

Data Analytics in Risk Assessment

A qualitative study on the use of data analytics in risk assessment within auditing.

BIRGITTE HELLE
KARINA KROKAN ALSTAD

SUPERVISORS

Victoria C. Edgar
Anna Alon

University of Agder, 2023

School of Business and Law

PREFACE

This master's thesis is an independent work written in the last semester of our master's degree at the University of Agder (UiA). It represents the completion of the Business School's Master program in Accounting and Auditing. Although the program has been challenging, we have acquired experiences and gained knowledge that we will carry with us for the rest of our lives.

During a guest lecture, we were introduced to the issue of digitalization in auditing and the growing use of data analytics. Since it sounded interesting and applicable to our future work as auditors, we wanted to explore and learn more about it. Data analytics is a subject that will only grow more useful and intriguing in the future. It was important for us to write a master's thesis addressing a topic that would better prepare us for our careers. From reading previous master theses as well as other research, we found that this assignment addresses a different issue than other assignments in the same category. This has made the assignment challenging but interesting and engaging to conduct.

The process has been quite educational, especially in terms of teamwork, communication, and implementation of skills. We have gained greater understanding on the topic of data analytics in risk assessment through the work on our thesis and are excited to use it in our upcoming job as auditors.

ACKNOWLEDGEMENTS

We would like to express our gratitude to our supervisors, Anna and Victoria, who have supported us along the way. They have provided helpful criticism and engaged in meaningful discussion throughout the process. Additionally, we would like to give a special thanks to all respondents that took time to participate in our interviews. Their contribution allowed us to conduct this research and provided us with valuable information about the subject.

SUMMARY

Possibilities to obtain a more thorough and efficient understanding of the entity and its environment during an audit, lays in the use of technology and data analytics presented for the auditor. In an environment with high volume of data and increasing complexity, there are potential to improve the quality of the auditor's risk assessment (IAASB, 2017, p. 7). However, research indicates that the use of DA is limited, despite the fact that it offers a variety of advantages and multiple audit firms have invested capital in the technology to enable the use of DA (Krieger et al., 2021). This is due to lack of knowledge, support, and acceptance from the standard-setters (Austin et al., 2021). Prior research has focused largely on DA in the audit process of obtaining evidence. The aim of this master's thesis is to provide insight on how DA is utilized in risk assessment and how this is affected by the guidance provided by the International Standards on Auditing (ISA).

We have examined how data analytics is currently used, identified potential for growth and improvement, and looked at how the ISAs support the use of data analytics in risk assessment. Our dissertation contributes to this lack of empirical research and add a new perspective to the discussion by answering: *“How data analytics are utilized in risk assessment and the role of the auditing standards in shaping its use”*.

To answer our research aim, we used a qualitative approach for gathering primary data. We conducted eight semi-structured interviews with informants with deep and broad knowledge within the auditing field. Our results shows that DA is widely used in risk assessment by larger audit firms, however, there are variations in how it is applied, prioritized, and defined. As a result, DA in risk assessment is currently not operating at its highest potential. By increasing knowledge and expanding access to standardized data, we may take a step toward achieving DA's promise in risk assessment. But in order for this to happen, the standards need to be updated. The present guidelines need to be modified since they neither discourage nor support the auditor to use DA. The criteria for employing DA, the auditor's skill requirements, or just more guidance and information about what may be used, might all be added to achieve this.

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Glossary and abbreviations:

ARM	Audit Risk Model
ATT	Automated tools and techniques
DA	Data Analytics
DnR	The Norwegian Institute of Public Accountants
ERP	Enterprise Resource Planning
FSA	The Norwegian Financial Supervisory Authority
IAASB	International Auditing and Assurance Standards Board
IFAC	International Federation of Accountants
ISA	International Standards on Auditing
MAA	Master in Auditing and Accounting
SAF-T	Standard Audit File-Tax Financial
SMB	Small and Medium sized Businesses
UiA	University of Agder

1 Introduction

In this chapter the topic and relevance of this study will be presented. We will go through the research's selected purpose in more detail, followed by the research questions. After that, we'll briefly outline the master's thesis' structure.

1.1 Relevance

A financial audit's goal is to ensure that the financial statements are created and presented in compliance with accounting rules and are free of material misstatements (Revisorloven, 2020, §9-1). Despite the potential advantages in the technological age, auditors frequently fall back on outdated methods of auditing due to lack of technological understanding and expertise (Liew et al., 2022).

Rapid technical advancements have made it possible to collect and transmit data digitally in unprecedented quantities (Salijeni et al., 2019). Because of this, there is now a greater emphasis on data, whether it is organized or unstructured, created internally or outside the business (Hofmann, 2017). The use of technology and data analytics presents opportunities for the auditor to obtain a more thorough and efficient understanding of the entity and its environment, improving the quality of the auditor's risk assessment and response in an environment with a high volume and increasing complexity of data (IAASB, 2017, p. 7).

The increasing quantity of data generated from businesses offers a greater source of information to be used while performing an audit (Vernocchi & Toggwyler, 2021). Audit data analytics, hereby called DA, is commonly defined as *“the science and art of discovering and analyzing patterns, deviations and inconsistencies, and extracting other useful information in the data underlying or related to the subject matter of an audit through analysis, modeling and visualization for the purpose of planning or performing the audit”* (IAASB, 2017, p. 7). DA contributes to improved client relations, higher efficiency, and a deeper understanding of the examined company (Maharaj, n.d). Additionally, DA can help auditors spend their time more efficiently by enabling a more focused audit based on more precise risk evaluations (Kleive, 2018). From the standpoint of the client, DA are advantageous since it may provide them more knowledge about their own business operations. As a result, audit businesses will be more competitive if they implement DA and comprehend the prospects (Austin et al., 2021). Following, the ability to apply DA and analyze the information provided is becoming key

competence for all auditors, as one can examine the accuracy in financial statements by using DA (Vernocchi & Toggwyler, 2021).

Emerging technology and a variety of opportunities has affected the need to adapt and adjust how audits are conducted (Maharaj, n.d). The Big 5 audit firms in Norway have made significant investments to develop their audit technology and have started to employ DA for financial statement audits (Eilifsen et al., 2020). Many auditors have a positive perception of the usefulness of DA and it is therefore already rapidly being used during an audit (Eilifsen et al., 2020). However, empirical studies shows that the usage of DA is restricted, even though it has several benefits and businesses have made large technological expenditures to exploit it (Krieger et al., 2021). This is due to lack of knowledge, support, and acceptance from the standard-setters (Austin et al., 2021). Based on this, we wish to find out more about the perspectives and DA practices of audit businesses in Norway. Prior research has tended to concentrate mostly on the audit process of acquiring evidence, but we wish to shed light on how DA is used in risk assessment and how it might affect the total audit.

This master's thesis contributes to the literature by focusing attention to the planning stage. As we will come back to later in chapter 2.5, the basis of any audit is the identification and evaluation of risks for material misstatements, particularly developing a thorough understanding of the entity (AICPA, n.d). Planning an audit requires considering aspects of the client's operations and administration, the availability and assignment of firm resources, client industry and regulatory factors, and much more. Fortunately, careful preparation results in more efficient audit execution and also teach auditors crucial risk management skills (Gartland, 2017). Efficient planning is an investment of time that will pay off in the engagement's later stages. A possible problem or a difficult audit area might be identified early in the planning process, thus saving time later in the audit (Gartland, 2017).

However, the use of DA in risk assessment is not given adequate consideration, even though it can enhance the audit's efficacy and quality. The process of acquiring evidence has been the emphasis of prior publications (Hofmann, 2017; Liew et al., 2022; Saggi & Jain, 2018), but this study contributes with greater knowledge on DA used in risk assessment and how it affects the whole audit. We think that a stronger focus on DA in the planning stage can benefit the subsequent audit procedures, not just risk assessment. For this reason, we decided to concentrate on DA used in risk assessment to close the knowledge gap. Focusing our attention may help us

identify elements that not only enhance the planning process, but also the audit evidence process. This will be done by looking at the auditors' perspective of DA use, auditors' actual utilization of DA, and varied benefits and obstacles of DA in risk assessment.

From the auditor's perspective, the current audit standards and not the auditor's technology, are a limiting factor in how far DA can be used to replace traditional methods (Vernocchi & Toggwyler, 2021). Earlier studies explain that for some the lack of guidance in the International Standards on Auditing, hereby referred to as ISA, has been a roadblock that has slowed their development with DA (Austin et al., 2021). For auditors to use data and newly accessible DA tools more efficiently, the regulatory framework must change (Vernocchi & Toggwyler, 2021). The planning stage, the evidence gathering stage and the reporting stage of the audit is the three stages where ISAs provide guidance on the use of analytical procedures (Mugwira, 2023). However, the vast majority of articles discuss challenges during the audit evidence stage and not in the planning stage. This dissertation investigates how ISAs impact is on the utilization of DA in risk assessment.

For those who will work as auditors, this topic is quite interesting and important considering the Big 5 audit companies have invested a lot of money in developing digital tools (Austin et al., 2021). Given that the Master in Auditing and Accounting (MAA), mostly concentrated on the conventional audit, finishing a dissertation that discusses digital auditing, its application, and the auditor's attitude would help to improve our ability in this area. Those of us who join one of the audit firms that focuses on digitization will benefit from understanding the opportunities and problems that digitalization creates. This master's thesis incorporates subject-specific insight from the general civil economics research as well as the MAA study.

1.2 Research aim and research questions

In our master's thesis, we chose to concentrate on DA due to the high importance of technological development and the growing use of it. To find a more specific aim we did research and spoke to auditors who thought it would be interesting to study DA in risk assessment, an area on which few have done research.

In this dissertation we aim to examine DA in risk assessment in more detail, determining if it is sufficiently utilized or if there is potential to increase the quality and assess the audit better. As

planning is an essential part of the audit (Grosu & Mihalciuc, 2021), we think there could be potential issues that are not being addressed because of the current lack of attention given to DA in risk assessment. To comprehend this in the best possible manner, we also need to study what sort of guidelines the ISA supplies to facilitate the implementation of DA in risk assessment.

We want to address this lack of empirical research and add a new perspective to the discussion by answering:

“How data analytics are utilized in risk assessment and the role of the auditing standards in shaping its use.”

To assist and provide further context for the aim of the research, we developed two research questions. As they are connected both directly and indirectly to the aim, answering them will support conclusions and claims that appear relevant to the core problem. The first research question is set to answer the following:

“How are data analytics used in risk assessment and is there potential for improvement?”

Then we wanted to investigate how the ISAs are providing direction to facilitate the use of DA. Therefore, we chose to pursue the following second research question:

“What should be included in the auditing standards to support the use of data analytics in risk assessment?”

By answering the two research questions this will tell us how DA is used, if it can be optimized, or whether it is already being used to its full potential. Additionally, how ISAs impact its potential, use, and development.

1.3 Structure

This thesis follows the typical format for master's theses, here consisting of six chapters. The introductory chapter introduces background for the choice of topic and the research questions.

Chapter two presents the literature review and relevant theory related to the issue of the thesis. The methodological approach to the research issue is reviewed in chapter three, with an emphasis on the unique features of a qualitative approach and how the method choice may impact the dissertation's structure and findings. We present the interview findings in chapter four, before analyzing and discussing them in chapter five based on our aim of the research and research questions presented in chapter one. The conclusion and concluding remarks are offered in chapter six, including outlining the limitations of the work as well as suggestions for more research.

2 Literature review

The following chapter presents our methodological approach for conducting the literature review, a presentation of previous research, and relevant information on the topic of our thesis.

2.1 Method of literature review

A literature review is a written argument that promotes a thesis' viewpoint by assembling credible evidence from earlier studies and getting an overview of the literature. It also provides background information and context for current knowledge on the given subject, which is crucial for further research (Machi, 2012, p. 4). To do this, we have conducted a systematic literature review. A systematic literature review can be described as identifying, assessing, and interpreting available research pertinent to the topic under study (Kitchenham, 2004, p. 1). By concentrating on the concepts and attempting to comprehensively cover all relevant and available literature on the subject, this study adheres to the methodology by Webster & Watson (2002).

Google Scholar, Web of science, Scopus, and Oria are the main databases we used to conduct comprehensive searches as part of our literature search. To find relevant articles and literature, we used key terms such as: “Data analytics in risk assessment”, “Auditing data analytics”, “Risk assessment”, “The International Standards on Auditing”, and “Auditing standards”.

These key terms and additional reference searches were mixed in different combinations to find available and relevant literature on this subject. We have examined both Norwegian and English literature to ensure that we have included as much relevant information as feasible. Since laws and regulations closely restrict everything that is done in auditing, we also looked at the information that these sources offered on the subject.

2.2 Audit DA

Companies produce vast amounts of data and DA as an audit methodology makes it possible to analyze big data sets and enhances the auditor's comprehension of the organization and its surroundings (Byrnes et al., 2014). Audit companies have gradually adopted DA, but as time passes, expectations rise and will fundamentally alter how financial statement audit services are delivered (Buchheit et al., 2020). The use of complex financial systems by the audit companies'

clients creates possibilities when using DA during the audit (Brown-Liburd et al., 2015). The quantity and size of data information are no longer a barrier as it is kept in cutting-edge Enterprise Resource Planning (ERP) systems as well as in bigger storage facilities outside the client (Vasarhelyi et al., 2015). ERP is an application that automates business processes and provides valuable insights on real time client data (SAP, n.d). It has been proposed that audit might examine the organization's finances considerably more thoroughly due to their extensive knowledge, experience, and skillful application of modern technologies (Yeamin & Sulaiman, 2022). Clearer insights, better decision-making, higher-quality audits, and greater additional value for their clients would emerge as a result of applying DA (Appelbaum et al., 2017). IAASB highlights the significance of DA by saying *“in an increasingly complex and high-volume data environment, the use of technology and data analytics offers opportunities for the auditor to obtain a more effective and robust understanding of the entity and its environment, enhancing the quality of the audit’s risk assessment and response”* (IAASB, 2016, p. 7).

2.2.1 DA in risk assessment

DA tools provide the most value when utilized from the beginning of an audit to the end, which is contrary to how many professionals have traditionally used it (Cangemi, 2014). With an increasingly need to have more knowledge about the client’s business, DA are allowing auditors to create new techniques to conduct audits (Murphy et al., 2015). In the risk assessment process DA can be applied to analyze large volumes of data quickly and efficiently, identify patterns, and perform trend analysis to identify potential areas of risk (Eilifsen et al., 2020). This gives auditors a powerful tool to convert data into visual outputs that are more understandable than just written documentation (Borthick & Pennington, 2017; Mugwira, 2023). Insight gained from DA in risk assessment gives a better understanding of the company and allows the auditor to adjust the audit focus on identified areas with an assumed high risk (Cangemi, 2014; Stenvold, 2020).

Every audit and consulting engagement planned by the auditor, must consider the objective to be achieved, the scope, timeline, and resources needed. The inherent risks of the audit object and the controls currently in place to minimize those risks, must be identified and evaluated to establish the individual components (Eulerich et al., 2020). According to ISA 315, auditors are required to do analytical tasks as part of the risk assessment (IAASB, 2019, p. 10). This will give a comprehensive image of the flow that occurs in the transactions, a more accurate knowledge of clients procedures, and a clearer view of risk (Appelbaum et al., 2017).

Unusual activity or unusual balances that differ from normal or expected levels may be a sign of increased risk (Buchheit et al., 2020). Tools that have the capability to identify such areas are data visualization and cluster analysis (Buchheit et al., 2020). Data visualization can be defined as *“the selection, transformation, and presentation of various forms of data in visual form that helps facilitate exploration and understanding”* (Alawadhi, 2015). This tool can be used together with the Excel Spreadsheet to make forecasts. Forecasting offers predictions based on past trends in recorded quantities as well as other variables and historical values (Schmidt, 2023). Visualizing anticipated outcomes and contrasting them with actual results, can assist auditors to rapidly spot anomalous changes or unexpected trends, support risk assessment and enhance their understanding of the client (Higginbotham et al., 2021).

Cluster analysis can be used in the planning stage but also as an analytical procedure when gathering audit evidence (Thiprungsri & Vasarhelyi, 2011). The approach is based on a machine learning algorithm that classifies observations in a data collection according to their traits, making it appropriate for examining data and its structure (Byrnes, 2019). In this technique, data points are grouped so that points in the same group (or "cluster") are similar while points in other clusters are not (Chandola et al., 2009). This method is a strong contender for fraud and anomaly detection, as it might be challenging to spot unusual or suspicious transactions (Thiprungsri & Vasarhelyi, 2011).

