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The Impact of Big Data Analytics on Management Accounting Information Quality and Decision-Making: A Field Study on Saudi Listed Companies

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Abstract

This study primarily aimed to examine the availability of Internal and External Big Data in Saudi listed companies on the main market. It also investigated the impact of Big Data Analytics (BDA) on Management Accounting Information Quality (MAIQ) and decision-making. An inductive approach was adopted through a review of relevant literature, alongside descriptive and diagnostic analyses to assess respondents' perspectives and to test the main and sub-hypotheses. The findings revealed a statistically significant impact of BDA in enhancing both the fundamental and secondary characteristics of MAIQ, thereby supporting more effective operational and investment decisions. Based on the results, the study recommends investing in digital infrastructure, developing data analytics skills among management accountants, integrating internal and external Big Data (BD) sources, and fostering a data-driven decision-making culture. Finally, it emphasizes the need for future research on the role of artificial intelligence (AI) in advancing the quality of management accounting information.

Keywords: *Management Accounting, Management Accounting Information Quality, Big Data, Big Data Analytics, Decision-Making.*

Introduction

Numerous prior studies related to field of management accounting have explored the concept of big data and its analytics, highlighting their characteristics, advantages, and the associated challenges that hinder effective adoption and implementation of big data analytics (BDA). For example, Kroon et al., (2021) examined the benefits and challenges of BDA integration. Furthermore, Wu and Chao (2023) emphasized the significance of integrating BDA with Enterprise Resource Planning (ERP) systems, noting that big data enhances the accuracy of information contained in the centralized ERP databases, thereby supporting more data-driven and precise decision-making processes. Similarly, Muhammed (2022) and Hammad (2021) underscored the value of adopting BDA in business contexts, as these analytics offer a more comprehensive understanding of the organizational environment and a deeper level of insight, ultimately facilitating improved decision-making and enhancing competitive advantages. This perspective is further reinforced by the findings of Boddapati et al. (2025) who demonstrated the positive influence of BDA on improving information quality, decision-making, operational

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performance, and return on investment, where management accountants can leverage to enhance the quality of management accounting information.

Considering the rapid technological and digital advancements shaping the modern business environment, particularly in the Kingdom of Saudi Arabia as part of the efforts to achieve the objectives of Saudi Vision (2030), it appears that a set of factors may fundamentally influence the Management Accounting Information Quality (MAIQ). Among these factors is big data and its analytics, which emerge as key elements expected to contribute significantly to the development and enhancement of the information quality, in alignment with the Kingdom's digital transformation initiatives.

Statement of the Problem

A review of the official websites of several listed companies operating in Saudi Arabia, reveals a growing adoption of Big Data Analytics (BDA) aimed at enhancing competitiveness and transforming business practices. Saudi Aramco listed company is a leading example, demonstrating a strong commitment to applying BDA to drive improvements in efficiency, productivity, predictive capabilities, emission reduction, and overall operational performance (Wallace, 2020; Aramco, 2019). Similarly, the Saudi Telecom Company (STC) has announced the establishment of large-scale data centers to support the cloud infrastructure of the local digital economy, while additionally offering big data transfer and analytics services to a wide range of corporate clients; helping them to realize substantial strategic benefits (Shepherd, 2020; STC, 2023). Moreover, the Saudi Electricity Company (SEC) was recognized as the best organization in the Arab world in adopting and applying big data analytics, as awarded during the 17th International Conference on Operations and Maintenance in Arab Countries, which took a place in United Arab Emirates (SPA, 2019). Al Rajhi Bank, one of the largest listed banks in Saudi Arabia, has also confirmed its commitment to implementation of big data analysis, and advancing its digital initiatives, recognizing the critical role of BDA in creating added value and supporting a forward-looking vision aligned with the Kingdom's digital transformation objectives (Al Rajhi Bank – Fintech Saudi).

Despite the potential benefits that can be achieved through the application of BDA, a review of the existing literature reveals that limited attention has been directed towards the Kingdom of Saudi Arabia inviroment, particularly regarding the impact of BDA on MAIQ, and its role in shaping operational and investment decision-making processes. However, management accounting is intrinsically linked to the benefits brought by BDA, including enhanced information quality, improved decision-making processes, and increased operational efficiency, (Shalhoob et al., 2024; Perdana et al., 2022). Therefore, and based on the clear adoption and application of BDA within the Saudi business environment; evidenced by disclosures from several listed companies across key sectors such as Aramco, STC, Saudi Electricity, and Al Rajhi Bank; the main problem of this study is to shed the light on the impact of BDA on MAIQ and decision-making in Saudi listed companies. This focus gains further relevance considering the alignment with the Saudi Vision (2030), besides the rareness of prior studies addressing the implications of BDA and its impact in the Saudi context.

Study Objectives

This study primarily aims to highlight the importance of big data analytics, and to:

a) Verify the actual implementation of these analytics within Saudi public companies listed on the main market.

b) Determine the impact of big data analytics on improving the quality of management accounting information and on enhancing operational and investment decision-making.

Significance of the Study

The significance of this study arises from its academic and practical contributions, as it enriches the literature with contemporary topics such as big data analytics, and its connection to accounting field, particularly management accounting. Academically, the study addresses a clear research gap by exploring the impact of BDA, from both internal and external sources, on MAIQ, and on operational and investment decision-making in Saudi listed companies. Practically, it provides real-world insights based on actual data regarding the extent of BDA adoption, and its role in improving information quality and decision-making efficiency. The study, moreover, offers actionable recommendations to help management accountants effectively leverage BDA, to enhance both operational and investment performance, and to strengthen competitive advantage. These contributions are especially valuable to decision-makers, practitioners, and technology developers aiming to integrate advanced data analytics with accounting systems.

Methodology

The study adopted the inductive approach in the theoretical part, while in its practical (field) dimension, it employed the quantitative approach to collect the necessary data. Furthermore, the study adopted the Resource-Based View (RBV) Theory, which focuses on the ability of companies to possess essential resources and evaluate them based on their value, rarity, inimitability, and non-substitutability, as well as the impact of these resources on the companies' competitive advantage (Barney, 1991). In addition, the RBV theory has been widely used in prior literature and studies, particularly those addressing the topic of big data, such as the studies of (Shabbir & Gardezi, 2020; Shan et al., 2018; and Yang & Zhou 2015). Accordingly, the (RBV) theory will contribute to this study by examining the possibility that the targeted Saudi listed companies possess such resources — namely, big data and its analytics — and how they can be used to improve the quality of management accounting information, maintain competitive advantage, and create added value for these companies.

Scope and Limitations

This study is subjected to some limitations that may be considered when interpreting and generalizing its results. The study was restricted to public companies listed on the main market in the Kingdom of Saudi Arabia, and therefore, the results may not directly apply to companies in other environments or markets that differ in economic or regulatory aspects. Additionally, the scope of the study was limited to assessing the impact of Big Data Analytics (BDA) on improving Management Accounting Information Quality (MAIQ) and decision-making, excluding the consideration of any other potential variables.

Study Structure

The structure of this study is organized into four main sections. The second section introduces and defines the key terms and concepts relevant to the research, followed by a comprehensive review and critical analysis of the related literature. The third section details the methodological procedures, describes the field study, and presents the statistical results obtained from the data analysis. The fourth and final section summarizes the key findings of the study and offers academic and practical recommendations based on the results.

Theoretical Framework

This section is structured into three main parts. The first part provides clear definitions of the key terms and variables of the study. The second part offers a comprehensive review of previous studies that are related to the research problem and objectives. The third and final part presents the researchers' critical analysis on the reviewed literature, highlighting gaps, contributions, and the relevance to the current study.

Big Data

Big Data is a fundamental concept in the modern digital era, commonly defined as large, fast-flowing, and diverse data that cannot be efficiently processed using traditional methods. Muhammed (2022) describes it as massive volumes of data requiring rapid processing with advanced technologies. Nissim (2022) emphasizes that big data involves both the collection of vast datasets and the use of sophisticated analytical techniques to uncover meaningful patterns. Similarly, Wang et al. (2022) highlight that big data emerges from real-time information systems and integrates multiple formats and sources. Regarding the characteristics of big data, some researchers and professional organizations have focused on three primary attributes known as the (3Vs): Volume, Velocity, and Variety, as noted in (Su et al., 2021; Sebbar et al., 2022). Others have expanded this framework by adding Veracity and Value, as highlighted by Mostafa (2023) and Franke & Hiebl (2022), an extension also adopted by professional bodies such as the ACCA and IMA, resulting in five fundamental characteristics (5Vs). Further expansions included seven characteristics like the Shahnawaz and Kumar (2025) study, and ten characteristics in (Koudia et al., 2023) study.

In this study, big data is defined as large-scale and multi-source data generated inside or outside the organization, characterized by five key dimensions (5Vs): Volume (the massive amount of data), Velocity (the rapid generation and processing of data), Variety (the diversity of data types and sources), Veracity (the reliability and accuracy of data), and Value (the meaningful benefit derived from data), which is reflecting the data's capacity to uncover meaningful patterns and insights when processed and analyzed using advanced methods.

