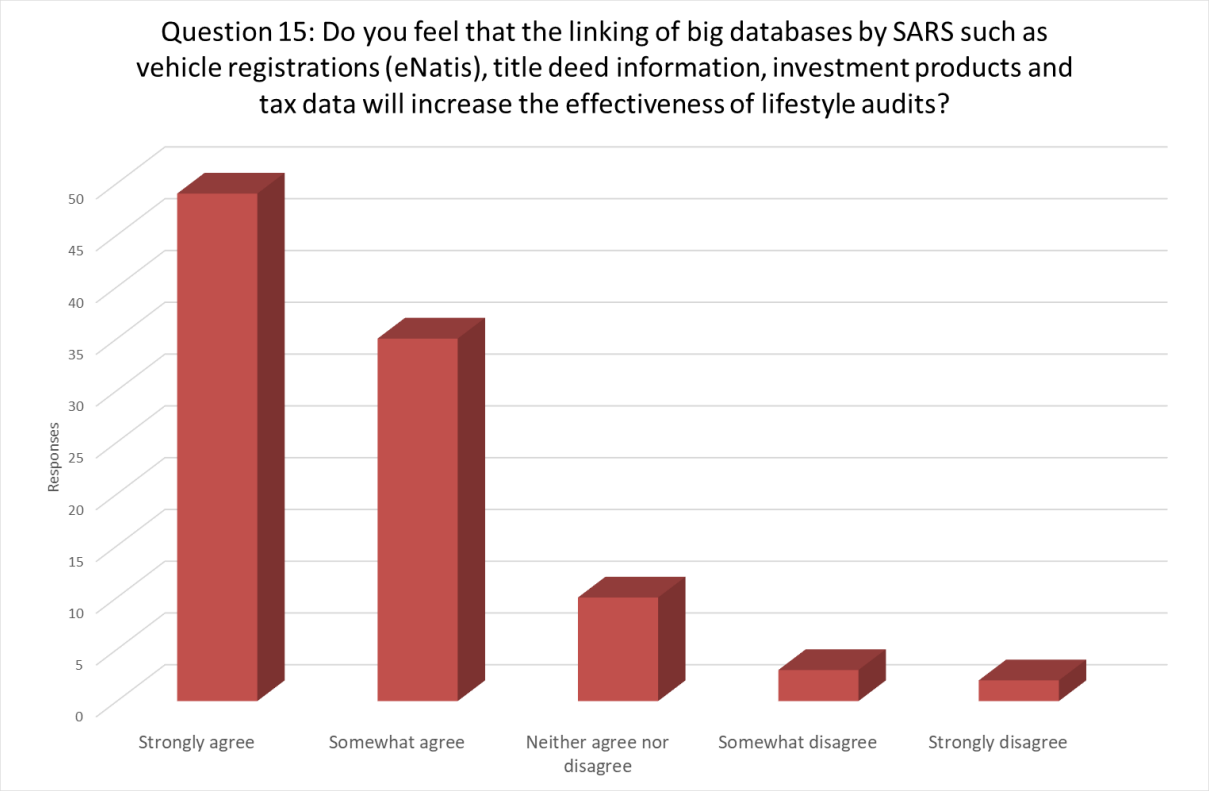
Source: Created by author.

As seen in Figure 8, Facebook was given the highest ranking, whereas Tiktok received the lowest ranking, which was significantly lower than other platforms. LinkedIn, being more focussed on professional relationships, was the second highest ranked.

Instagram and Facebook could both be good sources for image harvesting, while LinkedIn and Facebook could drive graph analysis to demonstrate relationships between entities. This data could then be analysed using Big Data in the conduct of lifestyle audits.