Another much-used tool that can be used in risk assessment is process mining. This tool helps to map the entire business process by identifying which type of actions that have been carried out, when they have been carried out, and who has carried them out (Werner et al., 2021). We can obtain a thorough understanding of the actual flow in the entity since the approach is based on all transactions that have gone through a process (Chiu & Jans, 2019). This approach will give a more detailed knowledge of clients' operations and a clearer picture of risk, compared to a verbal evaluation with the client (Rayamajhi, 2019).

The absence of significant mistakes in the statements cannot be completely guaranteed by the auditor. It will take too much time and resources. So, auditor establishes a preliminary judgement about materiality to better plan the scope of the audit and evaluate the results of the tests. The preliminary judgement about materiality *“is the maximum amount by which the auditor believes the financial statements could be misstated and still not affect the decision of*

reasonable users” (Messier, 2006, p. 110). When specifying materiality, a base is usually established as either a percentage, or as an amount. Setting these limits is a crucial step in the planning process because it directly influences the number and kind of audit actions that must be performed before a clean opinion can be issued (Messier, 2006, p. 17). Throughout the audit, it is a continuous procedure that is directly related to the auditor's ongoing risk assessment.

2.2.2 Advantages with DA

The literature identifies a number of advantages associated with the use of DA in audits. First, DA results in a broader audit scope as auditors can use the total population rather than samples, which increase the audit quality (Earley, 2015; Salijeni et al., 2019; Yeamin & Sulaiman, 2022). Big data technologies result in a broader audit scope by enabling full population testing and more in-depth accounting population analysis (Brown-Liburd et al., 2015). By locating and analyzing the accounting abnormalities, audit quality may be improved by providing deeper insights into client's operations. It enables auditors to develop a knowledge base on each engagement that can be used from year to year (Earley, 2015).

Secondly, fraud will also be easier to spot because auditors can use tools and technology they already have at their disposal. Auditors can examine all transactions more thoroughly, and the emphasis will change from identifying deviations to identifying anomalous patterns or trends (Gray & Debreceeny, 2014, p. 7). Additionally, the audit's risk of human mistake is diminished, increasing the likelihood that errors will be found and lowering the auditor's audit risk (Liew et al., 2022). It makes it possible for the auditor to spend more time analyzing and comparing data, rather than gathering and organizing it. But the auditor also needs to be mindful of the expenditures related to over-auditing, over-reliance on analytic experts, and inadequate guidance in the auditing standards (Yeamin & Sulaiman, 2022).

Another benefit of DA is that it may increase the efficiency of financial statement audits (Cao et al., 2015; KPMG, 2017; Yoon et al., 2015). However, with the increased complexity of the standards regarding DA, more effort and hours are spent on the audit (Capriotti, 2014). Because of this, there is a need for a well-executed audit plan with integrated DA as it might aid in mitigating the effects of the longer hours and enhancing efficiency (Murphy et al., 2015).

Regardless of where the client is located, new analytical tools can access the client's ERP, negating the need for the auditor to physically visit the client to collect information (Eilifsen et

al., 2020; Salijeni et al., 2019). But as previously mentioned, one disadvantage with DA is that acquiring all the data might be difficult for auditors, particularly if it originates from different systems (Perry, 2017). As a result, a standardized documentation that could collect and export pertinent information was created. SAF-T accounting is a standard format for the exchange of accounting data between different financial systems (Aasen, n.d). SAF-T, or Standard Audit File-Tax, is a collaborative development by industry organizations, system providers, and the Norwegian Tax Agency (Skatteetaten, n.d.). It applies from 1. January 2020 (Skatteetaten, n.d.) and contains trustworthy accounting data that can be exported from an original accounting system for a certain time-period, and is easily legible thanks to its standardization of structure and format (Bordeianu et al., 2022). Due to availability of high-quality data, such standardization might constitute a substantial advancement in DA.

These advantages suggest increased audit quality, which is anticipated to improve the audit report's precision as it gives a deeper understanding of transactions and risk areas with the client (Buchheit et al., 2020). By gaining a good understanding of the business, the auditor will be able to use this knowledge during the total audit. Such as when interviewing the management in the planning process (Cangemi, 2014). Knowing where the risk lies, the auditor can ask the right questions needed to address the risk. Additionally, auditors would be better equipped to assist their clients in making strategic judgments regarding their organizations to the degree that they can create models that can forecast future occurrences (Earley, 2015). The auditors may thus devote more time to tasks that are of higher importance to the client and do a more risk focused audit.

2.2.3 Disadvantages with DA

The broad use of DA on audits faces several obstacles notwithstanding the potential it has for enhancing audit quality. There are two major difficulties, which are (1) auditor training and competence, and (2) data availability, relevance, and integrity (Earley, 2015). Due to the complexity of the sector, the auditor must be highly competent to apply DA appropriately. The use of professional skepticism is also required since it is critical that the data used is of high caliber.

Traditional accounting education and training has not placed a strong emphasis on developing skills like pattern detection and the ability to analyze anomalies. Instead, these abilities are frequently gained over many years of field experience (Earley, 2015). As big data becomes

increasingly pertinent, this understanding will only become more crucial (Dubey & Gunasekaran, 2015). With a lack of intellect to manage a significant amount of data, operating auditors could struggle with information overload and locating the most relevant information (Murphy et al., 2015). The implementation of new technology is labor-intensive and needs time, resources, and enough funding (Pedersen, 2016). High level of efficiency and technology, requires additional expertise from the auditor (Cao et al., 2015). Due to this, the cost to the audit organization may increase if they are required to invest capital in auditor's core abilities (Salijeni et al., 2019).

Data reliability is a crucial issue that must be addressed for both internal and external data utilized in performing DA (Manita et al., 2020). In terms of big data, auditors may now efficiently analyze more of the same data (volume), have the capacity to use non-traditional data sources (variety), and complete more audit procedures in real time (velocity) (Hofmann, 2017). But the necessity for controls to monitor the accuracy and comprehensiveness of the data, becomes increasingly critical the more directly electronic data is created (Michael Minelli, 2012). It is necessary to evaluate the reliability of the underlying data utilized for DA. The suitability, accuracy, or even completeness of data provided from a third party should not be taken for granted (Yeamin & Sulaiman, 2022).

Another component that is becoming more crucial as technology advances is data storage (Moharm et al., 2019). Dealing with large amounts of data, maintaining data security and acquiring data appear to be challenging (Michael Minelli, 2012). Downloading or preserving sensitive data may raise questions regarding confidentiality and potential for unauthorized access to client information (Cao et al., 2015; Løwer & Sandvik, 2015). In addition, acquiring all the data might be difficult for auditors, particularly if it originates from different systems. Lack of data storage infrastructure is another problem that auditors must deal with, where data breaches and cyberattacks on organizations are frequent (Yeamin & Sulaiman, 2022). Most cloud services currently available are however sufficiently secure enough to adhere today's security requirements (Løwer & Sandvik, 2015).

According to Early (2015), due to false positives (i.e., abnormalities that the tool detected, but ended up being appropriate transactions), auditing firms continue to have serious reservations regarding the implementation of DA methodologies. Whether automated technologies can eliminate false positives or at the very least significantly reduce their frequency is yet to be

determined. Too many false positives could lead auditors to focus on areas that are ultimately not at risk of being incorrectly declared. By spending more time than necessary looking into a false positive, the auditor will waste time on unnecessary information, which could be detrimental to the client (Earley, 2015).

2.3 The Big 5 and DA

New innovations have affected the audit firms to keep up with technological developments, as they can give additional value and greater insight (Mugwira, 2023). Audit DA tools can be developed by audit firms or outsourced tools originated by technical software companies (Mugwira, 2023). Many audit firms are now investing large sums to acquire and adapt such tools in anticipation of the potential advantages (Cangemi, 2014). Benefits these tools can bring to the audit firms are among others the ability to test more data (Tang et al., 2017) and visualize information in different formats to identify trends and anomalies' (Buchheit et al., 2020). But with the increased use of new tools and technological disruption, auditors trust is dependent on an openness (PWC, 2022). This is done through an annually published transparency report on how they increase their quality in audit with tools such as DA (Forskrift om revisjon og revisorer, 2020, §2-3).

In Norway the Big 5 audit companies states that they use DA in their audit process and that it improves the quality and efficiency of the audit (BDO, 2021; Deloitte, 2022; KPMG, 2021; PWC, 2022). All five audit companies release a yearly report to build on the principles of transparency, reliability, and quality (BDO, 2023; Deloitte, 2021; EY, 2022; Jensen, 2022; KPMG, n.d). They describe among others, the effects of digital advances on the audit process in their transparency reports, but also on the Big 5's own websites (EY, n.d.).

KPMG has been making significant investments in the advancement of tools to guarantee high-quality auditing skills and take advantage of the opportunities presented by cutting-edge technology (KPMG, 2021, p. 19). To gather evidence and connect with clients, KPMG uses data and analytics extensively. They *"make extensive use of IT auditing in order to design an audit process for each individual engagement that makes maximum use of the opportunities offered by the client's IT environment and internal control routines"* (KPMG, 2021, p. 19). KPMG Clara is one example of their investments for DA tools. It is a modular audit platform

that integrates technology with built-in features that make use of data, automation, and visualization (KPMG, 2021, p. 19).

According to PWC's transparency report from 2022, they employ a program called HALO to evaluate large volume of data, examine whole populations to improve risk assessment, analysis, and testing (PWC, 2022, p. 30). In their transparency report they provide information about continually changing the way they work to increase client satisfaction, improve the quality of their output, and provide a healthy cash flow for future investments. They also point out that *“our firm has designed and implemented processes and controls to underpin the reliability of these audit technologies. (...). In addition, we have guidance focused on the sufficiency of audit documentation included in the workpapers related to the use of these audit technologies, including consideration of the reliability of the solution, and the documentation needed to assist the reviewer in meeting their supervision and review responsibilities as part of the normal course of the audit”* (PWC, 2022, p. 31).

If we look at Deloitte's transparency report, they are introducing innovation by making more use of data-driven analytics into the basic procedures for conducting audits. This is done using automation that enhances repetitive operations, analytics producing a more thorough and insightful perspective into data, and artificial intelligence that helps human discovery and problem-solving (Deloitte, 2022, p. 16). Further on they say that *“Deloitte auditors are enhancing procedures by making more use of data-driven analytics (...). This is due, in part, to the increased automation and effectiveness these provide, but also the need for Deloitte to stay abreast of technological advances used by the entities that we audit”* (Deloitte, 2022, p. 16). They have two worldwide audit systems, Deloitte Omnia and Deloitte Levvia, to show the company's dedication to providing digital, high-quality audits of all sizes and degrees of complexity.

BDO has developed a global audit tool for planning, documenting execution and concluding the audit (BDO, 2021, p. 21). The tool is called APT, and it is flexible and adaptable to different types of clients, levels of complexity, and industries, which improves the quality of their audit and assures compliance with the ISAs. In BDO's transparency report they describe APT as a cloud-based solution to provide clients with digitally enabled processes and procedures. The tool enhances how they plan, carry out, document engagements and allows to fulfill quality

obligations (BDO, n.d.). They have also created "Heartbeat", a data and analysis platform, to make it easier for their clients and BDO to acquire current accounting data (BDO, 2021, p. 23).

EY has little information on technology in their transparency report from 2022, but on their website, they say that the right use of data and artificial intelligence may boost risk assessments, change business processes, and provide businesses a competitive edge (EY, n.d.). By using analytical tools they *“can help you drive capital allocation strategies and investment decisions, create an end-to-end digital audit, generate new revenue opportunities, manage risk, conduct investigations, measure financial and nonfinancial performance, capture tax big data to inform decisions, increase customer satisfaction, and improve the customer experience”* (EY, n.d.).

A characteristic that reflects all transparency reports is that they understand how crucial it is to be able to examine the data of audit clients. The auditing industry anticipates significant changes in the next several years about how audits are conducted, the level of expertise expected of auditors, and how revenue is to be made (Brown-Liburd et al., 2015). They all agree that DA will dramatically change how the audit is conducted (Eilifsen et al., 2020). However, it was also said that there was a lot of confusion over the supervisory authorities' oversight of the audit engagement (IAASB, 2016). Auditing standards and risk management practices will need to be updated to accommodate new and more sophisticated use of DA in auditing (Hindberg, 2015). The progression of DA will be slowed down by the substantial ambiguity surrounding how the supervisory inspection authorities would assess and accept DA produced audit evidence (Eilifsen et al., 2020). Auditing companies have come a long way with implementing and acknowledging the importance of DA, but there is still more work to be done until the goal has been reached (Hindberg, 2015).

2.4 The ISA

The International Auditing and Assurance Standards Board (IAASB), are an independent standard-setting body within the International Federation of Accountants (IFAC) (IAASB, n.d.). IAASB's objective is to set high-quality international standards for auditing and assurance, quality management, and to facilitate the convergence between international and national standards. The Norwegian Auditors Act § 5-2 states that auditors are required to carry out their work in accordance with good auditing practice (Revisorloven, 2020, §5-2). In other

words, good auditing practice is an independent legal requirement that auditors must comply with (Regjeringen, 2017).

According to ISA 200 pt. 3, the purpose of auditing is to increase the intended user's confidence in the financial statement (IAASB, 2009a, p. 4). This is amplified by the Norwegian Auditors Act §9 -1, where it is specified that the purpose of the statutory audit is to generate confidence that the financial statement meet the legal requirements and are free of material misstatements (Revisorloven, 2020, §9-1).

Instead of using the term DA, the IAASB refers to more general automated tools and techniques (ATT). The reason for this is that the word "Data analytics" is limited since it does not include all developing technologies that are now being employed in the design and execution of audit processes (Titera, 2013). Additionally, technology and associated audit applications will keep developing at high speed (IAASB, 2020, p. 1). The IAASB continues by stating that an auditor may decide to use ATT to carry out specific audit processes if it is more beneficial. In other situations, conducting audit processes could be successful without ATT. The main part is that the applicability of specific ATT and their respective benefits may alter as technology advances and new auditing techniques emerge (IAASB, 2020, p. 6).

There are three stages in the auditing standards that provide guidance on the use of analytical procedures, where one of them is the planning process (Titera, 2013). The goal of auditors at this stage is to identify high risks by gaining a better understanding of the client's risks and to reveal areas that might require extra attention from the auditor during the audit process (Clikeman & Diaz, 2014). Because of this, the analytical processes outlined in ISA 315 are preliminary (Mugwira, 2023). It says that risk assessment procedures shall include as previously mentioned, analytical procedures (IAASB, 2019, p. 10). The guidance of analytical procedures is found in ISA 520 (IAASB, 2009b). When carrying out analytical operations as part of the risk assessment procedures, the auditor may find the requirements and application material in ISA 520 to be a valuable source of advice. But when it comes to the auditor's use of DA in risk assessment, there are few guidelines, requirements, and explanations of exactly what is needed for DA to be considered as sufficient (Manita et al., 2020; Yoon et al., 2015).

Many scholars view that there is an uncertainty on how the use of DA relates to the audit methodology because the ISA do not provide guidelines on how the auditor should use DA as part of the audit (Krahel & Titera, 2015; Manita et al., 2020; Yoon et al., 2015). IAASB believe that because technology is developing so rapidly, the rules will soon be out of date and instead serve as an unintentional impediment (IAASB, 2017). If we look at the ISAs, it neither discourages nor forbids the use of DA. The use of computer assisted audit techniques (CAATs) by the auditor in conducting the audit is acknowledged by the ISA (Gambetta et al., 2016). However, the reference was created in a completely different technological era and do not refer to DA as we use it today (Gepp et al., 2018; IAASB, 2017, p. 8; Manita et al., 2020). Auditors now run a higher risk of being questioned during an inspection and not having a solid foundation in the auditing standards to support the decisions they make and the actions they take (Cao et al., 2022; Eilifsen et al., 2020; IAASB, 2017, p. 10). This can discourage auditors from experimenting with and employing DA (Byrnes et al., 2014; Cao et al., 2022; Gepp et al., 2018).

2.5 Risk assessment

In 2019, a revised ISA 315 was implemented with an increased focus on risk assessment (IAASB, 2019). The biggest change was that the risk assessment became more detailed as the auditor must assess inherent risk and control risk for each identified risk (Nygård, 2022). “*Audit risk is the risk that the auditor expresses an inappropriate audit opinion when the financial statements are materially misstated*” (IAASB, 2009, p. 6), and is a function of the risk for material misstatements and detection risk. Detection risk is the risk for substantial misinformation, either alone or in combination with additional misinformation, that may not be revealed from the auditor’s audit measures conducted to reduce the audit risk to an acceptably low level (IAASB, 2009a, p. 7). The audit risk model, hereby called ARM, provides a framework for assessing the connection between the overall audit risk, inherent risk, control risk and detection risk (Hogan & Wilkins, 2008).