Big Data Sources

Nowadays big data is generated from highly diverse sources, including digital, audio, and visual formats, as well as data from websites, applications, sensors, mobile devices, social media platforms, and the Internet of Things (IoT), (González et al. 2022). Nevertheless, numerous studies have overlooked the critical distinction between internal and external sources of big data, despite its significant role in accurately understanding the nature of the data and determining the most appropriate methods for its processing and employment (Al-Dmour et al., 2025). Considering this, the researchers underscore the importance of classifying big data sources into Internal and External Big Data. Internal Big Data is the data generated within companies through operational systems and internal activities; which is typically structured or semi-structured (Oesterreich & Teuteberg, 2019), while the External data is collected from outside the organization, often in raw and unstructured formats, as supported by Al-Mihei and Salim, (2023), which is an essential classification for accounting generally and management accounting specifically.

Big Data Analysis

Several studies have addressed the types of Big Data Analytics (BDA). For instance, (Strang &

Sun, 2022) indicated that the main components of BDA include descriptive, prescriptive, and predictive analytics. They further explained that these analytics aim to answer key questions such as: What and when happened? What will happen? What is the best option or decision under uncertainty? Additionally, Hammad (2021) emphasized that big data analytics can be categorized into three primary types: Descriptive Analytics, Prescriptive Analytics, and Predictive Analytics, which is supported by (Gusc et., 2022). Based on these contributions, the current study adopts these types of BDA, and their conceptual definitions as follows:

- **Descriptive Analytics**: This type of analysis focuses on extracting and analyzing historical data from available records, to identify specific patterns or behaviors. The aim is to understand, interpret, and transform this data into valuable information that enhances business performance evaluation, and supports decision-making (Othman, 2020).

- **Predictive Analytics:** This analysis is concerned with mining and examining historical data to forecast future outcomes, by identifying behavioral patterns and extrapolating future trends based on these patterns. It employs a variety of predictive techniques to extract and convert data into valuable insights that support forecasting, and guide future decision-making (Saldana, 2021).

- **Prescriptive Analytics:** This analysis involves applying data mining techniques to determine the best possible outcomes. It heavily depends on predictive analytics to provide recommendations about what actions should be taken to achieve optimal results (Miles, 2021).

Critical Importance and Benefits of Big Data Analysis

Several studies have highlighted the relationship between big data analytics (BDA) and the roles of management accountants. Gärtner and Hiebl (2018) emphasized that management accountants can use big data across its processing stages, to generate significant benefits for businesses. During data collection and storage, big data offers diverse and rich sources that enable accountants to uncover deeper insights into customers, suppliers, and employees, enhancing knowledge, improving information quality, and supporting better decision-making (Abu-Hilal, 2023). In the processing and verification stage, it is essential to assess the quality and relevance of the data, as rapid decisions based on unreliable data can lead to incorrect outcomes. Finally, in the analytics stage, management accountants play a vital role in transforming processed data into actionable insights, delivering valuable information to support strategic planning, forecasting, and effective decision-making. Big data analytics further enhances management accounting information quality in real-time (Oranefo et al., 2024), which aligns with the findings of (Kabir et al., 2025; Shalhoob et al., 2024; Franke & Hiebl, 2022), where they confirm the positive impact of BDA on information quality and decision-making.

Management Accounting Information Quality

Accounting literature have defined and emphasized the fundamental and secondary characteristics of accounting information quality, as these characteristics are essential for evaluating the usefulness and effectiveness of such information in supporting decision-making. Al-Bakr (2022) identified the primary characteristics as relevance, reliability, understandability, objectivity, and truthfulness, while the secondary characteristics include comparability and constancy. Similarly, other studies highlighted relevance and reliability as primary characteristics, with comparability, verifiability, timeliness, and understandability as secondary ones, (Khalifati, 2018). In contrast, Abu-Oudah (2021) proposed that the primary characteristics include understandability, comparability, relevance, and reliability, while the secondary

characteristics include faithful representation, substance over form, neutrality, cautiousness, and completeness. Additionally, Boukadoum (2021) emphasized materiality as a key primary characteristic alongside with relevance and faithful representation. Kholmirzaev (2022) also noted that relevance and reliability are primary, while comparability and consistency are considered secondary characteristics. Therefore, and based on reviewing the characteristics of management accounting information as outlined by the Financial Accounting Standards Board (FASB), the International Accounting Standards Board (IASB), and the International Financial Reporting Standards (IFRS), this study adopts relevance, truthfulness, and materiality as the primary characteristics of management accounting information, while comparability, verifiability, timeliness, understanding are the secondary characteristics.

Primary Characteristics of Management Accounting Information

Relevance refers to the appropriateness of the information and its ability to influence decision-making, ensuring it provides meaningful value to its users. Second, truthfulness emphasizes the essential to accurately represent actual events, ensuring its reliability and errors free, distortions, or bias. Finally, materiality highlights the significance of the information in affecting users' decisions, particularly when its omission or misstatement could lead to different outcomes, all while considering the balance between the cost of providing the information and its potential benefits.

Secondary Characteristics of Management Accounting Information

First, comparability refers to the ability of accounting information to facilitate meaningful comparisons across different periods and entities, thereby supporting effective decision-making. Second, verifiability refers to the assurance that the information can be confirmed as accurate and reliable, providing users confidence in its integrity. Timeliness emphasizes the necessity of providing accounting information instantly to support decision-making. Finally, understandability refers to presenting information clearly in a way that is easily comprehensible to users, particularly those with limited knowledge of accounting and business.

Critical Importance and Benefits of Management Accounting Information Quality in Era of Big Data Analytics

Focusing on big data analytics and their impact on management accounting in general, and on the quality of management accounting information in particular, it becomes evident that BDA significantly affects both the inputs and outputs of accounting information systems, which management accountants heavily rely on in their daily functions. In this context, big data have reshaped the data collection phase (inputs) by expanding data sources to include external ones, such as various digital media and platforms. Consequently, the structure of accounting information and the nature of inputs relevant to decision-making processes have improved. In other word, the collection and storage of big data provide management accounting with new and diverse sources of information, which management accountants can leverage to enhance the quality of management accounting information. This, in turn, supports gaining clearer insights (outputs) and deeper understanding of patterns related to customer behaviors, trends, supplier and stakeholder activities (Salma, 2022). As a result, businesses can achieve higher levels of knowledge, improve competitiveness, develop products, access international markets, and ensure sustainability, Abdul- Razek, (2021). Such advancements have changed the role of management accountants, to be a strategic partner in decision-making, and adding value to the businesses.

Furthermore, BDA contribute to enhancing the achievement of both the primary and secondary characteristics of management accounting information, Elrasheeddy and Radhy (2021). According to Mostafa (2023), BDA improves the transparency and quality of accounting disclosures, enabling a shift from periodic reporting to real-time reporting, thereby strengthening investor and stakeholder confidence. Additionally, BDA facilitates the development of cost estimation and analysis models, which enhances the quality of planning and forecasting, and empowers accountants for more informed and effective decisions. This aligns with the findings of (Yoshikuni *et al*., 2023; Gao, 2022), who emphasized that BDA plays a crucial role in improving MAIQ and operational efficiency, as well as financial management. Based on this, researchers can conclude that BDA represent a critical factor in providing substantial advantages to management accountants, including the enhancement of MAIQ, and the improvement of both operational and investment decisions.

Operational and Investment Decisions in Era of Big Data Analytics

Several studies have addressed the concept of operational and investment decisions and emphasized the importance of improving them by using BDA. Kahla (2025) states that an investment decision involves allocating certain financial resources with the aim of generating returns in the future, which can be enhanced by applying BDA. Moreover, accountants can benefit from BDA in making more effective financial and non-financial decisions. Similarly, (Atallah et al., 2025) highlighted the potential of BDA to provide better alternatives for decision-makers in operational and investment contexts. Researchers believe that BDA strengthens management accounting's ability to improve decision quality, particularly financial, investment, and operational decisions closely linked to management accounting (Rahardja et al., 2025). This improvement is achieved by enhancing the quality of decision inputs, specifically management accounting information quality (MAIQ), whether sourced from internal systems like Enterprise Resource Planning (ERP) or from external data, or both. Accordingly, operational decisions refer to daily business activities, such as marketing, sales, logistics, pricing, reengineering process, and internal policies, while investment decisions involve allocating financial resources for long-term benefits, including asset replacement, market entry, or opening new sales channels.

Literature Review and Hypothesis Development

This section aims to review previous studies related to Big Data Analytics (BDA) and its impact on Management Accounting Information Quality (MAIQ), and decision-making (DM) processes. In this context, this section is divided into three main parts. The first presents previous studies explored BDA and its relationship with the sources and quality of Management Accounting Information. The second part focuses on prior studies that highlighted the relationship between BDA and decision-making. Finally, the third part presents an analysis of the reviewed studies ،including researchers' insights and observations.

Big Data Analytics and Management Accounting Information Quality

Several prior studies have highlighted the significant role of BDA in enhancing the MAIQ and improving DM processes. Kabir et al. (2025) confirmed that adopting big data technology improves accounting efficiency, accuracy, and security in U.S. industrial companies; which is in alignment with Franke & Hiebl, (2022); recommending investment in staff training to maximize these benefits. Similarly, Okeke and Eze (2025) explored the role of BDA in enhancing accounting information quality within the hospitality sector in Nigeria, finding that the three main key characteristics of big data—velocity, variety, and volume—significantly

improve the quality of accounting information and financial reporting, with a strong influence by data velocity and variety. They emphasized, moreover, the importance of investing in technologies that enhance processing speed and integrating diverse data sources to achieve comprehensive, timely, and accurate financial reporting.