4.1.6. Response to question 10 (question 15 on Survey Monkey)

Figure 9: Effectiveness of Big Data technology in lifestyle audits

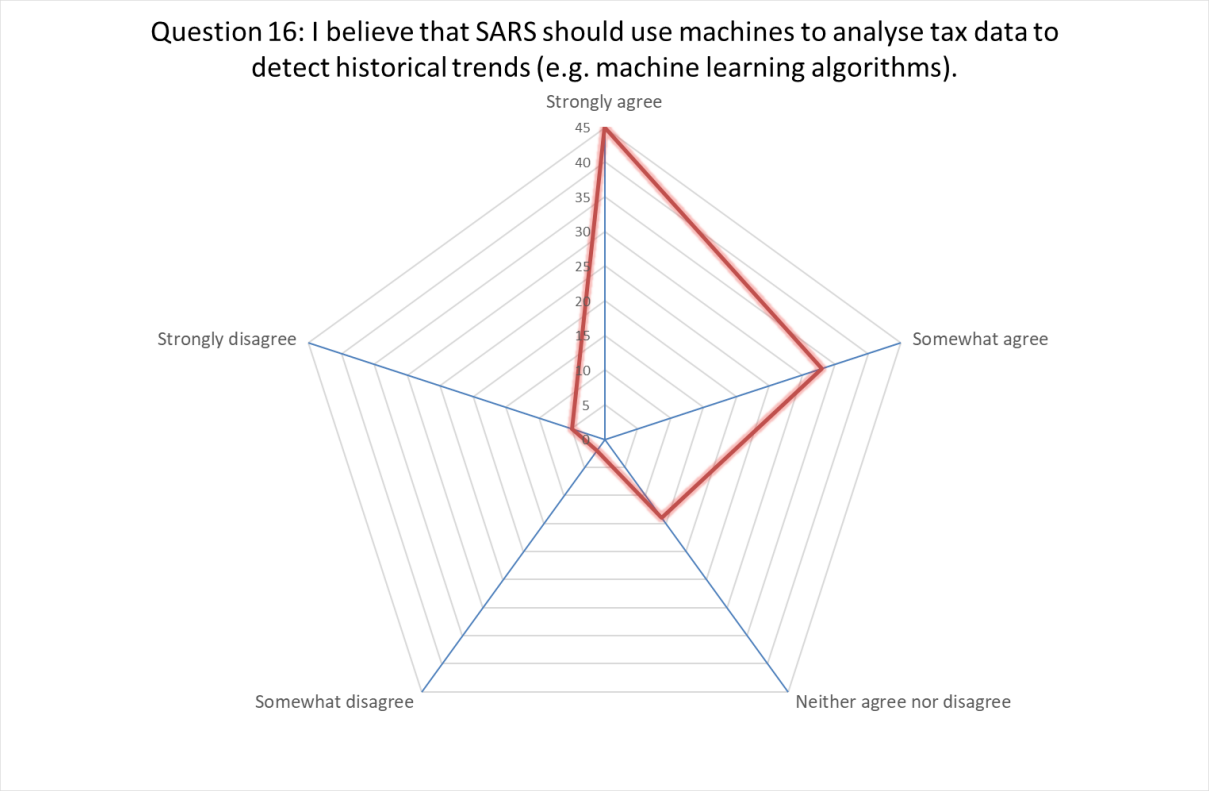


Source: Created by author.

As shown in Figure 9, regarding Big Data, 84% of respondents agreed that the linking of various public databases would increase the effectiveness of lifestyle audits (49% strongly agreed, and 35% agreed to some extent); 10% neither agreed nor disagreed; 3% somewhat disagreed; 2% strongly disagreed; and 1% left the question unanswered. This is a strong indicator that the respondents expect that further expansion of Big Data would be effective in the context of tax administration.