The model can be expressed as following:

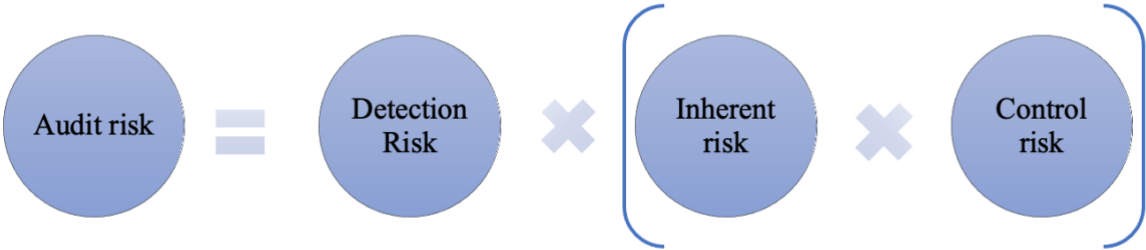


Figure 1: Audit risk model (ARM)

The ARM was created as a guide for planning audits (Houston et al., 1999). The planning stage entails the first steps the auditor must take to develop a strong angle of attack in the audit. To do so, the auditor use ARM to make a preliminary judgement of materiality (Davidson & Gist, 1996). One important step in the planning stage is risk assessment, which contributes to gain important information about internal and external factors of the client, but also identify areas where there might be material misstatements (Houston et al., 1999; Stenvold, 2020). Gaining an understanding of the company and its environment, as well as its internal controls is an important part to assess the risk (Fotoh & Lorentzon, 2023; Messier, 2006). This is done through three stages: *“The risk assessment procedure shall include the following: (a) inquiries of management and of other appropriate individual within the entity, (b) Analytical procedures, (c) Observation and inspection”* (IAASB, 2019).

As entities becomes more technological developed and the audit profession goes through a paradigm shift (Fotoh & Lorentzon, 2023), the number of analytical procedures will increase and get more advanced (Appelbaum et al., 2018). Analytical actions can include both financial and non-financial information (Borthick & Pennington, 2017), and the use of high-level aggregated data where the findings from this can provide a general indication of locating risks for material misstatements (IAASB, 2019, p. 23). These analytical tasks can be conducted using various automated tools or procedures such as DA (IAASB, 2019, p. 24). But the standards do not explicitly define the type of analytical procedure to undertake. Instead it is left to auditors judgement (Appelbaum et al., 2018). Following is ISA 315 implying that the auditor must do the audit with accuracy and reliability, and plan in a manner which ensures the completion of an efficient audit (Glover, 2006). However, the potential to improve audit quality efficiently by

using DA are potentially hindered by inspectors' creation of uncertainty (Austin et al., 2021; Cao et al., 2022).

2.6 Summary

In summary, we can see that there has been a significant rise in data, providing auditors with an extensive range of opportunities for professional growth and the creation of new auditing techniques. As DA is used more frequently, we may observe that the auditor gains deeper understanding of the company and conducts risk-focused audits, which provides higher-quality work. However, in light of the current drawbacks of DA and the lack of clarity around standards, can we see a moderate utilization. The development is gradual even though many audit businesses have invested a lot of capital in new audit tools. Despite this, with the lagging process of DA and revised ISA 315, few have shifted their point of view on to the application in risk assessment.

3 Methodology

This chapter presents the approach and research design we have selected for this dissertation. Here we aim to provide the reader with a good understanding of the research process by supplying a thorough description on how we have conducted this study. We will outline our process for gathering empirical data in the following chapters.

3.1 Research design

Research design can be expressed as a plan for the collection, examination and analysis of data gathered to answer the research questions (Bougie & Sekaran, 2020, p. 103). There are two main types of research designs, which are qualitative and quantitative. The objective of both qualitative and quantitative methodologies in research is to obtain new and useful knowledge using systematic strategies (Olsson et al., 2003, p. 66). Because we wish to obtain more in-depth knowledge and understanding on the aim of our study, we have chosen a qualitative approach (Rosenthal, 2016, p. 510).

With a qualitative method, the topic of the research can be explored in greater detail where the researcher and informant can have an open dialogue (Gripsrud & Olsson, 2018, p. 104). The researcher wishes to obtain a thorough picture of the informant's personal perspective and frame of reference. Individual interpretation is the foundation of a qualitative analysis (Olsson et al., 2003, p. 67). Qualitative methods are research techniques that generates descriptive data. This method is used to systematize knowledge about qualities into categories, descriptions, or models that best capture a given phenomenon (Sousa, 2014).

The research method in this study is exploratory given that there is limited previous research on auditor's use of DA in risk assessment (Bougie & Sekaran, 2020, p. 56). Exploratory research is often based on qualitative approaches to data gathering such as case studies, focus groups or interviews. The nature of exploratory research is flexible, where initial focus may be wide and gradually becomes more focused as the study goes on (Bougie & Sekaran, 2020, p. 56).

3.2 Data collection method

The collection of data is an integral part of the research design (Bougie & Sekaran, 2020, p. 103). We have built up an understanding of the theory surrounding our research aim, which enables us to comprehend previous literature and locate areas that can be interesting and relevant to take a closer look at. Primary data is data collected firsthand by the researcher directly from the source (Bougie & Sekaran, 2020, p. 49). The most widely used method for gathering data in qualitative research is interviews, where the semi-structured format is the most used interview technique (Kallio et al., 2016), which is the method we have chosen to collect primary data in this dissertation.

Due to auditing being a profession that is subject to international laws and regulations (IAASB, 2009a, pp. 4-5; Revisorloven, 2020, §9-7), our research aim is generalized to a global auditing practice. However, since we only had access to Norwegian informants, we decided to concentrate on how DA is used in risk assessment by audit firms located in Norway. As previously mentioned, inherent risk is a part of the ARM. An essential step in the auditor's identification of the inherent risk is having a thorough understanding of the client and its surroundings (IAASB, 2019, p. 6). As a result, the environment of the client, including elements like the country in which it is located, influences the auditor's risk assessment.

When choosing informants for our interviews, the focus was on representatives with a high level of knowledge and experience within auditing. To gain a wide range of perspectives and experiences, we sought information and data from several auditors from various audit firms as well as other units within auditing. Because the smaller audit firms did not employ DA in risk assessment, they did not want to devote time for our interview.

The Norwegian Financial Supervisory Authority, hereby referred to as FSA, acts as a control unit within auditing, where they at least every three years, inspect audit companies that audit public-interest organizations (Finanstilsynet, 2023). These inspections will consist of an evaluation of the company's internal quality control systems as well as an evaluation of the independence, availability of resources, compensation of the auditor, and audit execution (Deloitte, 2022). This makes FSA a highly relevant informant in relation to auditor's use of DA in risk assessment.

The Norwegian Institute of Public Accountants, hereby referred to as DnR, is an interest and competence organization for state-authorized auditors in Norway. DnR engages in a variety of educational, informational, and counseling initiatives, both nationally and globally. In collaboration with the FSA, the association also carries out regulatory quality controls of its own members (Revisorforeningen, n.d.). In light of this, DnR plays an essential part within Norwegian auditing and can contribute with highly relevant information on how DA are used in risk assessment, and how the ISAs are affecting its use.

3.2.1 Interviews

By using data generation methods, researchers can produce empirical evidence and data (Oates, 2006, p. 36). As mentioned, we chose to conduct semi-structured interviews in our collection of qualitative data. In semi-structured interviews, the researcher creates predetermined themes and questions that should be covered during the interview, but the researcher can alter the questions and even add additional questions if the participant raises themes that the researcher may not have been prepared for (DiCicco-Bloom & Crabtree, 2006; Kallio et al., 2016). This method has been found to be efficient in enabling openness between the interviewer and the participant, giving room for the participants' personal verbal expressions and enable greater in-depth information (Kallio et al., 2016).

The main topics of the research are covered in the interview guide. By giving participants direction on what to talk about, the goal is to examine the research topics by gathering comparable forms of information from each participant (Kallio et al., 2016). We conducted interviews with a total of eight informants. Six of these were informants representing bigger audit companies in Norway, as well as one informant from DnR and one from FSA.

Respondents	Role	Working title	Years' experience	Duration of interviews
P1	Auditor	Manager	5	53 min
P2	Auditor	Audit director	20	48 min
P3	Auditor	Senior Associate	5	57 min
P4	Auditor	Manager	5	43 min
P5	Auditor	Manager	8	42 min
		Partner	17	
P6	Auditor	Auditor Associate	2	56 min
R1	DnR	Advisor in accounting	8	50 min
R2	FSA	Senior Advisor	40	44 min

Table 1: Presentation of Interview respondents.

3.2.2 The interview guide

Semi-structured interviews begins with critical interview questions covering the aim of the research, with additional follow-up questions like “Do you have any examples?” or “How?” (Johannessen et al., 2005, p. 147). At the conclusion of the interview, the participant was encouraged to offer their own opinions or bring up additional aspects of the topic that were not covered by the interview questions (Kallio et al., 2016).

For the data collection in this research, three different interview guides where prepared. One for the informants representing various audit companies, one for the informant from DnR, and one for the representant from FSA. This was done to customize the questions to different participants with various background within auditing and to ensure relevant information was provided from each informant.

In the process of developing our interview questions we have reviewed the questions several rounds making minor improvements and changes to ensure that the questions are optimal for gathering important and relevant information. We took several precautions, avoiding leading questions as well as questions that would generate yes or no answers (DiCicco-Bloom & Crabtree, 2006; Kallio et al., 2016).

3.2.3 Recording and transcription

With permission from each informant, we recorded the conversations during the interview. Some of the interviews were conducted face to face at the offices of the informants, while other interviews were held over Teams-meetings. Both interview methods were recorded using the format called “Nettskjema Diktafon-app”. Nettskjema is the most secure and used tool for collection of data in research conducted in Norway (Nettskjema, n.d.).

After storing the files securely, the next step was to transcribe the collected data. Transcribing is the process of transforming audio recordings from the interviews into text (Adu, 2019, p. 59). Doing this the researcher gets to review participants’ responses to each question and discover possible patterns in the data (Adu, 2019, p. 60). To ensure high quality and verify accurate reflection of the content, we chose to transcribe all interviews word by word separately before comparing and revising them (Adu, 2019, p. 60).

In addition to the recordings, we also noted down interesting observations during the interviews. The recordings helped us to focus on the interaction with the informants and note down important and interesting remarks. This is seen as necessary to be able to capture possible non-verbal and additional background data to acquire all information from each interview (Harrell & Bradley, 2009, p. 75). Three of the interviews were conducted in Norwegian due to the informants’ preferences. The recordings and transcriptions from these interviews were transcribed in Norwegian before translated as directly as possible to English.

3.3 Data analysis

It is necessary to organize and analyze qualitative data, where there is various methods and formats for this type of analysis (Johannessen et al., 2005, p. 80). Analyzing data consists of making a new researcher-constructed totality that provides a simplified but conceptually accurate representation of the original reality (Johannessen et al., 2005, p. 229).

Qualitative data includes all non-numeric data such as words or sounds and can be obtained through interviews, documents and websites (Oates, 2006, p. 266). In this research it has been gathered textual qualitative data through interviews, which was recorded and then transcribed.

A qualitative data analysis is not always a straightforward task to conduct, and there are no specific guidance on how this should be done (Oates, 2006, p. 266).

3.3.1 Qualitative coding

A drawback of qualitative research is that the analysis and coding process is frequently inadequate recorded and documented (Miles et al., 2014, p. 71). It is therefore essential to explain why we selected the methods we did, as well as how the process of analyzing helped us comprehend our research and reach our findings.

There are several approaches to analyze qualitative data, whereas coding is one of many possible approaches (Saldana, 2021, p. 5). In a qualitative analysis a code is typically a single word or short phrase that symbolically assigns a significant, essence-capturing, or expressive attribute for a portion of language-based data (Saldana, 2021, p. 5). A code is a construct developed by the researcher in qualitative data analysis, as used in this study, that represents, and attributes interpreted meaning for all gathered data for later purposes through different analytical processes (Miles et al., 2014, p. 72).

Various methods used in coding can be broken down into two major categories. These are First cycle coding and Second cycle coding methods. First cycle coding can be considered as the analysis, where the researcher takes things apart, while Second cycle coding is viewed as the synthesis, where the researcher reassembled the components with new meaning (Saldana, 2021, p. 6).

3.3.1.1 First cycle coding

The processes conducted in the initial coding of collected data are referred to as First cycle coding methods. First cycle coding is divided into several subcategories, each of which has a variety of techniques categorized within it (Saldana, 2021, p. 88). Since each qualitative research is different, the best coding technique must be tailored for that specific study (Saldana, 2021, p. 89).

During First cycle coding the researcher can process data amounts that vary from single words to full paragraphs or pages of text and information (Miles et al., 2014, p. 72). As the research aim is to understand the use of DA in risk assessment, First Cycle coding methods such as

Descriptive, In Vivo, and Simultaneous coding were applied. By using multiple coding techniques, we were able to view the data from multiple angles and develop more conceptual and theoretical understandings of the research aim (Saldana, 2009, p. 76).

3.3.1.2 Second cycle coding

The portions coded in Second cycle coding processes can be the same units, longer text phrases, analytical messages about collected data, or reconfigurations of the codes created during First cycle coding (Saldana, 2021, p. 6). Second cycle coding were used to organize the data chunks from First cycle coding into fewer categories (Miles et al., 2014, p. 86). This was conducted to organize and gain a better overall picture.

3.3.1.3 Coding using NVivo

NVivo was used to code the collected data as it helps to handle many of the manual activities involved in qualitative analysis (UiA, 2020). It is a high-quality licensed software that we received access to through UiA.

The first subcategory used during First Cycle coding was Descriptive coding. This process involves segmenting the collected interview data into codes according to topics (Saldana, 2021, p. 134). Based on this, we organized the participant's interesting statements and remarks into descriptive groupings. To gain a deeper understanding of the participants thoughts, we then followed up with In Vivo coding. Here the codes places an emphasis on the actual words used by the participants (Saldana, 2021, p. 129). This coding technique can be beneficial to determine whether the researcher has comprehended what is significant to the participant (Saldana, 2009, p. 75). At last, we used Simultaneous coding where two or more different codes are applied to a specific qualitative datum, or a combined application of two or more codes to sequential qualitative data units. This method is suited when the collected data suggest numerous interpretations (Saldana, 2021, p. 124).

These methods were utilized to break down the transcripts from all interviews into categories based on different topics and words used. Some collections of data were coded with multiple codes because some data could be categorized in several ways. This made it simpler to compare the responses from the various informants and identify patterns and distinctions in the data.

After utilizing First cycle coding, we conducted Second cycle coding with the use of NVivo to put the patterns and distinctions we had found back together. This is done to organize the data better and generating actual findings (Miles et al., 2014, p. 86). It gave us a better overview of the findings from the substantial amount of textual data material, but also align the data with research. Second Cycle coding uncovered intriguing components that we could explore further and better insight into the material.

3.3.2 Reliability and validity

Regardless of the type of research conducted, it is important to consider how good the research is (Gripsrud & Olsson, 2018, p. 61), where reliability and validity are crucial issues in all types of measurement (Neuman, 2006, p. 188). Reliability and validity are key aspects to consider when evaluating the quality of a research. To be able to ensure the quality of this thesis we have carried out several measurements and applied scientific methods to obtain sufficient reliability and validity.

3.3.2.1 Reliability

Reliability is about the extent to which level one can trust the results from research to be trustworthy (Gripsrud & Olsson, 2018, p. 61), and is seen a necessary contributor to validity (Cooper & Schindler, 2014, p. 206). There is no general agreement about which criteria's should be met, when assessing the quality in qualitative research (King & Horrocks, 2010, p. 158).

For obtaining reliability when data collection is done through semi-structured interviews, it is important that each informant understands the questions in the same way so that the answers can be coded without the possibility of uncertainty (Silverman, 2006, p. 286). Here the conversation significantly influenced the data gathering and the interviewer's behavior, reaction, tone of voice as well as body language could all effect the data's reliability (Silverman, 2006, p. 286).

Throughout the interviews, we were careful to maintain our objectivity and refrained from expressing any biased opinions that might influence the informants' responses. The informants were allowed to speak freely without interruptions to ensure that their opinions, views, and concerns could clearly be expressed.

Furthermore, both researchers transcribed each interview recordings, to ensure that the recordings were transcribed verbatim. This was done to prevent including any personal interpretations or misunderstandings. Failure to capture seemingly unimportant but often crucial pauses, overlaps or small supplementary expressions, can seriously weaken the accuracy of transcript interpretation when using tape recordings and transcriptions (Silverman, 2006, p. 287).