Additionally, Boddapati et al. (2025) demonstrated that integrating BDA with Artificial Intelligence (AI) and machine learning (ML) enhances operational efficiency and reduces costs, especially in manufacturing sectors, recommending manufacturing leaders proactively adopt these technologies to rapidly identify production improvement opportunities and deliver timely solutions. In the same context, Abdul-Aziz (2025) emphasized BDA's role in improving accounting information quality and managing banking risks in Egypt, recommending further investment in big data analyzing systems and employee training. Furthermore, in the Saudi telecommunications sector, Al-Thubaity and Al-Mihei (2025) showed that descriptive, predictive, and diagnostic BDA significantly enhance integrated reporting and accounting quality; which is in alignment with Abu-Hilal (2023) and Othman (2020); calling for adoption of BDA, investment in necessary technologies, and strict data security actions. To sum up, these prior studies affirm the fundamental role of BDA in improving MAIQ and supporting decision-making across industries, which they in consistent with (Oranefo et al., 2024; Wu & Chao, 2023; Muhammed, 2022).

Big Data Analytics and Decision-Making

The reviewed studies collectively underscore the critical role of Big Data Analytics (BDA) in enhancing decision-making (DM). Rahardja et al. (2025) findings showed that BDA integration with Artificial Intelligence (AI), enhances operational decisions, improves risk prediction, automates financial processes, and expands customer outreach, which is alignment with (Kumar et al., 2023; Salma, 2022; Abu-Ouda, 2021; and Hänninen et al., 2018). Similarly, Al-Dmour et al. (2025) demonstrated that in the healthcare sector, BDA improves operational efficiency and decision-making, while AI enhances diagnostic accuracy and treatment planning. The study further highlighted that companies with strong infrastructure, qualified employee, and top management support are better positioned to successfully adopt these technologies, which is also supported by Aljumah et al., (2021) and aligns with (RBV) theory adopted by this study.

In addition, other studies confirmed the contribution of BDA in improving data quality and decision-making. For example, Shalhoob et al. (2024) found that BDA positively enhances fraud detection and error prevention, by integrating data from multiple sources and applying advanced algorithms, resulting higher-quality accounting information and more accurate financial reports, that supports decision-making process. These findings align with Liu, (2023); González et al., (2022); and Saldana, (2021). Moreover, Abou-Zied (2025) found that the use of predictive analytics applied to big financial data can significantly improve the accuracy of financial performance, forecasting and, in turn, the accuracy of strategic decisions. The study pointed to the importance of integrating big data with traditional accounting systems to improve information accuracy and operational efficiency. Additionally, Atallah et al. (2025) and Falana et al., (2023) demonstrated that BDA contribute to improving inventory management, logistics, forecasting, operational efficiency, and strategic decision-making. They called for wider adoption of BDA in businesses to maximize its value in enhancing accounting information quality and improving financial and operational performance. Collectively, these studies highlight the transformation impact of BDA in driving informed decisions, improving data quality, and supporting sustainable growth across industries.

Literature Contribution

Considering the above, researchers emphasize the critical importance of integrating big data sources (internal and external) by businesses as a fundamental factor of success, when adopting and applying (BDA), where it positively impacts the characteristics and quality of management accounting information (MAIQ), (Wang et al., 2022). Furthermore, this type of integration enables management accountants to develop more comprehensive view of the internal and external businesses environment, enhancing their ability to make better decisions and achieve a competitive advantage, (Darwiesh et al., 2022; Delgosha, 2020). Moreover, researchers argue that decisions informed by integrated big data sources contribute to fulfilling both internal and external business objectives, such as marketing, sales, and logistics decisions (Al-Beltagi, 2020; Othman, 2020). This is particularly evident in the potential interrelationship between marketing decisions based on external big data and operational or industrial decisions based on internal big data. Such integration provides management accountants with deeper insights, supports decision-making, and enhances value creation. This perspective is reinforced by several prior studies, including Barzizza et al. (2023), Perdana et al. (2022), and Amirhum (2022).

Despite the benefits of BDA in enhancing MAIQ and supporting operational and investment decisions in business firms are well proven, previous studies have overlooked the Kingdom of Saudi Arabia environment. This is particularly significant given the Kingdom's commitment to Vision 2030, which emphasizes digital transformation and the development of a powerful digital infrastructure to fully leverage BDA across business sectors. Based on the study objectives and the findings of previous related studies, the researchers formulated the following main and sub-hypotheses:

H1: Big Data Analytics have a positive impact on Management Accounting Information Quality in Saudi listed companies.

H1.1: Big Data characteristics have a positive impact on the primary characteristics of management accounting information in Saudi listed companies.

H1.2: Big Data characteristics have a positive impact on the secondary characteristics of management accounting information in Saudi listed companies.

H1.3: The use of Big Data Analytics has a positive impact on operational and investment decision-making in Saudi listed companies.

Field Study

Population and Sample

The study population encompasses all elements relevant to the phenomenon under investigation. Based on the study's problem and objectives, the targeted population consists of management accountants, executive managers, financial managers, system administrators, and data analysts working in Saudi listed companies listed on the Main Market. The total number of these companies is (231). However, companies operating in the Real Estate Investment Traded Funds (REITs) and Real Estate Management and Development sectors—including (18) and (13) companies, respectively—were excluded from the study, due to their unique standards and specific operational characteristics that fall outside the intended scope of this research. Therefore, the final study population was determined to include (200) Saudi listed companies on the Main Market, as officially reported by the Saudi Exchange as of January 1, (2024). The Saudi Exchange is the official authority responsible for supervising public organizations and is

recognized as the primary source of information regarding companies listed on the Saudi Stock Exchange.

Based on the key findings confirming the actual application of BDA by several Saudi listed companies, the study adopted a purposive (intentional) sampling technique. This type of sampling involves selecting specific individuals or cases believed to accurately represent the overall population (Kamel, 2022). Accordingly, the researchers distributed the study questionnaire to all (200) Saudi companies listed on the main market. Initially, (126) electronic responses were received. To enhance the response rate, the researchers conducted field visits and distributed an additional (48) paper-based questionnaires, targeting companies that had not responded electronically, which resulted in (41) more responses. After excluding one invalid response, the final number of valid responses reached (166). These responses were distributed across (61) companies, representing (18) out of the (19) Saudi targeted sectors—achieving a sectoral response rate of (94.74%). Notably, sectors such as Telecommunications Services and Banks recorded high response rates of (75%) and (70%) respectively, while the Media and Entertainment sector did not return any responses. In contrast, some sectors—such as Consumer Durables & Apparel, Commercial & Professional Services, and Financial Services—recorded only one valid response each .Nevertheless, these sectors were included in the analysis, as even a single response was considered important for representing the sector's participation and calculating its response rate. The remaining sectors showed response rates ranging between (19%) and (60%), including Basic Materials (26%), Energy (29%), Capital Goods (38%), Consumer Services (50%), Utilities (60%), Food & Beverages (19%), Health Care Equipment & Services (22%), and Insurance (19%). Overall, the study achieved a response rate exceeding (30%) of the total research population, thereby reinforcing the reliability and validity of its findings.

Data Collection

To ensure the accuracy and reliability of the results, and based on the nature of the required data, the researchers relied on exploratory visits, along with both electronic and paper-based questionnaires, as the primary sources for collecting the field study data in order to achieve the study's objectives. The questionnaire used in this study consists of three main sections. First section focuses on general information and includes two dimensions. The first dimension relates to participants' demographic data, covering gender, job position, academic qualification, and years of professional experience, with the aim of describing the study sample. The second dimension presents demographic data for Saudi listed companies listed on the main market, including the year of establishment, number of employees, capital size, and sector. This information is used to profile the study sample and enable necessary comparisons.The second section of the questionnaire focuses on big data and its analytics. It is structured to address two key dimensions: the first dimension aims to verify the existence of big data within the targeted companies. The second dimension seeks to confirm the actual application of big data analytics. The third section surveys the impact of big data analytics on the management accounting information quality, including three key dimensions: the first focuses on the extent to which big data analytics are used and their role in enhancing the primary characteristics of management accounting information. The second dimension assesses the degree of using big data analytics to improve the secondary characteristics of this information. The third dimension evaluates how the application of big data analytics contributes to supporting operational and investment decision-making within Saudi listed companies.

Measurements

A five-point Likert scale was used to measure participants' responses, ranging from "Not Applicable" (1) to "Applied and Very Effective" (5), which allows participants to express their opinions with high accuracy. A weighted average was calculated for each item to analyze respondents' views.

Opinion	Weight	Weighted Average Range
Not Applicable	1	1.00 – 1.79
Applied but Ineffective	2	1.80 – 2.59
Neutral	3	2.60 – 3.39
Applied and Effective	4	3.40 – 4.19
Applied and Very Effective	5	4.20 – 5.00

Table (1). Five-Point Likert Scale With and Corresponding Weights:

According to Table (1), averages from (1.00) to (1.79) indicate disagreement, (1.80) to (2.59) show agreement with no positive impact, (2.60) to (3.39) reflect neutrality, (3.40) to (4.19) confirm agreement with a positive impact of Big Data Analytics (BDA) on Management Accounting Information Quality (MAIQ) and decision-making, and (4.20) to (5.00) indicate a strongly positive impact. However, to test the study's hypotheses and achieve its objectives, the researchers conducted a set of statistical analyses using SPSS, structured into three main levels. First, the reliability and validity of the questionnaire were assessed to ensure the accuracy and consistency of the measurement tool. Then, a descriptive analysis was performed to present demographic data and response trends related to the adoption of BDA and key study variables. This was followed by a diagnostic analysis using ANOVA and the Binomial Test to explore the influence of demographic characteristics and test the study's hypotheses.