4.1.7. Response to question 11 (question 16 on Survey Monkey)

Figure 10: Use of machines to analyse tax data



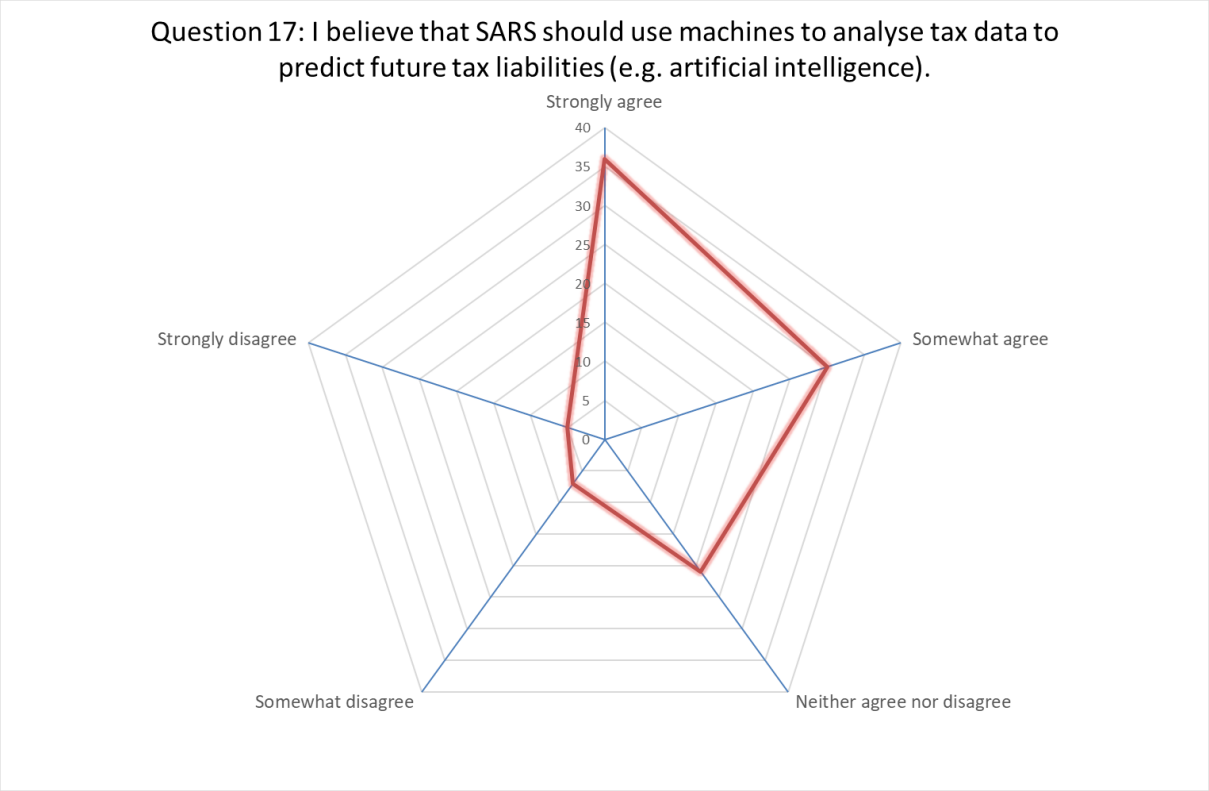
Source: Created by author.

As shown in Figure 10, 78% of respondents agreed that SARS should use machines (such as machine learning) to analyse tax data to detect historical trends (45% strongly agreed, and 33% somewhat agreed); 14% neither agreed nor disagreed; 2% somewhat disagreed; 5% strongly disagreed; and 1% left the question unanswered.

Descriptive and diagnostic analytics could be accelerated with machine learning to improve tax administrators' understanding of historical data and the key drivers thereof.

4.1.8. Response to question 12 (question 17 on Survey Monkey)

Figure 11: Use of machines in predicting tax liabilities



Source: Created by author.

Figure 11 shows that 66% of respondents agreed that SARS should use machines to analyse tax data to predict future tax liabilities (36% strongly agreed, and 30% somewhat agreed); 21% neither agreed nor disagreed; 7% somewhat disagreed; 5% strongly disagreed; and 1% left the question unanswered. These results indicate that taxpayers believe that there is value in using computers to forecast tax liabilities.

Predictive and prescriptive analytics, coupled with artificial intelligence, can assist in formalising the decision-making process involved in forecasting tax liabilities.