3.3.2.2 External and Internal validity

In qualitative studies, validity refers to how accurately the researchers' results reflect the study's purpose and reality (Johannessen et al., 2005, p. 228). Validity is a concept consisting of two dimensions, internal validity and external validity (Ritchie & Lewis, 2005, p. 273).

External validity is the extent to which the results of the study may be applied to populations other than those that have been studied, which can be challenging to identify in qualitative research. This is because qualitative research frequently uses a small number of carefully chosen study items for a particular purpose (Jacobsen, 2022, p. 255). Eight informants were used for this research, where all were chosen based on their competence and knowledge within auditing. Of these eight, five larger auditing companies in Norway were represented, as well as two other significant units within auditing. However, the smaller auditing firms are not represented at all, and the findings cannot be generalized to these. Although many of the major auditing companies and control units in Norway are represented, eight informants in total are a relatively small sample. This implies a weakness in our study's external validity (Jacobsen, 2022, p. 255).

Internal validity refers to whether the informants have given true information. To obtain true information, the researcher must acquire the right sources of information. If the wrong informants are interviewed, then the information from these would be inadequate (Jacobsen, 2022, pp. 240-242). In this thesis the informants have been selected carefully with a focus on conducting interviews with representants that have a deep understanding of the aim of the research and have experience within auditing. We have conducted a critical review of the interview guide ahead of each interview, as well as the answers to ensure internal validity (Jacobsen, 2022, pp. 240-242).

3.3.3 Research ethics

All research must submit to ethical principles and legal guidelines (Johannessen et al., 2005, p. 91). A confidential preservation of personal information is a right for individuals who are research subjects. Researchers have a responsibility to prevent the use and dissemination of information that might damage an informant, and each participant must be made aware of any restrictions on the confidentiality requirement by the researcher (DNFK, n.d.).

In the execution of this thesis, we are obligated to follow the university's ethical protocols for privacy concerns. In this process we sent a standard application to the ethics committee (Sikt, n.d.) and got this approved before we started our data collection.

Everyone that participated in the research signed a consent form before the interview took place, and before starting each interview we reminded the informant that we would now start recording them. All recordings were stored in Nettskjema data storage base (Nettskjema, n.d.).

4 Presentation of results

This chapter presents the findings from the interviews conducted for our investigation on the use of DA in risk assessment. Our research questions are (1) *“How are data analytics used in risk assessment and is there potential for improvement?”* and (2) *“What should be included in the auditing standards to support the use of data analytics in risk assessment?”*. This chapter is organized chronologically after the interview guides, and we will here present our findings found conducting First- and Second cycle coding using NVivo. The findings are presented in form of quotes from various informants, based on connecting topics and patterns. We have not included all citations that support the various findings, but a selection of quotes that represents our findings well. As mentioned in chapter 3.3.1.3 we did not opt to change the data format from our transcriptions using NVivo, but we coded the data in form of finding patterns and to comprehend the content of the data in a good matter.

4.1 How are data analytics used in risk assessment and is there potential for improvement?

In terms of defining DA, our findings show that there are similarities as many informants mentioned comparisons of financial numbers and looking at trends. The technical aspects of DA were mentioned by many respondents, however some focused more on it than others. P1 defined DA as *“That you have a source and then you compare it with another source. Or you use it to see a trend and a development”*, and P2 mentioned DA as a *“simple comparisons with last year to current year, to see if there are any changes that we need to follow up in the audit”*. Here we can see that the focus lies on the practical use of comparisons and looking at changes.

Other respondents place more emphasis on the benefits and the understanding that you get from DA such as P4, who said that *“for me the data analytics is structuring and use of data in order to get practical insight regarding the data you are going to use”*. P3 said *“I think data analysis means that you collect information. In other words, you have a lot of different information that must be collected in a clear way so that you get a simple overview that gives you an answer to what you are looking for”*. A much broader definition was mentioned by P6, who said that DA is the *“use of technology to generate digital tools to analyze financial information”*. Although DA is often seen as a tool for comparing financial data, there is much more to gain from the deeper insight it provides of what is happening behind the statistics.

In summary we can see that DA is a simple tool used to improve the understanding of financial numbers and to gain a deeper understanding of the business. One can observe that there are numerous parallels between the definitions provided by the informants and the one provided by IAASB. As previously mentioned, IAASB define DA as *“the science and art of discovering and analyzing patterns, deviations and inconsistencies, and extracting other useful information in the data underlying or related to the subject matter of an audit through analysis, modeling and visualization for the purpose of planning or performing the audit”* (IAASB, 2017, p. 7). We identify certain commonalities, such as finding and analyzing patterns, but there may also be a shortage of DA resourcefulness.

4.1.1 The use of DA

With the definitions as a starting point, we wanted to look more into the actual use of DA in risk assessment today. This was done to better understand if auditors follow the same procedure or whether they emphasize the use in various ways.

We found that the use of DA differs, and we can observe that auditors place varied emphasis. All respondents compare the financial information they receive from the larger clients to identify patterns, such as P1 who says that *“in risk assessment it's really just more to see trends and stuff like that. We sort of see how the developments have been this year and how the developments are going to be. (...) We use it mostly to ask the right questions. To find out what have happened and get an explanation from the customer”*. Several informants reiterate this, although some also say that in the planning stage, DA is not heavily employed.

One respondent that looked at the use of DA more as a formality, is P2. It was said that they don't *“think that we are putting that much emphasis on the data analytics(..) because we don't normally experience that we are finding that many deviations that has a really huge impact on the audit, in the risk assessment auditing. I don't think that the planning risk analytics have a really big part of the planning phase, its more just a formality in a lot of the big clients”*. This is much different from P6's response who mentioned that DA is strongly used in risk assessment. DA is *“a lot of data visualization really. Assessment of financial information by visualizing either in tables or graphical representations. To build up an understanding of the business which are very dependent on the industry”*. Due to the mention of visualizing, P6 differs somewhat from the others.

4.1.2 Challenges and benefits

As this master's thesis focuses on risk assessment rather than audit evidence gathering, many respondents said they did not experience many challenges. P1 said, *“on the risk assessment, I feel that there are not very many challenges, because there is quite a wide range of what you can do”*, but then followed up with the availability of data being a constrain. It was said that *“most data are available, but it's just a matter of being able to get the right data in. To be sure that it actually gives you the information that we want”*. This assertion was supported by P6, who said *“that there is a lot of cool stuff that can be done and that also has value for the audit and risk assessment. But I find it somewhat problematic to link financial data together with other data, in order to do benchmarking or to be able to compare companies you work with against the industry as a whole”*. The availability of data was widely recognized as a challenge while performing DA in risk assessment.

P5 stated that *“we also experience issues that the client uses different ERP systems, and different systems have different data that are captured, so there is no kind of standardization of data”*. Likewise, P1 stated that *“there is a lot of data there that is not readable in the documentation method they use”*. R1 then stated *“a lot of the reporting programs or bookkeeping programs, accounting programs that clients use, they typically don't have a focus on exporting masses of data. (...) often it requires you to rework or extensively format the data in order to actually be able to use it for data analytics”*. From this we also observe difficulties in standardization of client-data to make it usable for DA in risk assessment.

Others, such as P2, also confirmed that they *“don't think there is any challenges, because we are doing them quite simple”*, but then explain that *“the challenges are to get a good understanding of the changes”*. The component of having a good understanding was mentioned from several, such as P3. It was said *“I think it's a little bit that you have to have an understanding of what lies behind the numbers. (...) Because you might think it's a risk that isn't really there if you don't fully understand what's behind it”*. From this we can see the importance to keep up with the rapid advancements in technology in terms of being able to comprehend and understand it.

But DA in risk assessment also provide benefits. One aspect that has been consistently noted by respondents was how good insight you get to the data, and better knowledge of the risks and the clients' business. P1 described DA to give a *“more comprehensive picture so you then can*

dive into where the risk actually lies. You get a principled interactive audit where you are more in collaboration with the company, (...), and you get to know more about what we are looking for. So, they get more understanding rather than just doing the same thing all the time". This is followed up by P3 who said that it is *"very quickly done to get a good overview. I think that is the main advantage of data analysis. You're quickly getting control of the numbers in a much clearer analysis straight away"*. Seven out of eight respondents said they believed DA had the advantage of providing deeper insight. P2 agreed that it provided more information but did not place as much emphasis on it. When we questioned P2 about the advantages of employing DA in risk assessment, the response was that: *"I don't think that we are putting that much emphasis on the data analytics, because I think we are reviewing much more about the interviews with management"*. Although practically everyone recognizes the benefit of greater insight provided by DA in risk assessment, not everyone places the same value on it.

4.1.3 Quality and efficiency

The majority of participants believed that employing DA improved risk assessment quality. P1 said that *"you get a more directed audit and that's what makes it more risk-managed than if it's just the same thing we do. And many of the conversations you have with the customer in a way, notice that it's more aimed at what actually happens than the standard questions that you get, or are asked"*. DA identifies areas that must be studied and allows the auditor to spend less time on areas without risks. This was also addressed by P2 who said that DA *"has really improved the quality of the audit because we are focusing on where the risk is, and not doing the same approach on everything"*. P4, P5, R1 and R2 followed up on this by mentioning how DA adds an additional layer of information as you go deeper into the data to get better information when starting the audit.

P3 offered a response that was different from others, which was *"I don't necessarily believe that the quality will be greater in the risk assessment. But I think it will be easier to review the work during a control"*. This could possibly be because we asked the question as a comparison to traditional methods. Since the quality always has had to be good, there is no change from previous methods in terms of this. Adding to this, R1 reflected on that *"you have to have that balance and you have to understand when it's beneficial and when it doesn't really help you, but just gives you something that's interesting"*. It's crucial to be knowledgeable so when DA doesn't provide the information you're looking for, you know when to use other approaches.

As a mix of all answers, P6 said *“in the risk assessment phase the actual quality of the work, I don't think it is necessarily greatly improved. (...) I experience that it helps the auditor to gain an understanding of the business and an understanding of what actually happens in the company, and that it contributes to a general improvement in the quality of the audit”*. This highlights, using DA to analyze risk gives you better insight and, as a result, a strong knowledge that is crucial for planning the audit.

As efficiency gains are anticipated with more modern technology (Maharaj, n.d), we wanted to see if this was true when using DA in risk assessment. As R2 mentioned, *“all auditors want to do an efficient audit. They want to use as few hours as possible because that has something to do with the client relationship”*.

When asking the question about efficiency, the participants provided various replies. P4 was the only one to express a clear rejection, stating solely that the efficiency of risk assessment had not improved. P1 on the other hand, said both *“Yes and no. Risk assessment is not made more efficient if you remove the areas with which there is no risk. You want to drop the areas that are not significant or have no inherent risk”*. Here the respondent argues that you get a more directed risk assessment as you remove irrelevant areas. However, the time you would have spent on irrelevant areas are now directed on areas with potential risk. This was more defined by P5, who said that *“I don't think the hours go down (...). I would rather say that it can increase. But then we also say that we address issues more efficient than we did before. You get more insights through the entire process”*. So, the time you spend on risk assessment is somewhat similar, as you still must investigate all identified areas. The digital future of audit is not about reducing numbers of hours but rather do more insightful work.

Some respondents stated that they do think DA made risk assessment more efficient, while others stated that there is more a potential in it. P3 and R2 said they thought the efficiency had increased, but mainly on the bigger clients. This was also mentioned by P6, who said *“not on smaller customers, but on slightly larger customers, I believe that there are activity gains to be made”*. P6 followed up with another factor, which was *“time management of the project. The customer is not necessarily large enough for doing thorough data analyzes to provide so much value. There will then be a cost/benefit assessment because it is time-consuming to obtain data from external sources and analyze it against financial data”*. Agreeing with the potential of efficiency, R1 said that *“with increasingly advanced tools becoming more available (...),*

there's definitely a potential to be more efficient and do better risk assessments. Typically, how auditors use less time on things that has less risk and more time on things that is riskier. So, I think that the user invention will in both small and large firms, will all but guaranteed increase in the coming years". They both highlight that the development will make risk assessment more efficient, but there are challenges to overcome first.

4.1.4 Potential of DA in risk assessment

The comprehension of data has previously been mentioned as a challenge when using DA, where continuously training is a key component. P3 pointed out that *"I think good training is key. That everyone understands what they are looking for. At least that's something I've tried to focus on"*. To fully utilize DA's potential in risk assessment, it is necessary to understand what it truly provides and how to apply it properly. P3 followed up with *"that the auditor's knowledge of data analytics, statistics and the programs and tools used to carry out the analyses, that it is auditors who simply need more training in it. Perhaps also raising awareness of the possibilities. I think there are a lot of people who don't quite know where to start"*. For DA to be developed and used, it is crucial to be aware of its possibilities.

The accessibility and standardization of data are additional factors that affect the potential of DA. P1 started with that *"the dream is that you get everything, in such a SAF-T file where you can get everything from all companies. But there is a lot of data where that is not readable (...). So that's what's challenging about it. Being able to take this down to an understandable level"*. SAF-T has newly become a requirement and P6 stated that *"I am actually very optimistic about SAF-T. But there is a lack of implementation ability"*. P5 agreed and said that it is *"obviously a step in the right direction (...). A standardized extract would be the way to go, or maybe also the possibility to connect directly into the ERP-systems into the databases, because all of the data are available (...). When you're connected directly into the database you also get the raw data, and the raw data is normally standardized within different structures"*. Direct access to data is preferred by auditors because it improves data integrity and quality. *"If they become better at opening up so that we can obtain data. That is perhaps the most important thing. If you have good access to data, you can do much, much better auditing"* was said by P3. One problem regarding more access to data suggested by P2 is *"I think it's going to be more expensive to extract it, because the clients are doing their best to protect the data because of all these cyber security threats and stuff like that"*.

We also investigated if the risk assessment's use of DA might be followed up on and utilized further as evidence later on in the audit. The findings were mixed. P2 stated that *“if we compute more analytics in the planning phase and through that, reduce the amount of work we need to do in the execution phase, then we will definitely do more work in the planning phase. But today we can't reduce the amount of work based on something that you need in the planning phase. The planning phase is just more or less like how can we understand the client as fast and efficient as possible”*. In contrast R2 said that *“I think it is possible today. Risk assessment has always reduced the need for other audit procedures or how much audit evidence you have to gather”*. Several of the respondents thought they could rely more on DA in risk assessment and liked the thought of it. Yet it couldn't take the place of acquiring evidence. P6 substantiated this with the fact that *“If your purpose is to identify areas of risk, then the angle of attack on that action will be quite different from being able to obtain evidence then. So, I don't necessarily see the specific action that is done in the risk assessment, other than automatically being used to obtain evidence. But I think you can probably build on the work you have already done in data processing. Then you can still use the data base to do other analyses”*. From this we can see that there is potential for increasing reliance on risk assessment, but not at the expense of acquiring evidence.

4.2 What should be included in the auditing standards to support the use of data analytics in risk assessment?

In the second part of the interview, we wanted to get an understanding of how the standards are used today and how it affects the application of DA in risk assessment. The standards are designed to enhance auditor's reports for users of financial statements, but from previous research we have seen uncertainty and skepticism from auditors to this guidance.

4.2.1 The use of internal guidelines and ISA

To better understand the use of ISA, we first sought to determine whether or not auditors primarily adhere to internal guidelines or the standards while using DA for risk assessment. The internal guidelines, however, are based on an interpretation of the standards. This was some of the answers:

“We have always followed internal guidelines and never the standards because we are always measured against internal guidelines. The internal guidelines are always based

on the standards, and it's how they have interpreted the standards that is the way we are working. The internal guidelines are quite specific” - P2.

“Definitely internal routines. There is very little focus on the ISA’s on a day-to-day basis. This way you have a specialist department that is responsible for quality assurance of (...) the methodology we use. So, they are well into the ISA’s” - P3.

“I think almost everyone is just looking at internal routines” - P4.

“Audit companies use their internal guidelines because they want to be efficient and secure that all auditors are doing audit in the same way. Documenting the same way. So, that's more for an internal control purpose and for securing high quality” - R2.

The answers were all cohesive. All six’s auditors answered that they used the internal guidelines and procedures, rather than the international standards. Likewise, this was also commented by the control units.

4.2.2 ISAs support function

Additionally, we were interested in how the auditors perceived the direction and assistance provided by the standards. Few auditors apply the standards directly, as we can see from the chapter before, which will affect how they respond to this. We did, however, expect that auditors would have an opinion on the support function given that they are expected to be knowledgeable about and conversant with the international standards.