Reliability and Validity of the Study Instrument

The reliability of the study instrument refers to the consistency and stability of the measurement tool, indicating that it produces similar results when reapplied to the same sample (Muhammed & Abu-Shaghfa, 2025). In this study, the researchers intentionally developed a new and original questionnaire specifically tailored to the research objectives and variables. This approach was adopted to ensure that the instrument accurately captures the unique context and requirements of the study. To validate and refine the instrument, the questionnaire was submitted to ten (10) academic experts specializing in accounting from various Saudi universities. Feedback was received from eight (8) of these experts, and all suggestions were carefully evaluated and considered. This validation process aimed to ensure that the questionnaire items were clearly stated, precisely aligned with the intended measurement indicators, and effectively supported the study's overall objectives. Subsequently, the reliability of the final instrument was assessed using Cronbach's Alpha coefficient, which ranges from (0) to (1), with higher values indicating stronger internal consistency. Values below (0.50) are considered unacceptable; (0.50–0.59) weak; (0.60–0.69) acceptable; (0.70–0.79) good; (0.80–0.89) very good; and (0.90) or above indicate excellent reliability.

In addition, validity is defined as the extent to which the instrument consistently measures what it is intended to measure, specifically the internal consistency among the items and dimensions of the questionnaire. It can be calculated using the square root of the reliability coefficient (Al-

Huwaij & Al-Rahal, 2025). Accordingly, the current study assessed the validity by calculating the square root of the Cronbach's Alpha coefficient, as shown in Table (2).

Dimension	Sub-Dimension	Number of Items	Cronbach's Alpha	Indicator	Validity Coefficient
The Impact of Big Data Analytics on Management Accounting Information Quality	The extent of using BDA and their impact on achieving fundamental characteristics of MAI	5	0.89	Very Good	0.94
	The extent of using BDA and their impact on achieving fundamental characteristics MAI	5	0.86	Very Good	0.93
	The extent of using BDA and their impact on improving operational and investment decisions MAI	9	0.92	Excellent	0.96
Total		19	0.94	Excellent	0.97

Table (2). Validity of the Study Instrument.

As illustrated in Table (2), the highest Cronbach's Alpha coefficient recorded was (0.92), while the lowest was (0.86), with an overall reliability coefficient of (0.94) across all (19) questionnaire statements. The validity coefficients ranged from (0.93) to (0.96), with a total validity coefficient of (0.97). These results indicate a high degree of reliability and validity for the study instrument and its dimensions, which confirms that the questionnaire is sufficient to proceed with analyzing the collected data and testing the study hypotheses.

Descriptive Analysis

Following is detailed descriptive analysis of the first, second, and third sections of the questionnaire. Specifically, the first section addresses general information regarding participants and the responding companies. The second section focuses on assessing the vailability of big data and its analytics application. Finally, the third section examines the core variables of the study.

General Information

The demographic analysis of the study participants shows that the majority were male (82.5%), and most held either a bachelor's or a master's degree, collectively representing (91.6%) of the sample. Regarding academic specialization, nearly (80%) of the respondents had backgrounds

in accounting, finance, or public/business administration—fields directly relevant to the study's focus. In terms of professional experience, a significant proportion (36.2%) had (15) years or more of experience, suggesting a high level of expertise among the participants. These characteristics enhance the credibility of the findings by reflecting insights from experienced professionals with relevant academic and practical backgrounds.

In addition, the demographic profile of the responding Saudi listed companies reveals that the sample is mainly composed of large-cap, well-established organizations. A majority (62.6%) reported capital sizes exceeding one billion Saudi riyals, with (35.5%) exceeding fifteen billion, reflecting strong financial capability. Additionally, over (50%) of the companies had been operating for more than (30) years, indicating organizational stability and institutionalized practices. In terms of workforce size, most participating companies were large employers, with (39.2%) having over (5,000) employees and (33.7%) employing between (500) and (5,000). These characteristics strengthen the credibility of the study findings, as they are drawn from companies with substantial resources, extensive experience, and operational scale—factors that enhance the depth and relevance of their insights into the impact of Big Data Analytics (BDA) on Management Accounting Information Quality (MAIQ) and decision-making.

Big Data Availability and Analytics Application

To assess the availability of Big Data (BD) and its Analytics application, the researchers relied on the second section of the questionnaire, which includes a standardized checklist covering two key dimensions: verifying the existence of BD and assessing the extent of its analytics application within Saudi listed companies. The checklist consists of carefully designed statements aimed to measure the extent to which the characteristics and quality of Management Accounting Information (MAI) are achieved. Participating companies were asked to indicate the degree to which specific big data practices are implemented within their organizations. Each statement was scored as (1) if the primary or secondary characteristic of MAI was present, and (0) if absent. This scoring method enables the calculation of the overall quality level based on the percentage of achieved characteristics. This approach is consistent with methods applied in previous studies, such as (Boukadoum, 2021, P. 678). The quality assessment scale is presented in Table (3).

Level of Achieved Management Accounting Information Characteristics	**Scale**		**MAIQ Level**
	From	**To**	
	0%	Less than 50%	Low Quality
	50%	Less than 70%	Moderate Quality
	70%	%100	High Quality

Table (3). Management Accounting Information Quality Scale

As shown in Table (3), achieving (70%–100%) of the checklist items—representing primary and secondary MAI characteristics—indicates high quality; (50%) to less than (70%) indicates moderate quality; and less than (50%) means low quality. To begin with, Table (4) presents the descriptive analysis for the first dimension of the second section, which aims to verify the existence of BD from the perspective of the respondents. It also assesses the extent to which certain characteristics of MAI are achieved through their alignment with BD characteristics.

Dimension (2/1)	No.	Statement	N	Percentage	Targeted Characteristic
Adoption of Big Data	1	The company collects and generates large volumes of diverse data, from various internal and external sources.	157	95.7%	Variety (BD), Comparability (MAI)
	2	The company maintains large databases of valid data collected or generated over different periods from multiple sources.	154	93.9%	Volume (BD), Relevance (MAI)
	3	The company examines the reliability of collected data to ensure its usability in relevant departments.	155	94.5%	Veracity (BD), Verifiability (MAI)
	4	The company has the capability to regularly update its databases.	156	95.1%	Velocity (BD), Timeliness (MAI)
	Total		622	95%	

Table (4). The Adoption of Big Data in Saudi Listed Companies According to the Respondents' Perspectives

Table (4) demonstrates a strong confirmation of BD adoption in the Saudi responding companies. A significant majority of respondents affirmed that their companies collect and generate large volumes of diverse data, from internal and external sources (95.7%), maintain extensive and reliable databases over time (93.9%), and regularly verify the reliability of collected data to ensure its usability across relevant departments (94.5%). These findings confirm the presence of key Big Data characteristics—variety, volume, and veracity—which directly support essential management accounting information attributes such as comparability, relevance, and verifiability. Overall, with a combined confirmation rate reaching (95%) across all measured items, the findings strongly suggest that Saudi listed companies possess substantial BD resources and achieve several key management accounting information characteristics at a high level, as per the quality scale in Table (3).

Dimension (2/1)	No.	Statement	N	Percentage	Targeted Characteristic
Application of Big Data Analytics	1	The company regularly reviews, sorts, and organizes all Big Data available.	154	92.8%	Big Data Management, Truthfulness (MAI)
	2	The company benefits from collecting external data from various sources, such as social media, websites, email correspondence,	133	80.1%	External BDA, Value (BD)

		sensors, tracking devices, etc.			
	3	The company retains internal data from its different departments to utilize, such as data from the electronic accounting information system (e.g., customer, employee, supplier, and inventory data).	162	97.6%	Internal BDA, Value (BD)
	4	The company can leverage its available Big Data to gain insights and interrelationship.	159	95.8%	Value (BD), Understandability (MAI)
	5	The company makes certain decisions based on Big Data Analytics from diverse sources (internal/external).	161	97.0%	Value (BD), Materiality (MAI), Decisions-Making
	Total		769	92.65%	

Table (5). Extent of Big Data Analytics (BDA) Application in Saudi Listed Companies

In addition, Table (5) presents the descriptive analysis to what extent Big Data Analytics (BDA) are applied by Saudi listed companies. It reveals strong evidence that Saudi listed companies actively apply Big Data Analytics. Respondents significant confirmed that these companies regularly manage their big data (92.8%), utilize external data from various sources such as social media and tracking devices (80.1%), and retain internal data from multiple departments for analysis and decision-making (97.6%). These practices indicate the effective use of both external and internal big data, supporting the value characteristic of big data and enhancing the credibility and relevance of management accounting information (MAI). Additionally, most respondents affirmed that Saudi listed companies leverage big data to generate valuable insights (95.8%) and make decisions based on these analyses (97.0%), contributing to the understandability and materiality of MAI and impacting operational and investment decisions. With an overall confirmation rate exceeding (92.6%) across all measures, it is evident that these companies not only adopting big data but also apply BDA at a high level, significantly enhancing the quality of management accounting information, as aligned with the assessment scale in Table (3).