4.2. CONCLUSIONS DRAWN FROM RESPONSES

As has been discussed, the survey received responses from a demographically representative base, from various monthly income levels. Most respondents indicated that they did not perceive SARS to be actively monitoring social media, and most respondents thus also indicated that they were not cautious when posting on social media. Further, most respondents felt that images collected from social media platforms and data obtained

from the linking of Big Databases are credible sources for improving the effectiveness of lifestyle audits. Facebook, LinkedIn and Instagram were seen as the most popular choices in ranking social media platforms as sources for social media analysis. Information harvested from these platforms could be useful to SARS to link into Big Data systems to identify potential targets for lifestyle audits, or to use the graph technology associated with social media to identify potential related party relationships for further investigation.

Respondents mostly agreed that machines could be used effectively to improve the effectiveness of historical data analyses and to make predictions of the future. Machines could be used to identify hidden relationships in data and track variables to monitor for risk identification. Artificial intelligence could also enhance the speed and accuracy of analyses by detecting the patterns followed by taxpayers or in tax data. The relationships identified by machines could then be used by SARS to predict or identify non-compliance in a particular segment of the economy.

It is clear that the views collected from taxpayers who answered the questionnaire align with the literature review in Chapter 2, where it was noted that significant benefits have been obtained by tax administrations that have used modern data technology in the fight against tax evasion.

CHAPTER 5:
CONCLUSION

5.1. INTRODUCTION

In order to reach a conclusion to the study, the research question and objective are considered to evaluate whether the study has been successful in achieving the objective and answering the question.

The research question is: to what extent can lifestyle audits be enhanced by using modern information technology in the fight against corruption and tax evasion in South Africa? The research objective is to evaluate the impact of modern information technology on the effectiveness of lifestyle audits of individuals.

5.2. CONCLUSIONS FROM THE LITERATURE REVIEW

Literary sources, such as academic journals and textbooks, publications by industry experts and online articles, were considered as part of the literature review in Chapter 2. According to these sources, there is a public perception that due to the low number of successful prosecutions, lifestyle audits may not be effective in combatting tax fraud and non-compliance (Tax Consulting South Africa, n.d.). Additionally, the manual processes involved in typical lifestyle audits limit the scale of these investigations to a limited number of taxpayers (McIntyre-Louw & De Villiers, 2020:13).

Modern technologies are often interdependent in that they build on the foundations laid by other technologies, such as how artificial intelligence relies on Big Data. The literature review unpacked, simplified and provided understanding of various information age technologies, such as Big Data, data analytics, artificial intelligence and social media network analysis.

The use of these technologies by various tax administrations was also identified to demonstrate case studies in which the technologies have been successfully applied in the real world to significantly improve the effectiveness of tax investigations and collections. SARS could consider these examples as guidance on where these technologies could be applied in the South African context in its own processes.

5.3. CONCLUSIONS FROM THE QUESTIONS ON THE EFFECTIVENESS OF LIFESTYLE AUDITS

After ethical clearance had been obtained, a questionnaire was electronically distributed using SurveyMonkey. Primary data was obtained from the responses of 100 respondents who are demographically representative. The responses were then analysed, graphically presented and discussed.

A significant majority of respondents indicated that they did not think that SARS monitors social media or were unsure whether SARS does or does not. Thus, SARS may not be utilising social media to its full potential. Respondents further noted that images could indicate that individuals are living beyond their disclosed and known revenue sources, with Facebook and Instagram as important sources. LinkedIn may be an important source for using graph technology to establish links between related parties and jurisdictions. The majority of respondents also agreed that the linking of Big Data sources and using machines to perform data analytics, to learn and to make predictions could enhance the effectiveness of lifestyle audits.

5.4. FINAL REMARKS

This study has demonstrated the various modern technologies that could be applied by SARS and have been applied by various tax administrations globally in recent years. Both first and third world countries have been able to extract some of these benefits whilst significant opportunities remain to further improve the effectiveness of tax administration. It has been demonstrated that massive benefits could be obtained by transforming SARS into an information rich organisation. The research objective has therefore been achieved, which has likewise enabled the research question to be answered comprehensively. It is thus recommended that SARS actively construct integrated systems with alacrity by leveraging the information ecosystem to improve the effectiveness of lifestyle audits, tax administration, and collections.