Upon comparing the replies, we find that the auditors' and the control units responses differ. R2 said that *“we think that ISA is giving quite good support. But of course, there is work with the ISA standards to modernize them and to align them with new technology. So, it's an ongoing process. They're not perfect”*. It was acknowledged that they could enhance and modernize, but they are providing auditors the assistance that they need to do the work required of them. R1 came with a similar comment that *“there is assistance, but it could be clearer”*. We can see a commonality between the two control units, as they both agreed that standards provide assistance but that there is still room for improvements.

The auditors we spoke with had a different perspective on the support role of ISA. P1 said that *“we have the internal guidelines to define what should be done. If we have only looked exclusively at the ISAs, then we would likely go in circles on what actually needs to be done. (...) When the requirements are a bit unclear, you almost must define the requirements yourself. So, that's why we have the internal guidelines to define what should be done”*. This was supported by P2, who said *“I don't think it gives a good support. I think it just gives some hints here and there. But I don't think it really matter because I think that the big firms will always make their own guidelines, related to this stuff”*. Internal procedures will always be in place at auditing firms to help auditors conduct efficient, high-quality risk assessment. But when technology advances and tools such as DA get available, it might be challenging to evolve when the standards itself do not embrace it. This was commented by P4, who said that *“if you're going to make somebody do something, you must have the component of incentives, and I think that's what you lack in the standards”*. P6 then made a point by saying that *“there is not any support function in that sense, at least not when it comes to data analyses. You do follow the ISAs, but they probably do not have anything defined related to data analyses”*.

As shown, there is a difference in the responses between the control units and auditors. FSA and DnR do acknowledge that there is room for change and clearer assistance. The auditors mostly miss incentives and engagement on the use of DA in risk assessment.

4.2.3 Clearer guidelines and adjustments

We have up to this point examined the use and support of the ISAs, but we were interested in finding out more about what the participants think should or shouldn't be changed. If it is to provide better guidance and assistance, maintain the status quo, or make any other potential improvements.

P1 started off by saying that the *“challenge is that it fits what was ten years ago and what is now, since it is so undefined. But, if they had defined it more, then it would stop a new development tomorrow and not take it into account. So, if we had the ISA more defined, we might have to do a more frequent revision of the ISA in order to be able to keep up with what is happening in the market and availability of the data. That's the challenge of sharpening it”*. From this we can see that change is necessary but difficult to articulate. P4 noted that incentives are required to create and explore new possibilities. It was said that *“if the guidelines are quite specific and not too broad, people would start using it. But you must overweight. The magnitude*

or the time spent on the tests in order to use the data can't be bigger than just doing it as we are doing now". Few auditors would employ DA if the rules were too strict and included several criteria if it results in the process being too time-consuming.

R1 mentioned that a broad standard *"leaves a lot of room for interpretation which I think is necessary, but I think that it may cause some auditors to be unsure of how to apply it"*. The auditor can utilize interpretation to investigate DA if there are no specified criteria, but this can also lead to ambiguity. P3 stated *"It's very good to at least have a guide. The advantage that it's not too strict means that you can assess a little more yourself, but if it is too rigid, then it may not be as easy to find analyzes that hit the mark well. Companies are very different. So, it is not always so easy to find something that hits well for everyone"*. Likewise, P5 said that *"it is kind of company-specific what you have to do and what you can do. So, you can't narrow it down too much (...). It should be designed to kind of at least drive initiatives to some extent. The ISAs and the standards setters could be more direction-pointing"*. What we take from this is that auditors do require incentives to utilize DA and investigate the options while applying their professional judgment. Yet, to do so, direction and assistance are needed. P6 confirm this by stating that *"we should get 'on the field' then, simply with guidance and updated standards. Because those standards are not adapted to today's audit. They probably hit a little different, those standards, in that they are not adapted to the actions one would like to have done. There are a lot of data analyzes that I really would like to do in the risk assessment, because I believe that if you are on a customer where it is appropriate to do it, then you can do much deeper analyzes that will improve the quality"*.

Finding an appropriate level where it is not too much, nor too little guidance proved difficult. This was demonstrated through R1's response, who said that *"in some cases, the outcome might be over-auditing in the sense that the auditor is forcing himself to spend too much time on a task to meet the standards when he could have gotten away with less. But also, in the other end. You might have a specific case with circumstances that would dictate that you must be more critical. You need more solid proof to use it based on your circumstances. And in those circumstances clearer guidelines would allow that you simply don't do enough. So clearer guidelines will have pros and cons"*. P1 offered a somewhat different suggestion, saying *"there should be sufficient guidance in how to use it, but that guidance would have to be qualitative. I think the focus would have to be increasing technical knowledge. Training in that way might be*

a better way to approach it. Rather than expanding the guidance that standards give on data analytics”.

As we consider the comments from the participants, we can see that nobody has offered a clear description of what should be changed. Just something in between a too broad or too detailed standard. It was also suggested that the focus shouldn't be on changing the standards, but better training and increasing auditors' technical knowledge.

4.3 Other findings

In addition to the main findings of the master's thesis, other relevant results were obtained. We gained information regarding the tone at the top of several audit companies. These additional findings provide valuable insights into the efficiency and potential areas for improvement of DA in risk assessment.

4.3.1 Tone at the top

An interesting element that we found was reluctance from the ones higher up in the audit companies regarding the use of DA in risk assessment, especially among the partners. R1 stated *“I don't necessarily think that the standards themselves are generating uncertainty, but (..) for instance in the SMB segment, you have a lot of older partners and engagement partners that you're asking to leave a tried and tested method behind and start doing something completely new and that will always raise questions”*. This was supported by P4 that stated *“you have like the partners and older people at the firms, they are generally skeptical about using those kind of analysis. And that's why a lot of times we tend to just do like the normal test. (..) they are scared to start using it because of the 'FSA' or organs that are controlling them again”*. Likewise, P6 said *“Where I experience more resistance is perhaps with the partners, those who are actually in charge (..). That there is more resistance to quality assurance and the safety it provides. And then it is very easy to somehow fall back on old methodology”*. P5 also agreed on the importance of support at the top, but had a different experience than the other informants, and made the following remark *“tone at the top is important, so having leaders that encourage usage of data analytics is really important. (..) partners are aware of the data tools we use and encourage it. And they're pushing it on the audit teams, so that also encourages others to use data analytics”*. From this we see that the tone at the top is also very important for use and development of new methodology in risk assessment. Management and partners at the top have

a great influence on what is practiced and the amount of resources that are spent on development on tools such as DA.

5 Findings and discussion

In the following chapter will we discuss our findings presented in chapter four. Our research questions serve as foundation for chapter five's framework. First, we will look at the findings relevant to research question one, before we proceed to research question two.

5.1 How are data analytics used in risk assessment and is there potential for improvement?

5.1.1 The use of DA

While interviewing it became clear that there are differences in auditors' emphasis on the use of DA for risk assessment across audit companies. Most informants commented that they exclusively employ straightforward DA for evaluating risks in the beginning of the audit, mostly to find patterns, changes, and comparisons. Few mentioned modeling and visualizing. On the other hand, some said that DA is not emphasized in the planning process. Looking at this, some respondents may have defined DA with risk assessment in mind. This could lead to defining it in simpler terms, compared to how they might have defined it if the issue of risk assessment hadn't been introduced as a theme for the interview. Additionally, if we had provided them the IAASB definition beforehand, it might have had an impact on both how they would define DA and answer the following questions. This might have increased their awareness of overlooked simpler DA tools. However, the questions were given to the participants in advance. This gave them time to reflect and consider the actual application of DA in risk assessment.

We also noted that the respondents' views on the definition varied in terms of how broad it was. In comparison to respondents with broader definitions, those who view DA in risk assessment as a formality have given less thought to its utility and value. The varying definitions are an interesting aspect because they illustrate how different auditors view the importance of risk assessment and what value they may gain from this part of the audit, particularly when utilizing DA. This implies that there could be unnoticed potential with DA in risk assessment.

An interesting aspect to compare is the definitions given by the informants with IAASB's definition. Many participants have started the interview by addressing the important use of DA in evidence gathering, and rather little attention to the planning process. However, looking at

the definition of IAASB it highlights benefits of using DA in the planning of an audit equal to acquiring evidence (IAASB, 2017, p. 7). This reinforces the findings of different emphasis on risk assessment, as respondents with broader definitions similar to IAASB have a greater understanding of the usefulness and value of DA in risk assessment.

According to how we understand the responses, everyone uses DA in risk assessment, but the time, effort and focus differ. For some, risk assessment is viewed as a checklist to complete before moving on, while others see the benefits in investing more time up front to gain a deeper knowledge and foundation. Previous research has found that auditors who use a standard risk checklist made lower risk assessments than those without a risk checklist (Asare & Wright, 2004). In order to make the most of risk assessment while planning the audit, it is critical to be aware of matters like these. This is equally crucial when DA is included in the risk assessment. Standard procedures could lead to suboptimal understanding of DA and its output if the auditor were moving too quickly by following a list. Additionally, if risk assessment is seen as a checklist and something to overcome, the auditor might end up having to recover a lot of hours later due to overlooking actual risk areas. Failing to create a solid foundation in opposition to those who view this phase as worthwhile and vital, can in the long run result in loss of resources and time. Eventually you could fall short of the competition as you lag in development and knowledge.

Both similarities and differences in the informant's definition of DA could also influence their responses on their use of DA and how it may assist risk assessment. Nevertheless, given that most informants describe DA similarly, our perception is that they also utilize DA similarly. However, by concentrating more on risk assessment in the planning stage, realizing its benefits, and gaining a deeper understanding of the client, some auditors could produce an arguably more secure base for the audit.

5.1.2 Challenges and benefits

Considering DA in risk assessment, it appears from our findings that there aren't many major obstacles in technology and tool development for audit firms. Since DA utilized in risk assessment seems to be rather basic, it may be viewed as relatively simple to conduct.

The difficulties are primarily with data availability, knowing if you have the right information, and interpreting its changes or lack thereof. Lack of client data uniformity is another issue,

which might make it difficult for auditors to use raw data. We found that various businesses frequently employ various ERP systems, documentation techniques, and software applications for their financial data. This makes it problematic for auditors to use data directly, and it becomes necessary to invest time and resources into reformatting the data before it can be used for DA. We can see that these challenges are consistent with previous findings (Earley, 2015; Manita et al., 2020; Michael Minelli, 2012; Yeamin & Sulaiman, 2022), as also commented on in chapter 2.2.3.

The advancement of SAF-T is one aspect that could be beneficial for these factors, as chapter 2.2.2 presented. We found that receiving data directly from clients in a SAF-T format would make it a lot simpler for auditors to apply it with DA. The data wouldn't need to be reshaped to fit DA tools and it might be much easier to fully understand the data's meaning (Bordeianu et al., 2022; Perry, 2017). However, this is more difficult for auditing international firms as there are more factors to consider. We will look closer at the advancement of SAF-T in greater detail during chapter 5.1.3.

As previously mentioned in chapter 1.1, we found that most articles discuss challenges with DA mainly to the evidence gathering process and not much when used in risk assessment (Appelbaum et al., 2018; Earley, 2015; Fotoh & Lorentzon, 2023). Our findings add to the previously identified challenges with DA, as they are just as essential in risk assessment. We can see that there are some core and fundamental challenges related to the use of DA in both processes. Regardless of the analysis's purpose, the data must be of high quality. However, when related to risk assessment, difficulties like double work and uncertainty are not as highly underlined. This may be because DA in risk assessment has been spoken of as being rather simple to conduct.

Although DA has some drawbacks, it is evident from our findings that auditors obtain a quick and in-depth understanding of the client's business, making it simpler to comprehend and locate the real risk. These findings align with previous research (Borthick & Pennington, 2017; Murphy et al., 2015). Our participants were questioned about the advantages of using DA, and the answers came swiftly. But it is interesting to note that even though they are aware of these advantages, they still highlight use of DA in risk assessment infrequently. This is another outcome that the checklist may provide. If the auditor applies DA in risk assessment by following a checklist, it may result in a less than ideal comprehension of the advantages.

5.1.3 Quality and efficiency

Most informants agreed that DA improved the quality of risk assessment, which is accomplished through enabling an increased focus on where the actual risk lies. Auditors can identify areas that require more investigation, allowing them to spend less time on low-risk areas. Nevertheless, it is crucial to understand which information is valuable and which is not, as R1 pointed out. Overall, we discovered that the application of DA in risk assessment results in greater client understanding and strong knowledge, both of which are essential for the planning of the audit. These results are consistent with earlier studies (Cangemi, 2014; Stenvold, 2020). A well-planned audit will translate into a well-executed audit, increasing the overall quality.

The efficiency of DA is mentioned by our informants in several settings, although it is noted that efficiency is contingent upon the auditor having access to standardized data, which is found to be one of the challenges of DA. The adoption of DA and its impact on the efficiency and cost, place a high value on access to standardized data. However, it is interesting to compare our findings to previous findings. In prior research efficiency has been highlighted as an advantage of employing DA (Cao et al., 2015; Earley, 2015; Michael Minelli, 2012; Murphy et al., 2015). According to our research, auditors have different opinions on this matter. This is most likely because some respondents measured efficiency purely based on the amount of time spent on a task. Other respondents pointed out that if the same amount of work is accomplished in the same amount of time but is more insightful, one might say that the efficiency has increased. There may be a misconception of what is meant by "efficiency" in this context, which could have an impact on the informants' responses to the question. Thus, all respondents acknowledged the considerable opportunity for improving risk assessment efficiency.

Client size is another element that affects efficiency. In comparison to smaller clients, there is a higher level of efficiency for larger clients. As P6 points out, they must weigh the costs and benefits to determine whether it is worthwhile to invest time in it. However, because DA is currently not highly employed for smaller clients, the overall possibilities might be greater.

We find it interesting that the use of DA in risk assessment can both contribute to an increase in efficiency and quality of an audit, yet the focus on this topic still differs across audit companies. An increased efficiency and quality are components in an audit that easily would

be considered as highly important elements in terms of standing strong in the market compared to competitors. Clients' selection of auditor will undoubtedly be influenced by factors such as a high-quality audit to a lower cost. Prior research show that the use of DA can influence audit firm's competitiveness by allowing clients to learn more about their own business and consequently improving the audits value (Austin et al., 2021). This supports the assertion that utilizing DA can contribute to advantages over competitors. On the other hand, we need to keep in mind the benefits and challenges covered in chapter 5.1.2. To generate an increased efficiency and quality using DA in risk assessment, the benefits must outweigh the challenges and obstacles.

5.1.4 Potential of DA in risk assessment

The backing of management is one of the main forces behind the uptake of new technologies (Jeyaraj et al., 2006). P6 tells us that there is a positive attitude and an expectation almost to use DA in risk assessment. But the use of DA is no requirement. The findings presents that a more widespread acceptance and increased use of DA might have been achieved with more managerial support, as presented in chapter 4.3.1. This could then lead to advancements and improved application.

According to prior studies, using DA demands a high degree of ability (Eilifsen et al., 2020). Every informant agreed that specific skills are necessary for auditors to perform DA. Deep knowledge and understanding are from this, key factors for optimizing the potential of DA within risk assessment in auditing. Therefore, it is crucial that DA is accepted immediately and incorporated in the audit. As a result, auditors may put more pressure on management to provide continuous training. Today auditors must obtain certain criteria, this both when it comes to education as well as continuous training while operating as an auditor (Revisorloven, 2020, §5-1). Because of this, we find it a bit surprising that most informants urge additional training on this area. As DA is widely utilized in today's risk assessment, practicing auditors should already have a good comprehension of this. Still, it might also be an indicator that DA is evolving quickly while auditors' understanding is behind in this regard. However, this might be viewed as a potential to further advance the usage and fully utilize DA's potential in risk assessment rather than as a flaw that must be fixed.

The creation of SAF-T files makes it easier to utilize DA since they enable the acquisition of standardized data. We saw in the chapter 4.1.4 that availability and standardization of data are

elements affecting the potential of DA. The majority of participants addressed this and agreed that more data availability and standardization would boost the potential within DA in risk assessment. Direct client data might be considerably more easily accessed by auditors if SAF-T could be successfully developed and implemented. Another potential rising from this, is that direct client data might increase the reliability of the data. From the findings we can see that the uncertainty around the use of DA for documentation, might be explained by data uncertainty. If you do not trust the underlying data, then it is difficult to believe the analysis.

However, SAF-T is not yet operational or beneficial for auditors, but many see a big potential in it. Several respondents expressed high hopes for SAF-T, saying that with further development and optimization, it might be highly beneficial for auditors in terms of client data availability and applicability. As it is still in an early stage, it is not yet readable and has some limitations in terms of its utility. Additionally, P2 argued that it might become more difficult and expensive to extract client data because businesses are taking more precautions to protect their data against a growing amount of cyberattacks and other threats. This will then increase the costs of companies as they must invest in high tech to protect their data. As a result, they might be reluctant to share their data and seek a form of compensation to reduce their own costs.