In further analysis of the second dimension, the researchers categorized all responses based on the Saudi participated sectors. According to the study's scope, a total of (19) sectors out of the (21) main market sectors in the Kingdom of Saudi Arabia; (as of 01-01-2024); were initially targeted. However, the Real Estate Investment Trusts (REITs) sector, the Real Estate Management & Development sector were excluded, and no responses were received from the Media & Entertainment sector. As a result, the final analysis covered (18) responding sectors. Table (6) presents the analysis of the first dimension in the second section, aiming to verify the adoption of big data (BD) in Saudi listed companies by sector, and its contribution to achieving MAI characteristics through their association with big data attributes.

Dimension (2/1): Adoption of Big Data						Total	
No.	**Statement / Category**	The company collects and generates large volumes of diverse	The company maintains large databases of valid data collected or	The company examines the reliability of	The company has the capability to	**Big Data Adoption**	**MAI Characteristics Achievement (%)**
1	Energy	4	4	4	4	4	100%
2	Basic Materials	27	25	25	26	27	95%
3	Capital Goods	10	11	11	11	11	98%
4	Commercial & Professional Services	5	4	4	4	5	85%
5	Transportation	4	5	5	5	5	95%
6	Consumer Durables & Apparel	0	0	1	1	1	50%
7	Consumer Services	14	11	12	12	14	88%
8	Consumer Discretionary Distribution & Retail	3	3	3	3	3	100%
9	Consumer Staples Distribution & Retail	8	9	9	9	9	97%
10	Food & Beverages	8	8	8	8	8	100%
11	Health Care Equipment & Services	12	12	12	9	12	94%
12	Pharma, Biotech & Life Science	1	1	1	1	1	100%
13	Banks	28	27	27	29	30	93%
14	Financial Services	1	1	1	1	1	100%
15	Insurance	7	8	7	8	8	94%
16	Software & Services	2	2	2	2	2	100%
17	Telecommunications Services	13	13	13	13	13	100%
18	Utilities	10	10	10	10	10	100%
	Total	**157**	**154**	**155**	**156**	**164**	**95%**

Table (6). The Extent of Big Data Adoption in Saudi Listed Companies by Sector

Table (6) shows that most Saudi market sectors strongly confirmed the adoption of Big Data (BD), with confirmation rates (85%) to (100%), consumer durables sector, which recorded (50%) due to limited responses. Eight sectors, including Energy, Pharmaceuticals, Financial Services, Food and Beverages, Software Services, Telecommunications, and Utilities, fully confirmed the adoption of Big Data and meeting all target measures (100%). Additionally, seven other sectors reported over (90%) confirmation of having Big Data from internal and external sources. Overall, the total confirmation rate reached (95%), indicating the widespread adoption of BD across main Saudi market sectors. These sectors demonstrate essential Big Data characteristics—variety, volume, reliability, velocity, and Value—which significantly enhance the quality of management accounting information according to the established assessment

scale. Moreover, Table (7) presents the analysis of the second dimension, assessing the application of BDA across Saudi sectors.

Dimension (2/2): Application of Big Data Analytics							**Total**	
No.	**Statement / Category**	The company regularly reviews,	The company benefits from	The company retains internal data from its different	The company can leverage its available Big Data	The company makes certain decisions based on Big Data Analytics	**Big Data Adoption**	**MAI Characteristics Achievement (%)**
1	Energy	4	4	4	4	4	4	100%
2	Basic Materials	27	21	27	27	26	27	96%
3	Capital Goods	11	9	11	10	11	11	95%
4	Commercial & Professional Services	4	3	5	3	5	5	83%
5	Transportation	4	4	5	5	4	5	90%
6	Consumer Durables & Apparel	1	1	1	1	1	1	100%
7	Consumer Services	12	12	13	12	14	14	92%
8	Consumer Discretionary Distribution & Retail	3	3	3	3	3	3	100%
9	Consumer Staples Distribution & Retail	9	8	9	10	10	10	93%
10	Food & Beverages	7	6	8	8	8	8	94%
11	Health Care Equipment & Services	10	10	13	13	13	13	92%
12	Pharma, Biotech & Life Science	1	1	1	1	1	1	100%
13	Banks	29	21	28	28	29	30	92%
14	Financial Services	1	1	1	1	1	1	100%
15	Insurance	7	6	8	8	7	8	92%
16	Software & Services	2	2	2	2	2	2	100%
17	Telecommunications Services	13	12	13	13	12	13	97%
18	Utilities	9	9	10	10	10	10	97%
	Total	**154**	**133**	**162**	**159**	**161**	**166**	**93%**

Table (7). Extent of Big Data Analytics Application in Saudi Listed Companies by Sector

The results in Table (7) show that all (18) participating sectors confirmed the application of BDA, with rates ranging from (83%) to (100%). This confirms the achievement of all targeted measures for the second dimension, thereby supporting both primary and secondary characteristics of management accounting information and improving its quality. Clearly, six sectors—Energy, Consumer Durables, Consumer Discretionary Distribution and Retail, Pharmaceuticals, Financial Services, and Software Services—reported full application of all

measures (100%), while the other sectors confirmed rates (83%—97%). Overall, the average confirmation rate was (93%), indicating strong adoption of BDA in Saudi Arabia's main market sectors, effective data management, and value extraction that enhances the relevance, understandability, and quality of management accounting information for decision-making.

Impact of Big Data Analytics on Management Accounting Information Quality

The third section of the questionnaire include three dimensions designed to measure the extent of BDA usage and its impact on MAIQ, focusing on the achievement of both primary and secondary qualitative characteristics, as well as its influence on operational and investment decisions. To begin with, Table (8) summarizes respondents' views on how BDA improves the primary characteristics of Management Accounting Information (MAI) in Saudi listed companies.

No.	Section (3): The Impact of BDA on MAIQ Dimension One: The Extent of BDA Usage and Its Impact on MAIQ by Achieving primary Qualitative Characteristics	Mean	Std. Deviation	Indicator	Targeted Measure
1	The company leverages the volume of big data from various sources to make appropriate (short or long-term) decisions.	4.17	1.29	Applied & Effective	Volume (BD), Relevance (MAI)
2	The variety of big data (from diverse internal and external sources) helps the company identify the most suitable policies and procedures.	4.05	1.29	Applied & Effective	Variety (BD), Relevance (MAI)
3	The company regularly updates its databases to ensure appropriate policies and decision-making.	4.13	1.29	Applied & Effective	Velocity (BD), Relevance (MAI)
4	BDA enables the company to objectively interpret internal and external events without bias or misrepresentation.	3.92	1.51	Applied & Effective	BD Management, Veracity (BD) & Truthfulness (MAI)
5	The company uses key big data from internal and external sources to make some decisions and revise others.	4.12	1.32	Applied & Effective	Value (BD), Materiality (MAI)
-	**Total**	**4.08**	**1.12**	**Applied & Effective**	

Table (8). Dimension One: Impact of BDA on MAIQ's Primary Characteristics in Saudi Listed Companies

As shown in Table (8), the study confirms the effective use of BDA in Saudi listed companies, and highlights its significant role in improving MAIQ, particularly in achieving the primary qualitative characteristics—relevance, reliability, and materiality—as supported by Abdul-Aziz (2025) and Liu (2023). The companies benefit from the volume of big data in making appropriate short- and long-term decisions (Mean = 4.17) and from the variety of data in selecting optimal policies and procedures (Mean = 4.05), consistent with Franke and Hiebl (2022), Saldana (2021), and González et al. (2022). The findings further indicate that regular database updates (velocity) enhance the MAIQ and support timely decision-making (Mean = 4.13), in line with Wang et al. (2022). Moreover, BDA enables the objective and unbiased interpretation of internal and external business events (Mean = 3.92), contributing to clearer and more comprehensive decision-making, as confirmed by Darwiesh et al. (2022) and Delgosha (2020). The companies also leverage the value of big data to effectively make and revise decisions (Mean = 4.12). Overall, the total mean of (4.08) and standard deviation of (1.12) reflect a strong agreement among participants regarding the positive impact of BDA on MAIQ. These findings are in line with prior research, including Farraj (2021), Kroon (2021), and Gärtner and Hiebl (2018), which emphasized BDA's role in improving information quality, empowering management accountants, and enhancing decision-making effectiveness.

In addition, Table (9) presents respondents' views on how BDA improves the secondary characteristics of MAI in Saudi listed companies.