5.5. LIMITATIONS OF THE STUDY

Information on how SARS currently applies modern technology and the road map it intends to follow is generally limited to a few press statements. These press statements

mainly focus on the linking of databases and the calculation of key performance indicators. It is therefore unclear whether the full extent of Big Data and the stages of data analytics have been harnessed. If more de-identified tax data were made available, more detailed studies could be conducted.

5.6. AREAS FOR FURTHER RESEARCH

Should the limitation on the transparency of tax data be overcome, it will enable further research to be conducted. Research could include detailed studies to determine:

- the effectiveness of the current technologies applied by SARS;
- which of the modern technologies would be the most cost effective to implement in the future (economic);
- which of the modern technologies would most likely have the biggest impact on tax collection and administration (effectiveness);
- which of the modern technologies could be implemented in the shortest time frame (efficiency);
- the value of tax dividend available to be unlocked; and
- the order in which the implementation of modern technologies should be pursued.

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ANNEXURE A: QUESTIONNAIRE

MASTERS DISSERTATION QUESTIONNAIRE: LIFESTYLE AUDITS IN SOUTH AFRICA

As part of their dissertation a group of MCom (Taxation) students from the University of Pretoria, are conducting research on the effectiveness of lifestyle audits in South Africa. The research also expands into various aspects that lead to lifestyle audits such as social media and whistleblowing. The purpose of this survey is to obtain an understanding of how these aspects are viewed by South Africans in terms of their willingness to partake in, their view of the effectiveness and their general knowledge of the subject matter. If you need to contact the supervisor of this study, please contact Mrs. Tanya Hill at tanya.hill@up.ac.za or on 012 420 6354.

Participation in this online questionnaire is voluntary and anonymous. The answers you give will be treated as strictly confidential and will be used only for purposes of academic research and may be published in a journal.

We kindly request that you answer all questions honestly and that you do not leave a question unanswered. The duration of the questionnaire is estimated to be around 15 to 20 minutes. We would also like to use this as an opportunity to thank you for participating and assisting us in collecting data.

As a starting point we would like to explain the following terms:

1. Gross income: This represents the **total income from all sources, before deducting** any expenses, allowances or taxes;
2. Net Income: This refers to the amount an individual or business has left over **after** deducting costs, taxes and allowances;
3. Lifestyle audit: A lifestyle audit is **a term commonly used by forensic auditors to describe the tests that are performed to determine if the lifestyle of an individual is proportionate with that person's known income streams.**

Should you be willing to participate in this questionnaire, please click on the “next” button below. Should you not wish to partake in the questionnaire, please click on “exit”

NEXT

EXIT

Background Questions - Please choose one answer

1. I fall in the following age group:
    a) 18 - 25;
    b) 26 - 35;
    c) 36 - 45;
    d) 46 - 55;
    e) 56 - 65;
    f) 66 and older;
    g) Prefer not to say.

2. I am currently:
    a) Employed;
    b) Unemployed;
    c) Business Owner / Entrepreneur;
    d) Retired;
    e) Other;
    f) Prefer not to say

Please elaborate if you have chosen “other”

3. My gender is;
    a) Male;
    b) Female;
    c) Other;
    d) Prefer not to say.

4. My race is:
    a) Black;
    b) Indian or Asian;
    c) White;
    d) Coloured;
    e) Other;
    f) Prefer not to say.
    g)

Please elaborate if you have chosen “other”

5. I earn _____per month, before any deductions (e.g. income tax, medical aid, housing, entertainment etc.) are made to my salary (all amounts to be considered in ZAR):
    a) 1 – 18 900;
    b) 18 901 – 29 425;
    c) 29 426 – 40 725;
    d) 40 726 – 53 450;
    e) 53 451 – 68 130;
    f) 68 130 – 144 300;
    g) 144 300 and above;
    h) Prefer not to say.

Question 1

Do you believe that some of the problems South Africa is currently facing in terms of financial constraints may be minimised if all South Africans fairly paid their taxes?

a) Yes;
b) No;
c) Not sure.