We also briefly discussed how documentation collected using DA during risk assessment may be used as audit evidence. If DA tools in the risk assessment process generated high quality findings, we saw possibilities that this could be included as evidence documentation. This could result in more efficient audit work, however the aspects on this subject varied. R1 noted an opportunity, although the majority of auditors were split. They thought it was impractical since the angle of attack on DA would differ, depending on whether it was employed in risk assessment or later in the audit. The control units concurred with this as they recognized a possible but indirect connection. Nevertheless, the results of DA in risk assessment might not be relied on as direct evidence, yet it might strengthen the assertions.

5.1.5 Summary

The dissertation's first research question is "*How are data analytics used in risk assessment and is there potential for improvement?*". Our findings make it quite evident that DA is widely used in risk assessment by larger audit firms. We have found that simple approaches like comparisons and trend analysis are frequently utilized. DA in risk assessment can help auditors find risks more easily, obtain a quick grasp of the client's business, which strengthens the audit's

focus towards risk and raises the overall quality. However, there are variations in how it is applied, prioritized, and defined. This results in DA in risk assessment not being fully optimized as of now. A step toward realizing DA's potential in risk assessment is by raising awareness and making standardized data more widely accessible.

5.2 What should be included in the auditing standards to support the use of data analytics in risk assessment?

5.2.1 The use of internal guidelines and ISA

From previous research we have seen that legislative ramifications must be taken into account because it is possible that the current standards may need to be altered (Balios et al., 2020). This is predicated on the notion that the ISA must support the expanding knowledge base and the application of analytical techniques more efficiently (Appelbaum et al., 2017). According to the responses, the majority of audit firms have created their own internal guidelines. These guidelines are based on interpretation of the ISA, however most of them are more detailed and explicit regarding criteria. We discovered a variety of elements that were worthwhile to discuss further in relation to this.

As the ISA are supposed to give support and guidance to auditors, we wanted to find out why so much effort was spent creating their own internal guidelines. R2 indicated that audit firms aim to be efficient and secure that all auditors conduct audits in a uniform manner and use uniform documentation. It was to serve more as a means of internal control and of ensuring good quality, rather than claiming that the ISA is inadequate. We were then intrigued to find out through the interviews that the informants had limited understanding of what was really contained in the standards as they rarely use them. Given that the ISA serves as the framework for the whole audit (IAASB, n.d.), we found it highly surprising that auditor's at work had so little control over its content. However, since the internal guidelines are frequently stricter than the standards, the auditors themselves did not reflect on it.

The increased time consumption and work effort may be a drawback of internal guidelines. Currently there are no criteria or explicit recommendations in the ISAs, so when a specialist team is expected to interpret and produce internal rules, the audit may be burdened with extra work. This supports the finding's by Eilifsen et.al (2020). Since incentives do not exist, auditors

might not employ DA, and the rate of progress would drop. This was mentioned by P4, who believed that incentives were required, or auditors wouldn't utilize DA.

As previously mentioned, the internal guidelines are a more detailed interpretation of the ISAs. This might have a considerable impact on how DA is emphasized and implemented by auditors across organizations. For example, did the auditors have a different focus than IAASB, who placed more emphasis on the use of DA at the planning stage. This could be an effect from various internal guidelines, where interpreting the IAASB definition were done differently. This might be problematic in ways that have not yet been explored or considered, but it may also be necessary because it better aligns the audit with the clientele of the different audit firms. However, there are limitations on how much the internal guidelines can differ, as all of them are based on the ISAs and comply with its requirements.

5.2.2 ISAs support function

Regarding the question of whether the ISA provided enough support, respondents had varying views. The fact that the auditors' and the control unit's responses varied was an intriguing discovery. Talking to the representant from the FSA, we got the perception that the standards were giving quite good support. The auditors, on the other hand mentioned that they never use ISA because it lacks guidance and requirements. With the increased development and the many different tools that can be applied, it creates uncertainty and challenges. This is consistent with earlier study findings (Kraheil & Titera, 2015; Manita et al., 2020; Yoon et al., 2015). The partners tone may also contribute to increase uncertainty, as mentioned in chapter 4.3.1.

Auditor's lack of necessity is another issue affecting the use of ISAs. They use internal guidelines that more-or-less exactly specify what to do and identify when something is sufficient. Therefore, it might not seem necessary for the ISAs to change since, as P5 noted, they will always have internal rules to abide by regardless of how good the ISAs are. However, it is also plausible that the auditors' reliance on internal guidelines stems from the standards' lack of direction. The drawback of adhering to stricter guidelines can be that auditors reflexively obey a set of criteria and fail to see its benefits. But the lists of criteria guarantee satisfaction of requirements by the ISAs, and sometimes even more. As it also was mentioned, it gives an advantage as they can be more sufficient and secure high-quality audits. But it could also lead to differences between the audit firms due to their own interpretation of the ISAs.

There might also be a miscommunication between the two parties. The FSA representative indicated that they are looking at the comprehensive assessment, and rarely the individual DA. Additionally, it was mentioned that auditors often produced high-quality DA, so they seldom made explicit comments about it. This is supported by previous research, where we can see FSA commenting that they inspect the completed audit engagement before forming their opinion on the DA use (Eilifsen et al., 2020). It appears to us that the analysis was not that significant by itself. The fact that auditors do not need to emphasize the terms of DA, but rather the total assessment, should be seen as a good indication. Today auditors are hesitant to attempt exploring with DA because they believe that every step they take is being scrutinized and remarked upon. But if they used DA and instead ensured that the entire audit was satisfactory, they could be able to benefit more as they wouldn't have to inspect everything in detail. However, it could also be the reason to why they do additional work. If the control unit is looking at the entire package and not just the specific DA, then auditors must perform further work as DA alone is insufficient. When it is believed that a single DA is not providing adequate documentation, a lot more effort must be done.

Given that each audit firm creates their own internal rules and ISAs use a wide definition of DA, may cause differences in how it is applied. This may have led to a knowledge gap amongst auditors when it comes to DA. These findings are supported by previous research regarding information overload and additional expertise (Cao et al., 2015; Murphy et al., 2015; Pedersen, 2016). Numerous different analytical tools may be used by various auditing firms at various stages. This was reflected on in the definitions, as they did emphasize it differently. P2 stated however, that internal guidelines were cited as a competitive advantage since the audit companies develop their own tools and do not share their experiences. All major auditing firms spend a lot of time and resources on it because they are aware that they must keep up with technological advances. This was supported by Cangemi (2014). It could have a favorable impact on the use of DA, as they all invest in development of DA and experiment with it differently. So as time passes, auditors may also benefit from a larger evolution of DA and new techniques because of the divergent interpretations. The backside of this is that it divides the audit companies, and the quality of audits will vary more as time passes. However, there has always been a difference in application of tools and how the audit is conducted.

5.2.3 Clearer guidelines and adjustments

The reason mentioned by IAASB for not specifying the use of DA, is that it will impede future progress and may necessitate more frequent revisions (IAASB, 2017). A comment worth noticing was made by R1 who said that clearer guidelines have both pros and cons. If you get clearer guidelines and requirements, then the auditor will know that adhering to them will be sufficient. In some circumstances the result could be over-auditing. The auditors spend more time than necessary to fulfill the requirements when they might have gotten away with less. However, you can also have a unique situation where the circumstances need the auditor to be more critical. Based on the situation, it is required more convincing evidence to apply DA. And in these certain situations, more precise rules would let the auditor “get away” with not doing enough. All respondents said that they did not support too tight or wide criteria. But everyone did also concur that the ISAs do need a change. However, it is possible that technology will continue to develop at the same rate as it has in the last couple of years, which makes it difficult to create standards since it can restrict options.

Although the standards offer guidance, all responses point out that they are out of date and do not take DA into consideration. Many auditors would like to utilize these types of tools more frequently and experiment with it in the planning stage of the audit, but the lack of guidance makes this difficult. In the future, this might influence the experts developing the internal guidelines for this part of the audit, since they won't know what is acceptable, which could influence the quality of risk assessment. Although it may not be the most pressing issue now, it is crucial that the audit industry do not lag. As auditors serve as the public's fiduciary, it is crucial that the work done by auditors is up to today's standard and quality in the market.

P6 mentioned that to decide whether to utilize DA or not, a cost-benefit analysis must be performed. The auditor must be aware of all available tools and the benefits they provide to conduct the best review. The promotion of DA in risk assessment can therefore be greatly assisted by the ISA, if they develop a better understanding. The challenge is figuring out exactly what is required. Several respondents mentioned that criteria for an auditor's understanding and knowledge, such as ongoing training and certification, should enhance the use of DA. However, annually training requirements for the company's auditors might become prohibitively expensive and have negative effects. But as P3 pointed out, data understanding is essential to fully utilize DA. Following up, P6 emphasized the value of being aware of the many analytical techniques that may be used. So, adding requirements for the auditors' expertise and knowledge

around the different analytical tools could be one potential adjustment to the ISA. The findings shows that change is desired, though it is challenging to pinpoint the precise nature of an optimal change.

5.2.4 Summary

In this chapter we have discussed our finding in regard of the research question “*What should be included in the auditing standards to support the use of data analytics in risk assessment?*”. All participants that we spoke with agreed that changing the criteria will enhance how DA is applied. But it is challenging to pinpoint precisely what needs to be altered. It could be the criteria for using DA, the auditor's expertise requirements, or simply extra advice and information about what may be utilized. However, with the respondent's little knowledge regarding the information provided by the standards, our findings are restricted. Nevertheless, DA in risk assessment can improve quality and has a lot of promise, but the standards must take it into consideration. Since the current standards neither prevent nor encourage the auditor to utilize DA, they must be changed.

6 Conclusion

This master's thesis contributes by addressing the lack of empirical research and add a new perspective to the discussion by giving an understanding on *“How data analytics are utilized in risk assessment and the role of the auditing standards in shaping its use”*. In preceding chapters, we have examined and presented the material from the interviews. We will here provide the assignment's conclusion.

6.1 Overall findings

This study demonstrates that although DA is a crucial component of the planning stage and risk assessment at the major audit companies in Norway, its potential is underutilized. To maximize the potential of DA in risk assessment, auditors must see the value of using DA throughout the total audit (Cangemi, 2014) with support of the ISAs.

Our study imposes attention to DA's underutilization resulting from auditors' perception and their lack of devoting time at the planning stage. We can observe that DA employed in risk assessment has promise, but it must be prioritized by auditors to build a stronger foundation and facilitate the audit's conclusion. Following will more data standardization create a wide range of opportunities, and with support of management, it will also enable DA experimentation. Increasing the planning stage's attention to risk will enhance the audit's overall quality and efficiency, not just in risk assessment. Our study thus contributes to raising awareness of key factors that influence the prioritizing of DA in risk assessment. This can be of great importance as complex and advanced methods becomes an increasingly large part of the audit in the future. Increased acceptance of DA and the ability to make the required changes in the ISAs, can both result from raising awareness.

Additionally, our findings indicate that incentives are required, and the change must begin in the ISAs. Many participants expressed a desire for additional qualitative requirements for the expertise of auditors and information on the different tools that may be applied when using DA. With a more explicit guidance that is not too broad nor specific, it could enhance the development of DA. Because today there is support for using DA in risk assessment, but minimal encouragement. This demonstrates that the improvement of ISAs is important for more than just obtaining evidence, strengthening the arguments for a change. However, many audit companies have good support by their internal guidelines and it is therefore not an urgent issue.

Today the ISAs assist as a passive complementary role to the internal guidelines in influencing how DA is used. Yet, the results suggest that auditors desire the role of ISAs to motivate and encourage the use of DA in risk assessment. This is to further generate ripple effects on management to create acceptance, which will enable the auditors to explore more with the use of DA. Our findings add to previous research as auditors want change in the ISAs regarding DA in risk assessment.

6.2 Limitations

There are several limitations associated with the dissertation that must be considered. DA is a complex subject with several terminologies that might be challenging to understand. The design and outcome of the assignment may be impacted by differences in the understanding of words, such as DA when specified within risk assessment. As we did not give the respondents a definition pre-hand, this might affect what kind of tools and analysis they were thinking of when answering.

As a result of conducting qualitative research with few respondents the findings cannot be applied to the entire population, and it may appear to be limited. Additionally, the dissertation was carried out during the yearly settlement period, which is a time of year when auditors have a greater workload and limited time. We may have had a greater response rate and possibly additional audit companies in the population if the interviews had been conducted in the fall.

6.3 Further research

The master's thesis provided us with additional understanding of how DA is employed in risk assessment, which has revealed several potential areas for further study. Firstly, it will be interesting to look more into the data used in DA, and if there is a potential for the standards to set criteria for the data to help increase the use and trust of DA. Secondly, we think that concentrating on how the standards may be altered in connection to audit evidence would be fascinating and lead to potential conclusions. There is a need for examining the ISAs in depth and provide specific suggestions related to DA. The standards are being discussed quite frequently these days, but nobody seems to be sure about what they want or need.

Although auditing is a global industry, we were unable to account for factors outside of Norway. An interesting subject to look further into, could be to speak with the IAASB as they have

deeper insight regarding the content of the ISAs. This could provide additional perspectives on the matter.

Additionally, we were only able to speak with larger auditing firms. Looking at it from the perspective of smaller firms would be fascinating since they have different perspectives and approaches. However, our perception is that smaller audit firms do not apply DA as much. Due to this, understanding the rationale behind their decision not to utilize DA in risk assessment would be intriguing and pertinent.

At last, we believe it could be interesting to focus on the SAF-T implementation, and how it together with DA effect smaller entities in Norway. Many participants held the opinion that smaller businesses benefit the most from SAF-T as they are not international and the possibilities for DA are increased by standardized data.

7 References

- Adu, P. (2019). *A Step-by-Step Guide to Qualitative Data Coding*. Routledge.
- AICPA. (n.d). *Audit Risk Assessment*.
- Alawadhi, A. (2015). *The application of data visualization in auditing* Rutgers, The State University of New Jersey]. Graduate School - Newark Electronic Theses and Dissertations.
- Appelbaum, D., Kogan, A., & Vasarhelyi, M. A. (2017). Big Data and Analytics in the Modern Audit Engagement: Research Needs. *Auditing-a Journal of Practice & Theory*, 36(4), 1-27.
- Appelbaum, D. A., Kogan, A., & Vasarhelyi, M. A. (2018). Analytical procedures in external auditing: A comprehensive literature survey and framework for external audit analytics. *Journal of accounting literature*, 40(1), 83-101.
- Asare, S. K., & Wright, A. M. (2004). The Effectiveness of Alternative Risk Assessment and Program Planning Tools in a Fraud Setting. *Contemporary Accounting Research*, 21(2), 325-352.
- Austin, A. A., Carpenter, T. D., Christ, M. H., & Nielson, C. S. (2021). The Data Analytics Journey: Interactions Among Auditors, Managers, Regulation, and Technology*. *Contemporary Accounting Research*, 38(3), 1888-1924.
- Balios, D., Kotsilaras, P., Eriotis, N., & Vasiliou, D. (2020). Big Data, Data Analytics and External Auditing. *Journal of Modern Accounting and Auditing*, 16(5), 211-219.
- Bordeianu, G.-D., Radu, F., Urban, V., & Paraschivescu, A. O. (2022). Digital Challenges Brought by Financial Reporting in 2022 – SAF-T (Standard Audit File for Taxation). *Economy transdisciplinarity cognition journal*, 25(2), 23-28.
- Borthick, A. F., & Pennington, R. R. (2017). When data become ubiquitous, what becomes of accounting and assurance? *The Journal of information systems*, 31(3), 1-4.
- Bougie, R., & Sekaran, U. (2020). *Research Methods For Business, Eighth Edition*. John Wiley & Sons Inc.
- Brown-Liburd, H., Issa, H., & Lombardi, D. (2015). Behavioral Implications of Big Data's Impact on Audit Judgment and Decision Making and Future Research Directions. *Accounting Horizons*, 29(2), 451-468.
- Buchheit, S., Dzurinin, A., Hux, C., & Riley, M. (2020). Data Visualization in Local Accounting Firms: Is Slow Technology Adoption Rational? *Current issues in auditing*, 14(2), A15.
- Byrnes, P. E. (2019). Automated clustering for data analytics. *Journal of Emerging Technologies in Accounting*, 16(2), 43-58.
- Cangemi, M. P. (2014). Performing a Strategic Risk-Based Assessment: Integrating Data Analytics into the Audit Universe. *EDPACS*, 49(5), 1-6.
- Cao, M., Chychyla, R., & Stewart, T. (2015). Big data analytics in financial statement audits. *Accounting Horizons*, 29(2), 423-429.
- Cao, T., Duh, R.-R., Tan, H.-T., & Xu, T. (2022). Enhancing Auditors' Reliance on Data Analytics under Inspection Risk Using Fixed and Growth Mindsets. *The Accounting review*, 97(3), 131-153.
- Capriotti, R. J. (2014). Big Data Bringing Big Changes to Accounting. *Pennsylvania CPA journal.*, 85(2), 1-3.
- Chandola, V., Banerjee, A., & Kumar, V. (2009). Anomaly detection: A survey. *ACM Computing Surveys*, 41(3), 15-58. Anomaly detection: A surveyChandola, V
- Chiu, T., & Jans, M. (2019). Process Mining of Event Logs: A Case Study Evaluating Internal Control Effectiveness. *Accounting Horizons*, 33(3), 141-156.
- Clikeman, P. M., & Diaz, J. (2014). ABC electronics: An instructional case illustrating auditors' use of preliminary analytical procedures. *Current issues in auditing*, 8(1), 11-110.
- Cooper, D. R., & Schindler, P. S. (2014). *Business Research Methods, Twelfth Edition*. McGraw-Hill Education.
- Davidson, R. A., & Gist, W. E. (1996). Empirical Evidence on the Functional Relation between Audit Planning and Total Audit Effort. *Journal of accounting research*, 34(1), 111-124.
- Dubey, R., & Gunasekaran, A. (2015). Education and training for successful career in Big Data and Business Analytics. *Industrial and commercial training*, 47(4), 174-181.