No.	**Section (3): The Impact of BDA on MAIQ** **Dimension Two: The Extent of BDA Usage and Its Impact on MAIQ by Achieving secondary Qualitative Characteristics**	**Mean**	**Std. Deviation**	**Indicator**	**Targeted Measure**
1	The large volume of big data from diverse sources supports the company in conducting objective and reliable comparisons.	4.10	1.23	Applied & Effective	Volume (BD), Comparability (MAI)
2	The company leverages the diversity of big data from multiple internal and external sources to perform effective comparisons and determine appropriate policies based on those comparisons.	4.10	1.27	Applied & Effective	Variety (BD), Comparability (MAI)
3	Big data analytics with its continuous flow, enables the company to provide timely information that meets employees' needs.	3.96	1.33	Applied & Effective	Velocity (BD), Timeliness (MAI)
4	Users of big data from various internal and external	3.98	1.34	Applied &	Reliability (BD), Verifiability

	sources are able to verify the accuracy of the data and the reliability of the analytics performed.			Effective	(MAI)
5	The company relies on key big data from multiple sources (internal and external) that are presented in a clear and understandable format to support the achievement of organizational objectives.	4.07	1.34	Applied & Effective	Value (BD), Understandability (MAI)
-	**Total**	**4.04**	**1.05**	**Applied & Effective**	

Table (9). Dimension Two: Impact of BDA on MAIQ's Secondary Characteristics in Saudi Listed Companies

As presented in Table (9), the means range from (3.96) to (4.10), with standard deviations between (1.23) and (1.34), indicating strong agreement on the application of BDA in Saudi listed companies, and its positive impact on MAIQ, consistent with Othman (2020). The results highlight that the volume and variety of big data from multiple sources enable these companies to determine policies, (Means = 4.10; SD = 1.23, 1.27). This aligns with the study's theoretical framework and Mostafa (2023), who noted that big data from internal and external sources enhance decision-making through its volume and variety. Moreover, the results show that the velocity of big data supports timely responses to employee needs (Mean = 3.96), in agreement with Gao (2022), emphasizing real-time data access. Furthermore, the reliability and value of data enhance the verifiability and understandability of MAI (Mean = 3.96, 4.07). Respondents confirmed the role of BDA in ensuring data reliability, producing trustworthy analytics, and providing clear information presentation, consistent with Al-Thubaity and Al-Mihei (2025). Overall, the total mean of and (4.04) standard deviation of (1.05) indicates strong agreement on BDA's positive impact on MAIQ, by achieving secondary qualitative characteristics, consistent with Abdul-Razek (2021), confirming BDA's effectiveness in improving information quality and creating added value. The study further confirms the clear use of BDA by Saudi listed companies and its significant role in enhancing MAIQ through secondary qualitative characteristics—comparability, timeliness, verifiability, and understandability—enabling companies to achieve their goals and make better decisions.

The following presents the results of the third and final dimension in this section, which addresses respondents' perspectives on the role of BDA in improving operational and investment decision-making within Saudi listed companies. As shown in Table (10), the findings demonstrate the extensive and effective application of BDA, with means ranging from (3.78) to (4.19) and standard deviations between (1.07) and (1.62).

No.	Section (3): The Impact of BDA on MAIQ Dimension Three: The Extent of BDA Usage and Its Impact on Enhancing Operational and Investment Decisions	Mean	Std. Deviation	Indicator	Targeted Measure
1	The company relies on predictive analytics of available big data to enhance sales forecasting and operating cash flows.	4.19	1.07	Applied & Effective	Predictive Analytics, Forecasting & Decisions
2	The company uses BDA to analyze customer sales patterns and behaviors, enabling the identification of relevant trends and correlations.	4.06	1.29	Applied & Effective	Descriptive Analytics, Sales Decisions
3	The company makes certain pricing and cost decisions for products and services based on (internal/external) BDA of related historical events.	4.12	1.26	Applied & Effective	Descriptive Analytics, Marketing Decisions
4	The company conducts data mining on relevant big data (internal/external) related to logistics operations (inbound/outbound) to identify available alternatives and support logistical decisions.	3.78	1.62	Applied & Effective	Diagnostic Analytics, Logistical Decisions
5	The company makes internal decisions, such as reengineering processes, restructuring functions, or updating policies, based on comprehensive big data from internal and external sources.	3.78	1.57	Applied & Effective	Value (BD), Operational Decisions
6	The company uses BDA related to asset costs and useful lives to support asset replacement decisions.	4.07	1.32	Applied & Effective	BDA, Asset Replacement Decisions
7	The company leverages BDA (from internal and external sources) to support decisions on opening new sales outlets and to gain better insights into	3.98	1.51	Applied & Effective	BDA, New Outlet Decisions, Emerging Market Needs

No.	Section (3): The Impact of BDA on MAIQ Dimension Three: The Extent of BDA Usage and Its Impact on Enhancing Operational and Investment Decisions	Mean	Std. Deviation	Indicator	Targeted Measure
	customer needs and emerging market opportunities.				
8	The company makes investment decisions based on BDA available from diverse internal and external sources.	4.01	1.34	Applied & Effective	Value (BD), Investment Decisions
9	The company leverages the volume, variety, and velocity of big data from reliable sources, to make timely and well-informed operational and investment decisions based on comprehensive analysis and validation.	4.12	1.28	Applied & Effective	BD Characteristics (5Vs), MAIQ, Operational and Investment Decisions
-	**Total**	4.01	**1.08**	**Applied & Effective**	

Table (10). Dimension Three: Impact of BDA on Enhancing Operational and Investment Decisions in Saudi Listed Companies

These results of Table (10) emphasize BDA's significant contribution to enhancing both operational and investment decisions. Specifically, companies strongly rely on Predictive Analytics to enhance forecasting of sales and operational cash flows (Mean = 4.19, SD = 1.07), consistent with Abou-Zied (2025) and Muhammed (2022). (2021). The companies, moreover, apply Descriptive Analytics to understand customers behavior and sales patterns (Mean = 4.06, SD = 1.29) and to make pricing and cost decisions (Mean = 4.12, SD = 1.26), in line with Salma (2022) and Abu-Ouda (2021). Additionally, the utilization of Prescriptive Analytics facilitates logistical decision-making, through the exploration of big data from both internal and external sources (Mean = 3.78, SD = 1.62), consistent with Atallah et al. (2025). The application of BDA further supports ainternal operational decisions, including process reengineering and asset replacement (Means = 3.78 and 4.07), aligning with Sebbar et al. (2022) and Ferrari (2019). Decisions on opening new sales outlets and investment strategies based on big data insights (Means = 3.98 and 4.01) consistent with Hänninen et al. (2018). Finally, respondents emphasized utilizing big data characteristics—volume, variety, velocity, reliability, and value—for timely and accurate decision-making (Mean = 4.12, SD = 1.28), align with Koudia et al. (2023). Finally, decisions concerning market expansion, such as opening new sales outlets and making investment choices based on BDA insights (Means = 3.98 and 4.01), align with findings of Kumar et al. (2023). Finally, the respondents highlighted the importance of leveraging the key characteristics (5Vs) of big data—volume, variety, velocity, reliability, and value—to ensure timely and informed decision-making (Mean = 4.12, SD = 1.28), which is in line with Nissim

(2022).The overall mean of (4.01) and standard deviation of (1.08) reflect strong consensus among respondents on the positive impact of BDA at a "Applied & Effective" level.

Across all three dimensions, researchers conclude that BDA demonstrates a significant positive role in enhancing MAIQ and decision-making in Saudi listed companies, thereby contributing to business value, consistent with Al-Mihei & Salim (2023), Barzizza et al. (2023), Gusc et al. (2022), and Amirhum (2022).

Diagnostic Analysis

This section of the study aims to explore potential differences among Saudi listed companies concerning the third section of the questionnaire, based on the demographic characteristics of the responding companies. Additionally, it involves testing the study's hypotheses to further examine the relationships within the collected data.

One-Way Analysis of Variance Test

This study applied One-Way Analysis of Variance (ANOVA) to assess differences among Saudi listed companies concerning the third section of the questionnaire, which measures BDA usage and its impact on MAIQ and decision-making. The analysis was conducted based on company demographics, including capital size, establishment year (age), and number of employees, as detailed below.

Firs of all, Table (11) illustrates the variance in responses among Saudi business sectors regarding the impact of BDA on MAIQ, in terms of achieving the fundamental and secondary characteristics and enhancing operational and investment decisions. The One-Way ANOVA results (F = 1.145, P = 0.317) indicate no statistically significant differences among Saudi listed companies across sectors, regarding the impact of BDA on MAIQ and decision-making. The overall mean (4.04, SD = 0.95) suggests that most sectors consistently recognize BDA's important role in enhancing the fundamental and secondary characteristics of MAI, including relevance, accuracy, truthfulness, materiality, comparability, timeliness, verifiability, and understandability, which in turn supports better operational and investment decisions.

Section (3)	Sector	N	Mean	Std. Deviation	F	Sig	Statistical Indicator
The Impact of BDA on MAIQ	Energy	4	4.21	0.96	1.145	0.317	**Not significant**
	Basic Materials	27	4.16	0.92			
	Capital Goods	11	3.99	0.91			
	Commercial & Professional Services	5	3.70	1.26			
	Transportation	5	3.30	1.02			
	Consumer Durables & Apparel	1	2.96	-			
	Consumer Services	14	3.65	1.12			
	Consumer Discretionary Distribution &	3	5.00	0.00			

	Retail						
	Consumer Staples Distribution & Retail	10	4.51	0.47			
	Food & Beverages	8	4.34	0.47			
	Health Care Equipment & Services	13	3.65	1.29			
	Pharma, Biotech & Life Science	1	3.82	-			
	Banks	30	4.14	0.93			
	Financial Services	1	4.16	-			
	Insurance	8	3.84	0.84			
	Software & Services	2	4.43	0.80			
	Telecommunications Services	13	4.34	0.88			
	Utilities	10	3.87	0.94			
	Total	166	4.04	0.95			

Table (11). Comparison of Saudi Business Sectors Regarding the Impact of BDA on MAIQ and the Enhancement of Operational and Investment Decisions.