Any additional remarks

Question 2

Did you know that SARS conducts lifestyle audits on individuals in South Africa to ascertain whether people are living above their means in terms of taxes declared?

a) Yes;
b) No;
c) Not sure.

Question 3

Do you think that SARS monitors your social media platforms (such as Facebook™, Instagram™ etc.) to establish whether you are being truthful and complete in your tax returns?

a) Yes;
b) No;
c) Not sure.

Question 4

Are you conscious of the content you post on social media in order to avoid being investigated by SARS?

a) Yes;
b) No;
c) Not sure.

Question 5

I believe that the images people post on social media (such as Facebook™ and Instagram™) could indicate that these people are living beyond their known income sources.

a) Strongly agree;
b) Somewhat agree;
c) Neither agree nor disagree;
d) Somewhat disagree;
e) Strongly disagree;

Question 6

Rank these social media platforms in terms of importance as a potential source for the conduct of lifestyle audits by tax authorities?
(6 being the highest importance and 1 being the lowest)

a) Facebook™ ☐
b) Instagram™ ☐
c) LinkedIn™ ☐
d) Tiktok™ ☐
e) Twitter™ ☐
f) YouTube™ ☐
g) Not sure.

Other not mentioned above (indicate ranking):

Question 7

Do you think that the lifestyle audit process has been effectively implemented in South Africa? Please provide a reason for your answer.

a) Yes;
b) No;
c) Not sure.

Type your answer here

Question 8

Are you currently or have you ever been aware of an individual who is not declaring their full gross income on their tax returns?

a) Yes;
b) No;
c) Not sure.

Question 9

Would you report any individual to SARS who you know is not declaring their true gross income on their tax returns? Please provide a short reason for your answer:

a) Yes;
b) No;
c) Not sure.

Type your answer here

Question 10

Do you feel that the linking of big databases by SARS such as vehicle registrations (eNatis), title deed information, investment products and tax data will increase the effectiveness of lifestyle audits?

a) Strongly agree;
b) Somewhat agree;
c) Neither agree nor disagree;
d) Somewhat disagree;
e) Strongly disagree.

Question 11

I believe that SARS should use machines to analyse tax data to detect historical trends (e.g. machine learning algorithms).

a) Strongly agree;
b) Somewhat agree;
c) Neither agree nor disagree;
d) Somewhat disagree;
e) Strongly disagree.

Question 12

I believe that SARS should use machines to analyse tax data to predict future tax liabilities (e.g. artificial intelligence).

a) Strongly agree;
b) Somewhat agree;
c) Neither agree nor disagree;
d) Somewhat disagree;
e) Strongly disagree.

Question 13

Do you believe that whistleblowers should be financially rewarded, if their information leads to the recovery of funds by SARS?

a) Yes;
b) No;
c) Not sure;
d) Prefer not to say.

Question 14

Should whistleblowing be rewarded in South Africa and specifically by SARS, would you be more inclined to blow the whistle on someone who is avoiding tax? Please provide a short reason for your answer.

a) Yes;
b) No;
c) Not sure.

Question 15

Would you rather receive a monetary reward for the act of whistleblowing or remain anonymous (Keep in mind to receive a reward you will have to provide contact details)?

a) I would rather stay anonymous;
b) I would rather receive a reward;
c) Not sure.

Type your answer here

Question 16

Are you aware of the fact that you can report an individual anonymously on the SARS website who is guilty of a tax crime?

a) Yes;
b) No;
c) Not sure.

Question 17

Do you believe that SARS is able to protect the identity of a whistleblower? Please state a reason for your answer:

a) Yes;
b) No;
c) Not sure.

Type your answer here

Question 18

Have you been in a situation where you have earned more income than you have declared on your tax returns, either by way of a second job, investment income, crypto-currency transactions or any other way?

a) Yes;
b) No;
c) Not sure.

Question 19

Have you ever been in a situation at work or otherwise where you were aware of illicit activity, such as tax fraud or tax evasion, but you felt frightened or too intimidated to disclose this information?

a) Yes;
b) No;
c) Not sure.