- Earley, C. E. (2015). Data analytics in auditing: Opportunities and challenges. *Business Horizons*, 493-500.
- Eilifsen, A., Kinserdal, F., Messier, W. F., & McKee, T. E. (2020). An Exploratory Study into the Use of Audit Data Analytics on Audit Engagements. *Accounting Horizons*, 34(4), 75-103.
- Eulerich, M., Georgi, C., & Schmidt, A. (2020). Continuous Auditing and Risk-Based Audit Planning-An Empirical Analysis. *Journal of Emerging Technologies in Accounting*, 17(2), 141-155.
- Finanstilsynet. (2023). *Revisor*. Finanstilsynet.
<https://www.finanstilsynet.no/tilsyn/revisor/#Finanstilsynetstilsynsmyndighet>
- Fotoh, L. E., & Lorentzon, J. I. (2023). Audit Digitalization and Its Consequences on the Audit Expectation Gap: A Critical Perspective. *Accounting Horizons*, 37(1), 43-69.
- Gambetta, N., García-Benau, M. A., & Zorio-Grima, A. (2016). Data analytics in banks' audit: The case of loan loss provisions in Uruguay. *Journal of business research*, 69(11), 4793-4797.
- Glover, S. M. M. J., William F. (2006). *Auditing and Assurance services. A systematic approach*. McGraw-Hill/Irwin.
- Gray, G. L., & Debreceeny, R. S. (2014). A taxonomy to guide research on the application of data mining to fraud detection in financial statement audits. *International Journal of Accounting Information Systems*, 15(4), 357-380.
- Gripsrud, G., & Olsson, U. H. (2018). *Metode og dataanalyse*. Cappelen Damm Akademisk.
- Grosu, M., & Mihalciuc, C. C. (2021). Audit Risk Assessment and Influence on the Auditor's Opinion. *Audit financiar (Bucharest, Romania)*, 19(163), 528-543.
- Harrell, M. C., & Bradley, M. A. (2009). Data Collection Methods. Semi-Structured Interviews and Focus Groups.
- Higginbotham, N., Nash, L., & Deméré, W. (2021). Making audits more effective through data visualization. *Journal of Accountancy*.
- Hindberg, T. (2015). Big Data og revisjon. *Revisjon og Regnskap*, 37-18.
- Hofmann, E. (2017). Big data and supply chain decisions: the impact of volume, variety and velocity properties on the bullwhip effect. *International journal of production research*, 55(17), 5108-5126.
- Hogan, C. E., & Wilkins, M. S. (2008). Evidence on the audit risk model: Do auditors increase audit fees in the presence of internal control deficiencies? *Contemporary Accounting Research*, 25(1), 219-+.
- Houston, R. W., Peters, M. F., & Pratt, J. H. (1999). The Audit Risk Model, Business Risk and Audit-Planning Decisions. *The Accounting review*, 74(3), 281-298.
- Internasjonal Revisjonsstandard 200.
 INTERNATIONAL STANDARD ON AUDITING 520
- Jacobsen, D. I. (2022). *Hvordan gjennomføre undersøkelser? Innføring i samfunnsvitenskapelig metode, Fjerde Utgave*. Cappelen Damm Akademisk.
- Jensen, L. A. (2022). *Transparensreport 2022*.
- Jeyaraj, A., Rottman, J. W., & Lacity, M. C. (2006). A review of the predictors, linkages, and biases in IT innovation adoption research. *Journal of Information Technology*, 21(1), 1-23.
- Johannessen, A., Tufte, P. A., & Kristoffersen, L. (2005). *Forskningsmetode for Økonomisk-Administrative Fag 2. Utgave*. Abstrakt forlag.
- Kallio, H., Pietilä, A.-M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: developing a framework for a qualitative semi-structured interview guide. *J Adv Nurs*, 72(12), 2954-2965.
- King, N., & Horrocks, C. (2010). *Interviews in Qualitative Research*. SAGE Publications Ltd.
- Kitchenham, B. (2004). Procedures for Performing Systematic Reviews. *Keele University Technical Report TR/SE-0401 ISSN:1353-7776*(Keele University UK
- Kleive, K. (2018). Business Analytics del 2: Bedre revisjon med dataanalyser. *Regnskap og Revisjon*, 8, 16-18.
- KPMG. (2017). Audit 2025, the future is now. *Forbes insights*.

- Krahel, J. P., & Titera, W. R. (2015). Consequences of big data and formalization on accounting and auditing standards. *Accounting Horizons*, 29(2), 409-422.
- Krieger, F., Drews, P., & Velte, P. (2021). Explaining the (non-) adoption of advanced data analytics in auditing: A process theory. *International Journal of Accounting Information Systems*, 41, 100511.
- Liew, A., Boxall, P., & Setiawan, D. (2022). The transformation to data analytics in Big-Four financial audit: what, why and how? *Pacific Accounting Review*, 34(4), 569-584.
- Løwer, C., & Sandvik, E. (2015). Cloud Computing: Rettslige utfordringer ved bruk av nettskyen. *Regnskap og Revisjon*, 30-36.
- Machi, L. A. (2012). The literature review : six steps to success.
- Maharaj, R. (n.d). *The role of data analytics in auditing*. RSM.
- Manita, R., Elommal, N., Baudier, P., & Hikkerova, L. (2020). The digital transformation of external audit and its impact on corporate governance. *Technological forecasting & social change*, 150, 119751.
- Messier, W. F. (2006). Auditing & assurance services : a systematic approach.
- Michael Minelli, M. C. A. D. (2012). Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses. 586.
- Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative Data Analysis; A Methods Sourcebook*. SAGE Publications Inc.
- Moharm, K. I., Zidane, E. F., El-Mahdy, M. M., & El-Tantawy, S. (2019). Big Data in ITS: Concept, Case Studies, Opportunities, and Challenges. *IEEE transactions on intelligent transportation systems*, 20(8), 3189-3194.
- Mugwira, T. (2023). Implications to the Audit Process of Auditing that uses Data Analytics Tools and New Business Models.
- Murphy, M. L., CPA, & Tysiac, K. (2015). Data Analytics Helps Auditors Gain Deep Insight: Technology Provides Opportunity to Test Full Data Sets Rather Than Just Samples. *Journal of accountancy online.*, 219(4), 52-54.
- Nettskjema. (n.d.). *Nettskjema*. Universitetet i Oslo.
- Neuman, W. L. (2006). *Social Research Methods, Qualitative and Quantitative approaches, Sixth Edition*. Pearson Education, Inc.
- Nygård, A. (2022). Den praktiske implementeringen av ny ISA 315. *Revregn*, 7, 25-26.
- Oates, B. J. (2006). *Researching Information Systems and Computing*. Sage Publications Ltd (UK).
- Olsson, H., Sörensen, S., & Bureid, G. (2003). *Forskningsprosessen : kvalitative og kvantitative perspektiver*. Gyldendal akademisk.
- Pedersen, J. S. (2016). Dataanalyse i revisjon. *Regnskap og Revisjon*, 30-31.
- Perry, J. S. (2017). *What is big data? More than volume, velocity and variety*.
- Rayamajhi, D. B. (2019). Dataanalyser i revisjon – metodikken. *Revisjon og Regnskap*.
- Lov om revisjon og revisorer (revisorloven), (2020). https://lovdata.no/pro/#document/NL/lov/2020-11-20-128/KAPITTEL_9
- Ritchie, J., & Lewis, J. (2005). *Qualitative Research Practice, A Guide for Social Science Students and Researchers*. SAGE Publications Ltd.
- Rosenthal, M. (2016). Qualitative research methods: Why, when, and how to conduct interviews and focus groups in pharmacy research. *Currents in pharmacy teaching and learning*, 8(4), 509-516.
- Saggi, M. K., & Jain, S. (2018). A survey towards an integration of big data analytics to big insights for value-creation. *Information Processing & Management*, 54(5), 758-790.
- Saldana, J. (2009). *The coding manual for qualitative researchers*. Sage Publications.
- Saldana, J. (2021). *The Coding Manual for Qualitative Researchers 4E*. Sage Publications.
- Salijeni, G., Samsonova-Taddei, A., & Turley, S. (2019). Big Data and changes in audit technology: contemplating a research agenda. *Accounting and Business Research*, 49(1), 95-119.
- Silverman, D. (2006). *Interpreting Qualitative Data, Third Edition*. SAGE Publications Ltd.
- Skatteetaten. (n.d.). *SAF-T Regnskap*. Skatteetaten.

- Sousa, D. (2014). Validation in Qualitative Research: General Aspects and Specificities of the Descriptive Phenomenological Method. *Qualitative research in psychology, 11*(2), 211-227.
- Stenvold, T. D. (2020). Revisjonshandlinger i praksis.
- Tang, F., Norman, C. S., & Vendirzyk, V. P. (2017). Exploring perceptions of data analytics in the internal audit function. *Behaviour & information technology, 36*(11), 1125-1136.
- Thiprungsri, S., & Vasarhelyi, M. A. (2011). Cluster Analysis for Anomaly Detection in Accounting Data: An Audit Approach. *The International Journal of Digital Accounting Research, 11*, 69-84.
- Titera, W. R. (2013). Updating audit standard-enabling audit data analysis. *The Journal of information systems, 27*(1), 325-331.
- Vasarhelyi, M. A., Kogan, A., & Tuttle, B. M. (2015). Big Data in Accounting: An Overview. *Accounting Horizons, 29*(2), 381-396.
- Vernocchi, M., & Toggyler, A. (2021). *How a data-driven auditing approach can increase trust in business*. EY.
- Werner, M., Wiese, M., & Maas, A. (2021). Embedding process mining into financial statement audits. *International Journal of Accounting Information Systems, 41*, 100514.
- Yeamin, J., & Sulaiman, N. A. (2022). The use of data analytics in external auditing: a content analysis approach. *Asian Review of Accounting*(31-58).
- Yoon, K., Hoogduin, L., & Zhang, L. (2015). Big Data as Complementary Audit Evidence. *Accounting Horizons, 29*(2), 431-438.

8 Appendix

8.1 Interview guide – Auditor:

General questions:

What is your job title?

How would you describe your area of responsibility?

How long have you worked with auditing?

What is your work experience within auditing?

Critical questions:

Part 1

1. How do you define data analytics?
2. How do you use data analytics during risk assessment?
 - a. Do you use data analytics in all evaluations or only in some specific areas?
3. What challenges do you experience when auditing related to the use of data analytics in risk assessment?
 - a. How do you handle these challenges?
 - b. Do you think the use of data analytics challenges the professional skepticism of an auditor?
4. What benefits do you experience when auditing related to the use of data analytics in risk assessment?
 - a. Do you have any examples?
5. How is the quality of the risk assessment affected when using data analytics compared to traditional methods?
 - a. Do you think the use of data analytics causes auditors to become less critical to the data material? Why/why not?
6. Does the use of data analytics in risk assessment increase the efficiency of the audit? If so, is it for several different audit processes or mainly risk assessment?
 - a. How and why?
 - b. Do you have any examples?
7. Can you tell us what could be done to maximize the potential and sufficient use of data analytics in risk assessment?

8. Are there internal factors that may prevent progression in the further development of data analytics within auditing?
 - a. Why/why not?

Part 2

1. When using data analytics in risk assessment, do you mainly follow internal routines and guidelines, or do you use the standards more directly?
 - a. How do you use the guideline/standards? Do you have an example?
2. How do you experience the ISA`s as a support function for the use of data analytics in risk assessment?
 - a. Do you think that the auditing standards provide a sufficient scope for auditors to experiment and use data analytics in risk assessments? Or do you consider the standards to create uncertainty?
3. Do you believe that clearer guidelines and requirements in the standards would help or hinder the use and further development of data analytics in risk assessment?
 - a. How? Do you have an example?
4. Are there other external factors that may prevent progression in the further development of data analytics within auditing?
 - a. Could you give any examples?
5. What do you think should be adjusted regarding the standards or guidelines to maximize the potential of data analytics in risk assessment?
6. In your opinion, should the auditing standards be further adapted to facilitate the use of digital analytics in the audit?
 - a. How?

Closing questions:

In conclusion, is there something more you would like to add that we have not covered?

8.2 Interview guide – DnR:

General questions:

What is your job title?

How would you describe your area of responsibility?

How long have you worked with auditing?

What is your work experience within auditing?

Critical questions:

Part 1:

1. How do you define data analytics?
2. What is DnR's role in relation to the auditing industry?
3. What specifically is DnR working on to accommodate data analytics in the auditing industry?
 - a. For example, courses, training, etc.
4. Can you say something about what auditors contact DnR for, in relation to data analytics in risk assessment?
 - a. Do you have any examples?
5. How can DnR contribute to promoting a stronger and more consistent use of data analytics in risk assessment?
6. Does the use of data analytics in risk assessment increase the efficiency of the audit? If so, is it for several different audit processes or mainly risk assessment?
 - a. How and why?
 - b. Do you have any examples?
7. How is the quality of the risk assessment affected when using data analytics compared to traditional methods?
 - a. Do you think the use of data analytics causes the auditor to become less critical to the data material? Why/why not?
8. What do you think is the potential of data analytics in risk assessment?

Part 2:

1. How do you perceive the ISA's as a support function for auditors when they are using data analytics in risk assessment?
 - a. Why?

2. Do you think that the ISA`s provide a sufficient scope for auditors to experiment and use data analytics in risk assessments?
 - a. Do you consider the standards to be generating uncertainty?
 - b. How / why?
3. Are there internal or external factors that might have slowed down further progression in adopting the use of data analytics in risk assessment?
4. Do you believe that clearer guidelines and requirements in the standards would help or hinder the use and further development of data analysis in risk assessments?
 - a. How? Do you have an example?
5. In your opinion, should the auditing standards be further adapted to facilitate the use of digital analytics in the audit?
 - a. How?

Closing questions:

In conclusion, is there something more you would like to add that we have not covered?

8.3 Interview guide – FSA:

General questions:

What is your job title?

How would you describe your area of responsibility?

How long have you worked with auditing?

What is your work experience within auditing?

Critical questions:

Part 1:

1. How do you define data analytics?
2. What is The Norwegian Supervisory Authority's role in relation to the auditing industry?
3. Can you describe how data analytics affects your control of an audit firm?
4. What challenges do you experience related to data analytics during a control of an audit firm?
 - a. Do you have any examples?
 - b. How do you handle these challenges?
5. What benefits do you experience related to data analytics during a control of an audit firm?
 - a. Do you have any examples?
6. Have you experienced disagreement with auditors, regarding the correct way of interpreting rules and requirements for data analytics in risk assessment?
7. How is the quality of the risk assessment affected when using data analytics compared to traditional methods?
 - a. Do you think the use of data analytics causes the auditor to become less critical to the data material? Why/why not?
8. Does the use of data analytics in risk assessment increase the efficiency of the audit? If so, is it for several different audit processes or mainly risk assessment?
 - a. How and why?
 - b. Do you have any examples?
9. What do you think is the potential of data analytics in risk assessment?