According to Table (11), the consumer discretionary distribution and retail sector recorded the highest mean (5.00, SD = 0.00), indicating solid agreement on the highly effective use of BDA in enhancing MAIQ characteristics. Similarly, sectors such as energy (4.21), consumer staples distribution and retail (4.51), food and beverages (4.34), and telecommunications (4.34) also demonstrated strong support, confirming BDA's significant role in improving the quality of management accounting information. On the other hand, the transportation sector showed a lower mean (3.30, SD = 1.02), suggesting a neutral perception and greater variation, possibly due to differences in digital infrastructure, employee competencies, or internal policies. This finding aligns with Dmour et al., (2025) and Haoxiang & Smys (2021), who noted that barriers to BDA adoption include concerns about data privacy, security, limited financial resources, and lake of technical skills, which may restrict the full realization of MAIQ's core and supplementary benefits. Additionally, the consumer durables and apparel sector reported the lowest mean (2.96), likely influenced by the sector's very limited response rate (one response out of six companies, representing only 1% of total responses), which may not adequately reflect the sector's overall position.

In addition, the study explores whether capital size influences the impact of BDA on MAIQ among Saudi listed companies, as presented in Table (12). The results indicate no statistically significant differences (F = 2.242, P = 0.067) in the perceived impact of BDA on MAIQ among Saudi listed companies based on capital size. The overall mean score (4.04, SD = 0.95) reflects a broadly positive consensus on the effectiveness of BDA in enhancing MAIQ. Notably, larger firms, specifically those with capital ranging from (10,000) to less than (15,000) million and those exceeding (15,000) million, reported higher mean scores (4.34 and 4.21 respectively), suggesting a more advanced and effective utilization of BDA capabilities, likely due to superior data management and digital infrastructure resources, as supported by Raj et al. (2023), and

Perdana (2022).

Section (3)	Category of Capital Size	N	Mean	Std. Deviation	F	Sig	Statistical Indicator
The Impact of BDA on MAIQ	From (1) to less than (500) million	23	3.88	1.09	2.242	0.067	**Not significant**
	From (500) to less than (1,000) million	39	3.71	1.06			
	From (1,000) to less than (10,000) million	40	4.18	0.77			
	From (10,000) to less than (15,000) million	5	4.34	0.52			
	From (15,000) million or more	59	4.21	0.90			
	Total	**166**	**4.04**	**0.95**			

Table (12): Comparison of Saudi Listed Companies Regarding the Impact of BDA on MAIQ and Decision-Making by Capital Size.

On the contrary, smaller firms, within the (1) to less than (500) million and (500) to less than (1,000) million categories, recorded comparatively lower means (3.88 and 3.71) with greater response variability (SD = 1.09 and 1.06), potentially reflecting constraints related to limited big data infrastructure investment, consistent with findings from Ghimire et al., (2024). However, smaller Saudi listed companies can overcome these challenges by adopting modern cloud-based Enterprise Resource Planning (ERP) systems that support BDA affordably, meeting business needs efficiently, as evidenced by AL-Jumaili et al. (2023).

Furthermore, Table (13) shows whether company age influences the impact of BDA on MAIQ among Saudi listed companies.

Section (3)	Category of Establishment Year (Company Age)	N	Mean	Std. Deviation	F	Sig	Statistical Indicator
The Impact of BDA on MAIQ	From (1) to less than (10) years	0	0	0	0.895	0.445	**Not significant**
	From (10) to less than (20) years	45	3.88	0.92			
	From (20) to less than (30) years	38	3.99	1.16			
	From (20) to less than (30) years	18	4.12	0.95			
	From (40) years or more	65	4.17	0.82			
	Total	**166**	**4.04**	**0.95**			

Table (13): Comparison of Saudi Listed Companies Regarding the Impact of BDA on MAIQ and Decision-Making by Establishment Year (Age).

As presented in Table (13), results reveal no significant differences (F = 0.895, P = 0.445) regarding the impact of BDA on MAIQ, among Saudi listed companies across different age groups. The overall mean (4.04, SD = 0.95) reflects a generally positive and consistent perception of BDA's role in enhancing both the fundamental and secondary characteristics of MAI and supporting better decision-making, which in line with Boddapati et al. (2025). Companies aged (40) years or more reported the highest mean (4.17, SD = 0.82), suggesting that older firms may achieve greater benefits from BDA due to their extensive experience, stronger IT investments, and greater adaptability to modern business environments. However, this finding contrasts with Wei (2024), who emphasized that younger companies, born in the digital era, may have more flexibility and a stronger capacity to leverage big data technologies effectively.

Finally, Table (14) explores the potential influence of employee size on the impact of BDA on MAIQ in Saudi listed companies.

Section (3)	Category of Employee Size	N	Mean	Std. Deviation	F	Sig	Statistical Indicator
The Impact of BDA on MAIQ	From (1) to less than (100) employees	3	3.64	1.37	1.972	0.101	**Not significant**
	From (100) to less than (500) employees	15	3.59	1.12			
	From (500) to less than (1,000) employees	18	4.18	0.79			
	From (1,000) to less than (5,000) employees	68	3.95	0.99			
	From (5,000) employees or more	62	4.24	0.85			
	Total	**166**	**4.04**	**0.95**			

Table (14): Comparison of Saudi Listed Companies Regarding the Impact of BDA on MAIQ and Decision-Making by Employee Size.

Table (14) shows no significant differences in the mean responses of Saudi listed companies, regarding the impact of BDA on MAIQ based on employee number groups (F = 1.972, P = 0.101). The overall mean (4.04, SD = 0.95) reflects a positive agreement on BDA's role in enhancing MAIQ –by achieving MAI fundamental and secondary characteristics– as well as operational and investment decisions, in alignment with Falana et al., (2023) and Abu-Hilal (2023). Notably, companies with more than (5,000) employees recorded the highest mean (4.24, SD = 0.85), reflecting a strong effective application of BDA. In contrast companies with (100) to less than (500) employees had the lowest mean (3.59, SD = 1.12), although they still reported a positive impact. Other categories showed mean scores ranging from (3.64) to (4.18), which further supports the effective use of BDA across different company groups. These results align with Shalhoob et al. (2024), who highlighted BDA's role in improving information quality and operational decisions. Although the differences are not statistically significant, the results

indicate that larger companies may gain greater benefits from BDA, likely due to their stronger resources and capabilities, as confirmed by Okeke & Eze (2025) and Aljumah et al., (2021).

Variables, Measurement Approach, and Hypotheses Test

To examine the proposed hypotheses and understand the relationship between Big Data Analytics and Management Accounting Information Quality, the study begins by defining its key variables.

Study Variables

The independent variable is Big Data Analytics (BDA), which refers to advanced, non-traditional techniques for storing, processing, and analyzing large-scale, fast-flowing, and multi-sourced data—generated internally or externally—which hold no value in their raw form until analyzed to uncover meaningful insights and correlations that support business and create added value. On the other hand, the dependent variable is Management Accounting Information Quality (MAIQ), which represents a set of fundamental and secondary characteristics that management accounting information must possess to support managerial accountants in improving practices and making better decisions. These characteristics include relevance, accuracy, materiality, reliability, comparability, understandability, verifiability, and timeliness.

Measurement Methodology

To test the study's hypotheses, responses on the five-point Likert scale were recoded into a binary scale, to determine whether participants perceived a significant impact of BDA on MAIQ, as presented in Table (15).

Response	Weight	Weighted Percentage Interpretation
No impact	0	Less than 50%
Neutral	-	Exactly 50%
Impact exists	1	Greater than 50%

Table (15): Binary Recoding and Weighted Interpretation

Responses were categorized as "impact exists" if the weighted percentage exceeded (50%), "no impact" if below (50%), and "neutral" if exactly (50%). Furthermore, the researchers applied the non-parametric Binomial Test, which is uitable for analyzing binary outcome data from questionnaires. This test is used to determine whether the proportion of agreement or success in a set of binary trials (i.e., those with only two possible outcomes such as yes/no or success/failure) significantly deviates from a predetermined benchmark—typically the neutral value of (50%). Based on this analytical approach, the following section presents the results of testing the study's main and sub-hypotheses.

Hypothesis Testing

To achieve the main objective of this study, a main hypothesis was developed by researchers, along with three sub-hypotheses. This main hypothesis (H1) stated that Big Data Analytics has a positive impact on Management Accounting Information Quality in Saudi listed companies. As shown in Table (16), the binomial test results indicate that (90%) of respondents confirmed that BDA (independent variable) positively affects MAIQ (dependent variable), reflecting a strong agreement toward the "Impact exists" category.

Hypothesis	Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
H1: BDA have a positive impact on MAIQ in Saudi listed companies.	Yes, impact exists	149	90%	50%	<.001
	No impact	17	10%		
	Total	166	100%		

Table (16): Binomial Test Results for the Main Hypothesis

On the other hand, only (10%) of respondents reported no perceived impact of BDA on MAIQ. The statistical significance was confirmed at the 0.05 level, with a p-value less than (0.001), supporting the rejection of the null hypothesis and validating (H1). These findings reveal that the application of BDA significantly enhances MAIQ in Saudi listed firms, as supported by Kabir et al., (2025), Okeke & Eze (2025), Abdul-Aziz, (2025), and Elrasheeddy & Radhy, (2021), therefore (H1) is accepted.