Question 20

Are you aware of the Protected Disclosures Act of 2000 and the workings thereof?

a) Yes;
b) No;
c) Not sure.

Question 21

Do you think that lifestyle audits are an effective tool in the fight against corruption and tax evasion? Please provide a short reason for your answer.

a) Yes;
b) No;
c) Not sure.

Type your answer here

Question 22

Are you aware of any instances where a whistleblower has been prejudiced due to the disclosure of any information to a figure of authority, may it be an employer or government official?

a) Yes;
b) No;
c) Not sure.

If you answered yes, please may you give a brief overview of the circumstances

Question 23

Do you understand the purpose of SARS conducting lifestyle audits on certain individuals?

a) Yes;
b) No;
c) Not sure.

Question 24

Do you believe the findings gathered by auditors are reliable in the fight against corruption and tax evasion? Please provide a brief reason for your answer.

a) Yes;
b) No;
c) Not sure.

Type a reason for your answer here

Question 25

Have you heard of any successful prosecutions resulting from lifestyle audits?

a) Yes;
b) No;
c) Not sure.

Question 26

From the list below, please select any factors that could negatively impact the findings gathered by auditors.

- ☐ Corruption (bribes);
- ☐ Undeclared income and/or assets;
- ☐ Fraud;
- ☐ Collusion;
- ☐ Lack of understanding of the lifestyle audit process by auditors;
- ☐ Lack of use of technological measures used when gathering information;
- ☐ Protection of individuals rights;
- Other (please specify _____)

Question 27

In your opinion, what do you consider to be risks and challenges associated with conducting lifestyle audits?

Type your answer here

Question 28

Please feel free to make any additional remarks on this field of study that you wish for the students to consider.

Type your answer here

ANNEXURE B:

DECLARATION OF PLAGIARISM

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

DEPARTMENT OF TAXATION

Declaration Regarding Plagiarism

The Department of Taxation emphasises integrity and ethical behaviour with regard to the preparation of all written assignments. Although the lecturer will provide you with information regarding reference techniques, as well as ways to avoid plagiarism (see the *"Guidelines on Referencing"* document), you also have a responsibility to fulfil in this regard. Should you at any time feel unsure about the requirements, you must consult the lecturer concerned before submitting an assignment.

You are guilty of plagiarism when you extract information from a book, article, web page or any other information source without acknowledging the source and pretend that it is your own work. This does not only apply to cases where you quote the source directly, but also when you present someone else's work in a somewhat amended (paraphrased) format or when you use someone else's arguments or ideas without the necessary acknowledgement. You are also guilty of plagiarism if you copy and paste information directly from an electronic source (e.g., a web site, e-mail message, electronic journal article or CD-ROM) without paraphrasing it or placing it in quotation marks, even if you acknowledge the source.

You are not allowed to submit another student's previous work as your own. You are furthermore not allowed to let anyone copy or use your work with the intention of presenting it as his/her own.

Students who are guilty of plagiarism will forfeit all credits for the work concerned. In addition, the matter will be referred to the Committee for Discipline (Students) for a ruling. Plagiarism is considered a serious violation of the University's regulations and may lead to your suspension from the University. The University's policy regarding plagiarism is available on the Internet at *http://www.library.up.ac.za/plagiarism/index.htm.*

For the period that you are a student at the Department of Taxation, the following declaration must accompany **all** written work that is submitted for evaluation. No written work will be accepted unless the declaration has been completed and is included in the particular assignment.

	Student
I (full names & surname):	Francois De Bruyn Cilliers
Student number:	99004195

Declare the following:

1. I understand what plagiarism entails and am aware of the University's policy in this regard.
2. I declare that this assignment is my own, original work. Where someone else's work was used (whether from a printed source, the Internet or any other source) due acknowledgement was given and reference was made according to departmental requirements.
3. I did not copy and paste any information directly from an electronic source (e.g., a web page, electronic journal article or CD ROM) into this document.
4. I did not make use of another student's previous work and submitted it as my own.
5. I did not allow and will not allow anyone to copy my work with the intention of presenting it as his/her own work.

Signature