Part 2:

1. How do you perceive the ISA`s as a support function for auditors when they are using data analytics in risk assessment?
 - a. Why?
2. How do you experience the ISA`s as a support function when conducting a control of an audit that has been done with the use of data analytics in risk assessment?
 - a. Do you have an example?
3. Do you think that the ISA`s provide a sufficient scope for auditors to experiment and use data analytics in risk assessments?
 - a. Do you consider the standards to create uncertainty?
 - b. How / why?
4. Are there internal or external factors that might have slowed down further progression in adopting the use of data analytics in risk assessment?
5. Do you believe that clearer guidelines and requirements in the standards would help or hinder the use and further development of data analysis in risk assessments?
 - a. How? Do you have an example?
6. In your opinion, should the auditing standards be further adapted to facilitate the use of digital analytics in the audit?
 - a. How?

Closing questions:

In conclusion, is there something more you would like to add that we have not covered?

8.4 Discussion paper

8.4.1 Discussion paper Birgitte Helle

Introduction

The Association to Advance Collegiate Schools of Business (AACSB), granted in 2019 an accreditation to University of Agder. In this regard, providing a discussion paper is a part of the requirements for submitting the master's thesis at the Business School. Its goal is to examine the subject of responsibility and ethics based on the master's topic. The master's program in accounting and auditing's learning outcomes incorporate these fundamental ideas.

Summary of Master's thesis

The use of data analytics in risk assessment and whether it is sufficiently employed are the topics of the master's thesis. There have been various advancements in technology that are important for improving the efficiency and quality of audits, and we believe that data analytics has this potential in risk assessment. According to what we know, data analytics has been applied for a while, but not sufficiently. The subject is highly relevant as it could make audit more efficient, increase the quality and give auditor a better understanding of the company (Kleive, 2018).

To discover, evaluate, and reduce risks, data analytics is being employed in the risk assessment process more and more. Data analytics may be used in the context of auditing to rapidly and efficiency evaluate huge amounts of data, spot trends, and do trend analyses to spot possible risk areas (Gripsrud & Olsson, 2018). In general, data analytics is a helpful technique that may assist auditors in identification and assessing risk more quickly and accurately, eventually producing more thorough and precise audit reports (Earley, 2015). We thus conducted interviews with both auditors and control bodies to better understand if data analytics is being exploited to its full potential. First, through examining the benefits and difficulties, we came closer to understanding how it is employed. The participants were then asked if they saw any potential for data analytics and if so, what it may be. This was done to see if there was a context between the answers of how it is utilized today, and how it could be utilized.

The second part of the master's thesis discuss how ISA supports the use of data analytics in risk assessment. ISA is a tool that auditors can turn to for direction and assistance related to the use

of DA, as well as for its development. From previous research regarding evidence gathering this has not been the case, as it has rather provided uncertainties (Eilifsen et al., 2020). Because of this, we looked to see whether it had similar factors regarding utilization in risk assessment.

The outcomes of the inquiry demonstrated that data analytics had not been adequately used in risk assessment. There is a difference in how it is emphasized, which decreased the potential for development. By turning the focus more on data analytics in risk assessment, could possibly have a positive effect on the total audit. The control units and certain auditors are of the opinion that by putting greater emphasis on data analytics in risk assessment, you can depend on it more as it provides a much better foundation. The duplicate effort that has been a clear issue with data analytics could be lessened as a result. But for it to happen, the standards must alter. Incentives are required, and ISA must provide a stronger recognition of the prospective utility. All participants agreed that greater advice and more auditor competence could be a possible solution for improving the standards. It would be simpler to use and experiment with data analytics if the auditor understood how to perform data analytics, the data supporting data analytics, all the different sorts of analysis to undertake, and tools to utilize.

Responsibility and ethics

The research emphasizes responsibility in several ways. Auditing is a highly regulated industry, and to maintain the impartiality and integrity of the audit, auditors are expected to abide by all laws and regulations that may be in force. The standards state that an audit must be focused and efficient. These neither encourage nor disallow auditors from using digital tools or working methods, but they do demand that the audit certificate be produced in a more secure manner than with a traditional audit. Both the auditor and auditor company have the burden of proof for the efficiency when using the new auditing technologies and data analytics.

The auditor has the responsibility with guaranteeing the accuracy of the data that firms publish in their annual reports. This includes determining and evaluating any risks that might materially affect the financial statements as well as developing and carrying out audit processes to mitigate those risks. Auditors also has an important role as the public's trusted representative (Revisorloven, 2020, §9-1). Therefore, it is the auditor's duty to ensure that the trust is not in risk of harm. Due to the extensive use of discretionary evaluations throughout the audit assignment, the auditor is charged with a significant amount of responsibility during numerous stages of the audit. The law and the auditing standards both specify the obligation.

The auditor must also inform management and the audit committee of the results of the risk assessment procedure as part of their duties. Identifying important risks, addressing them through processes, and any problems or concerns found during the audit are all included in this. The auditor is doing their duty to offer a frank and unbiased evaluation of the company's financial statements by disseminating the results of the risk assessment procedure.

Auditors should have sufficient knowledge and understanding of data analytics to be able to evaluate the relevance and reliability of the data used in the audit. Auditors must evaluate the accuracy and completeness of the data utilized in the analysis and consider how any data restrictions or biases would affect the audit's conclusions. It is also crucial to employ data analysis with professional skepticism. One must adhere to the rules and comply with them, but they must also be balanced with an awareness of other elements. As the criteria's in the ISA are ambiguous, the auditor must use professional skepticism to secure solid proof and documentation, as well as solid and trustworthy data.

The Norwegian Institute of Public Accountants is clear that auditors must assume their fair share of the responsibilities in order to help the Norwegian business community make the transition to a greener economy (Revisorforeningen, n.d-b). Auditors should consider how climate change may affect a company's financial statements, as well as the possibilities and hazards related to the shift to a low-carbon economy. The effect of sustainability considerations, such as environmental, social, and governance (ESG) threats on the business's financial performance and reputation, should also be considered. Auditors may find data analytics to be a beneficial tool for identifying and evaluating the risks related to sustainability and climate change considerations. Data analytics may be used by auditors to evaluate huge volumes of data and spot trends or abnormalities that can point to risks or possible problems.

Data analytics can be used to measure and track sustainability performance. For instance, audit companies may gather and evaluate data on their energy usage, greenhouse gas emissions, water usage, waste generation, and other sustainability metrics. Companies can find chances to reduce their environmental footprint and enhance their sustainability performance by analyzing this data. Additionally, the reporting and disclosure of sustainability can be supported by data analytics. Companies may develop more accurate and trustworthy sustainability reports that

give stakeholders clear information about their sustainability performance by evaluating sustainability data.

It is crucial for auditors to uphold professional skepticism and follow fundamental ethical standards in the auditing profession. Integrity, objectivity, professional competence and diligence, confidentiality, and professional behavior are established by the international code of ethics (Revisorforeningen, n.d-a). Risk assessment using data analytics might provide auditors with ethical difficulties. The difficulty of confidentiality is only one that auditors face. Large-scale data collection and analysis from several sources, some of which may contain sensitive or secret information, might be part of data analytics. The confidentiality of the data must be maintained by auditors, and they must take care not to disclose it to unauthorized persons.

Data quality is another significant ethical concern. For data analytics to generate accurate and trustworthy findings, high-quality data is necessary. The data that auditors use must be accurate, comprehensive, and pertinent to the audit's goals. Inaccurate or inadequate data might result in improper interpretations of the findings or wrong conclusions.

The possibility of bias for an auditor is the third difficulty. Bias, both deliberate and inadvertent, can affect data analytics. Auditors must take precautions to reduce the impact of any potential biases in the data and the analytical process.

Inadequate interpretation can also be challenging. Large volumes of data can be generated by data analytics, thus auditors must be able to properly comprehend and analyze the findings. Inaccurate conclusions or hazards that were ignored might stem from poor interpretation or analysis of the data. Therefore, the auditor must keep up to date on DA developments. If the auditor lacks the competence required to utilize DA, then the auditor must continuously acquire new knowledge. It will be quite challenging for the auditor to find out what is wrong if they do not understand the statistics used for data analysis. This also applies to auditors' IT expertise.

Data ownership and data subject rights are issues that are brought up by the usage of data analytics. Auditors must make sure that they have the necessary authorizations and consents to use the data and that they are adhering to all applicable privacy and data protection regulations.

When assessing the risks related to climate change and sustainability considerations, auditors have a duty to use professional judgment and skepticism. They should evaluate the sufficiency of the firm's disclosures on these risks and consider any potential effects on the financial statements of the company.

Summary

Overall, the process of risk assessment plays a significant role in the auditor's duty to render an unbiased judgment on the financial statements of the organization. The auditor is doing their part to deliver a high-quality audit that can assist to increase the accuracy and dependability of the financial statements by conducting a comprehensive risk assessment and developing suitable audit procedures to manage identified risks. Auditors must use professional judgment, follow professional norms and procedures, and keep an ethical perspective throughout the audit process due to ethical concerns associated to data analytics in risk assessment.

8.4.2 Discussion paper Karina Krokkan Alstad

Introduction

The purpose of this discussion note is to discuss this master's thesis in light of the topic responsibility. The topic of responsibility has been central in several of the subjects and classes through this master's degree and is a topic that is highly important and relevant to my upcoming career within financial auditing.

Summary of the Master's thesis

The objective of this master's thesis is auditors use of DA in risk assessment. The audit profession has traditionally been characterized by many manual and time-consuming processes, including the planning stage where this thesis focuses. The use of technology and DA tools offers auditors the chance to comprehend the client and its surroundings more completely and efficiently (Eilifsen et al., 2020). Most auditors are in favor of DA, and it is increasingly employed in today's audit (Eilifsen et al., 2020). This can contribute to improve the quality of risk assessment and response in a setting where data is voluminous and becoming more complex (IAASB, 2017, p. 7). When digitalization is incorporated into the audit, the auditors can focus more time on where the actual risk is and instead conduct tasks that requires judgement and analysis (Eilifsen et al., 2020; Kleive, 2018). However, empirical research reveals that the use of DA is limited despite its many possible advantages (Krieger et al., 2021), and auditors frequently go back to traditional auditing due to a lack of technological understanding and expertise (Liew et al., 2022).

We sought to address the limited application of DA and bring new perspectives by finding out *“How data analytics are utilized in risk assessment and the role of the auditing standards in shaping its use”*. Additionally, we developed two research questions to sufficiently assist and provide a further context on this. The first research question was *“How are data analytics used in risk assessment and is there potential for improvement?”*, while the second research question was *“What should be included in the auditing standards to support the use of data analytics in risk assessment?”*.

For this study a qualitative approach was applied, conducting semi-structured interviews with eight informants. Six informants were representatives from the bigger auditing firms in Norway, while the two others were representants from control units within Norwegian auditing. By interviewing not only auditors, but also other parties within auditing we were able to gain a

wider insight into how DA are used today, its potential and how the standards affect auditors use of DA.

Our findings make it quite evident that DA is widely used in risk assessment by the larger audit firms. However, there are variations in how it is applied, prioritized, and defined. By concentrating on areas that could genuinely include material misstatements, DA in risk assessment can help auditors uncover risks more quickly, rapidly comprehend the client's business, and contribute to increased efficiency and audit quality. From this we can see that DA in risk assessment could be a good contributor to auditors' purpose and responsibility to instill assurance that the financial statements are accurate and without material misstatements. However, we found that DA has its challenges in terms of data availability and standardization, as well as comprehending and using client data. These are factors that need to be addressed to be sure that the use of DA in risk assessment, do not impair auditor's role as the public's trustee when stating their opinion on the financial statement.

The standards set the requirements as well as the boundaries for what auditors can and cannot do. We found that today's standards offer broad boundaries for the use of DA in risk assessment, which enables a wide interpretation on what is allowed. This can create uncertainties and challenges, leaving the auditors without guidance and proper requirements, making them develop their own internal guidelines. Since the standards regulates how the audit is conducted, it is important that the standards facilitate proper and sufficient use and development within auditing. DA in risk assessment can improve quality and has a lot of promise, but the standards must take it into consideration as well as making sure that any change does not compromise the auditor's responsibility.

Responsibility and ethics

When performing one's duties as an auditor, there are both legal and ethical requirements that must be followed. Auditor's act §9-1 states that the purpose of statutory audit is to instill assurance that the financial statements are accurate and do not contain any material misstatements, which also contribute to avoid and identify financial crime. The auditor's task is to bring down the audit risk to an exactable low level, by gathering sufficient and appropriate audit evidence (IAASB, 2009a, p. 9). During the audit assignment, professional judgement is used to a large extent. One of the professional judgements the auditor must make, is what

constitutes as sufficient audit evidence and when the audit risk is at an exactable low level (IAASB, 2009a, p. 5). From this, the auditor bears a significant responsibility throughout all phases of the audit.

Professional judgment is the use of relevant education, experience, and knowledge to make decisions within the audit, accounting, and ethical standards about what actions are appropriate (IAASB, 2009a, p. 8). Furthermore, auditors are obliged to carry out a statutory audit in accordance with good auditing practice (Revisorloven, 2020, §9-4). Among other things, this involves building up an understanding of the business, its internal controls and other matters that may be of importance in the audit, including the applicable legal requirements for the business under audit (Revisorloven, 2020, §9-4(a)). This demonstrates how crucial it is for the auditor to have a thorough grasp of the firm that is under audit, its operations, and the industry in which it works. Auditors won't be able to conduct appropriate assessments with professional judgement if they do not fulfill the responsibility to develop such a thorough understanding.

Auditors are entrusted with such a significant responsibility that they serve as the public's trustee in their efforts to prevent and uncover material misstatements (Revisorloven, 2020, §9-1). The auditing profession are subject to essential ethical requirements, including the requirements for independence (Revisorloven, 2020, §9-1). The fundamental ethical principles that define what's expected of a professional auditor include that their work is done with integrity, objectivity, professional competence and diligence, professional conduct, and confidentiality (IAASB, 2009a, p. 14).

The vast increase in technology advancement across different industries generates a responsibility for auditors to keep up with these changes and comprehend developments. Advancements in technology must be understood by auditors in order for them to deal with these types of issues during an audit and preserve their professional competence and diligence. The same applies when technological tools, such as DA are used in various parts of the audit. When using DA during risk assessment for example, it's crucial that auditors have the knowledge necessary to be able to understand the meaning behind the data. If this is not accomplished, significant areas of risk might go unidentified during the planning stage, which could have a detrimental impact on the remainder of the audit. Worst-case scenario, it could impair the quality of the audit and the auditor may express an insufficient audit opinion.

The financial statement has many different users of importance. For instance, many investors base their decisions on information from the financial statements. Therefore, the information presented in the financial statement must be accurate and free of material misstatements, as this could cause users to base their financial decisions on misleading information. Because of this it's crucial for auditors to maintain their ethical responsibility. The auditor must act independently in doing so, and for that reason be aware of conditions that might threaten this independence, including both apparent and actual independence (IAASB, 2009a, p. 14; Revisorloven, 2020, §8-1). Independence increases the auditor's ability to act with integrity, objectivity and with a professional skepticism (IAASB, 2009a, p. 14).

Due to technological advancements, massive amounts of digital data are being collected and transmitted. As a result, it is more crucial than ever that all data are kept secure and not obtained by anyone who shouldn't have access to it. Lack of data storage infrastructure, frequent data breaches, and cyberattacks on companies are issues that auditors are faced with (Yeamin & Sulaiman, 2022). Auditors are legally obliged to prevent unauthorized parties from gaining access to or knowledge of information received in connection with the client's operations (Revisorloven, 2020, §10-1). From this, auditors have both an ethical and legal obligation to process and store data in an adequate and secure manner. Data leaks and inadequate storage of data will violate the auditor's responsibility to maintain their confidentiality and sufficiently store client information.

There are many ethical dilemmas when it comes to using DA in auditing. It is crucial that the auditor does not slack on the importance of their professional judgement and skepticism. From the Norwegian Auditors act, auditors are obligated to conduct the audit with professional skepticism, including being aware of the possibility of material misinformation in the financial statement due to fraud or accidental errors (Revisorloven, 2020, §9-4). This makes it important for auditors not to assume that data received from clients is accurate in addition to utilize their professional skepticism towards the outcome from DA.

Summary

From this dissertation one can see that DA is per now widely used in risk assessment by larger audit firms. As DA can help improve the quality of risk assessment and handle larger amount of data in an efficient matter, its use will undoubtedly only increase in the future. It is crucial that auditors do not presume the information obtained from clients nor the results of DA to be accurate. The utilization of DA in risk assessment could be a good contributor to auditors'

purpose and responsibility to instill assurance that the financial statements are accurate and without material misstatements. However, the differences in how DA is applied, prioritized as well as defined will only enhance the importance of making sure that auditors do maintain their professional skepticism and judgement to fulfil their ethical responsibility.