Additionally, the first sub-hypothesis (H1.1) stated that big data characteristics have a positive impact on the primary characteristics of MAI in Saudi listed companies. Table (17) presents the results of the Binomial Test for this sub-hypothesis.

Hypothesis	Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
H1.1: Big Data characteristics have a positive impact on the primary characteristics of MAI in Saudi listed companies.	Yes, impact exists	148	89%	50%	<.001
	No impact	18	11%		
	Total	166	100%		

Table (17): Binomial Test Results for the First Sub-Hypothesis

Table (17) results show that (89%) of participants confirmed the significant impact of big data characteristics on MAIQ by enhancing its primary characteristics—namely, relevance, accuracy, and materiality. The results, which in alignment with Al-Thubaity and Al- Mihei (2025), Abdul-Aziz (2025), and Kumar et al., (2023), revealed a strong statistical significance at the (0.05) level, with a p-value less than (0.001), which supports the rejection of the null hypothesis and, in turn, accept the first sub-hypothesis.

Furthermore, the second sub-hypothesis proposed that the characteristics of big data have a positive impact on the secondary characteristics of management accounting information in Saudi listed companies. Table (18) presents the results of the Binomial Test used to evaluate this hypothesis.

Hypothesis	Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
H1.2: Big Data characteristics have a positive impact on the secondary characteristics of MAI in Saudi listed companies.	Yes, impact exists	149	90%	50%	<.001
	No impact	17	10%		
	Total	166	100%		

Table (18): Binomial Test Results for the second Sub-Hypothesis

Table (18) reveals that (90%) of respondents confirmed a positive effect of big data on the secondary characteristics of management accounting information (MAI)—namely, comparability, timeliness, verifiability, and understandability—where the five V's of big data (volume, variety, velocity, veracity, and value) played a key role. In contrast, (10%) of respondents reported no such effect. The results demonstrated strong statistical significance at the (0.05) level, with a p-value less than (0.001), aligning with Boddapati et al. (2025) and Abou-Zied (2025), supporting the rejection of the null hypothesis and, consequently, the acceptance of the second sub-hypothesis.

Finally, the third sub-hypothesis suggested that BDA positively influences operational and investment decision-making in Saudi listed companies, as shown in the Binomial Test results in Table (19).

Hypothesis	**Category**	**N**	**Observed Prop.**	**Test Prop.**	**Exact Sig. (2-tailed)**
H1.3: BDA has a positive impact on operational and investment decision-making in Saudi listed companies.	Yes, impact exists	145	87%	50%	<.001
	No impact	21	13%		
	Total	166	100%		

Table (19): Binomial Test Results for the third Sub-Hypothesis

Table (19) shows that (87%) of respondents confirmed that the use of BDA positively impacts the improvement of operational and investment decisions in Saudi listed companies. Specifically, various types of BDA—such as descriptive, predictive, and prescriptive analytics—were found to influence operational decisions related to sales, marketing, and logistics, as well as investment decisions involving asset replacement and the expansion of sales outlets. The results demonstrated strong statistical significance at the (0.05) level, with a P-value less than (0.001). These findings align with results of Rahardja et al. (2025), Barzizza (2023), and Darwiesh et al. (2022), Al-Beltagi, (2020), thereby supporting the rejection of the null hypothesis. Accordingly, the third sub-hypothesis—stating that the use of BDA has a positive impact on operational and investment decisions in Saudi listed companies—is accepted.

Conclusion and Recommendations

This section summaries the key findings of the study, followed by practical recommendations and suggestions for future research.

Conclusion

The results highlight the significant role of BDA and its core characteristics in enhancing MAIQ and improving decision-making efficiency within Saudi listed companies. BDA contributes to strengthening both the primary characteristics of MAI—such as relevance, reliability, and materiality—and its secondary characteristics, including comparability, timeliness, verifiability, and understandability. This enhancement is largely driven by the five core features of big data—volume, variety, velocity, veracity, and value—which support the extraction of insights from diverse internal and external data sources.

Furthermore, the adoption of BDA across various sectors in Saudi Arabia has shown clear impact on operational and investment decisions, including sales optimization, marketing and logistics improvements, asset replacement, and expansion into new markets. Companies apply descriptive analytics to track sales trends and customer behavior, predictive analytics to forecast revenues and cash flows, and prescriptive analytics to identify optimal alternatives and enhance logistical efficiency.

Notably, several sectors demonstrated full confirmation (100%) of BDA adoption and utilization, including the Energy**,** Pharmaceuticals**,** Software & Services**,** Financial Services**,** and Consumer Discretionary Distribution & Retail sectors. These industries showcase a strong commitment to leveraging BDA from diverse internal and external sources to enhance MAIQ and decision-making processes, which algin with Saudi Arabia's Vision (2030) that emphasizes digital transformation, data-driven governance, and the strategic use of advanced technologies to enhance organizational performance. Collectively, these analytical practices contribute to improving MAIQ and enabling timely, informed, and strategic decisions—reflecting the growing reliance on BDA across the Saudi business sectors.

Recommendations

Considering the theoretical and empirical findings of this study, the researchers recommend a set of strategic actions to reinforce the role of BDA in improving MAIQ and supporting decision-making within Saudi listed companies. First, investing in digital infrastructure is essential to facilitate the adoption of BDA tools, enabling management accountants to access timely, accurate, and value-added insights. Second, training management accountants in the application of BDA and the interpretation of results aims to enhance MAIQ and, in turn, enable them to better support senior management in making effective operational and investment decisions. Third, greater integration between internal and external data sources is recommended to enhance the depth and relevance of accounting information, particularly in marketing, sales, logistics, asset renewal, market expansion, and other strategic domains. Fourth, it is recommended that companies foster a data-driven decision-making culture by implementing institutional policies that support the systematic use of BDA by management accountants. Additionally, conducting further applied studies to gain deeper and more precise insights into the impact of BDA on MAIQ—particularly in sectors that received limited attention in this study, such as commercial and professional services, consumer durables, pharmaceuticals, and financial services. Finally, future research is needed to explore the impact of artificial intelligence (AI) on MAIQ, considering its increasing potential to improve accounting practices and decision-making.

References

Abdul-Aziz, A. A. (2025). The impact of using accounting information provided by big data on banking risk. Journal of Management Research, 43(2), 1–34.

Abdul-Razek, S. M. (2021). The Role of Internal Auditing in the Governance of Big Data to Improve the Quality of Accounting Information: An Empirical Study. Al-Fikr Al-Muhasabī Journal (Accounting Thought), 25(1), 900–961.

Abou-Zied, M. E. (2025). Using Big Data Analysis in Management Accounting to Improve Financial Forecasting and Strategic Decision Making "A Field Study". Scientific Journal of Financial and Commercial Studies and Research, 6(1, Part 2), 743–793.

Abu-Oudah, B. N. (2021). Impact of Huge Financial Data on the Quality of Accounting Information: From the Viewpoint of the Auditors in the Southern Provinces (Master's thesis). Faculty of Economics & Administrative Sciences, Islamic University of Gaza, Palestine. , pp. 1–132.

Abu-Hilal, M. (2023). Impact of big data analytics on improving accounting information quality: A field study in the Palestinian setting. Zarqa Journal of Research and Humanities, 23(3), 781–799.

Atallah, H. M. M., Ghali, A. A., & Abbas, S. A. (2025). Analyzing the relationship between big data and financial and operational performance: Empirical evidence. Journal of Commercial and Environmental Studies, 16(1), 437–460.

Al-Bakr, H. A. (2022). The role of using big data analytics in activating accounting systems for insurance contracts in Kuwaiti companies. Scientific Journal of Financial and Administrative Studies and research, 13(2), 804–839.

Al-Beltagi, Y. (2020). Role of big data in supporting integration among manufacturers, suppliers, and customers in a just-in-time production system: An empirical study. Journal of Contemporary Commercial Studies, 6(10), 897–950.

Al-Dmour, R., Al-Dmour, H., Basheer, A. E., & Al-Dmour, A. (2025). Impact of AI and big data analytics on healthcare outcomes: An empirical study in Jordanian healthcare institutions. DIGITAL HEALTH, 11, 1–15.

Al-Huwaij, A. M., & Al-Rahal, I. G. (2025). Factors affecting the low success rate in the principles of financial accounting courses "A case study on students who failed the courses at the Faculty of Economics and Commerce in Garabulli". Humanities and Natural Sciences Journal, 6(1), 252–322.

Aljumah, A. I., Nuseir, M. T., & Alam, M. M. (2021). Traditional marketing analytics, big data analytics and big data system quality and the success of new product development. Business Process Management Journal, 27(4), 1108–1125.

Al-Jumaili, A. H. A., Muniyandi, R. C., Hasan, M. K., Koh, J. S. P., & Singh, M. J. (2023). Big data analytics using cloud computing based frameworks for power management systems: Status, constraints, and future recommendations. Sensors, 23(6), 2952.

Al-Mihei, R. A., & Salim, E. A. (2023). The impact of using big data analytics on improving the quality of integrated business reports among companies listed in the Egyptian Financial Market: A field study. Scientific Journal of Financial and Administrative Studies and research, 15(1), 1–45.

Al-Thubaity, R. J., & Al-Mihei, A. A. (2025). The role of big data analytics in improving the quality of integrated business reports: Perspectives of employees in the Saudi telecommunications sector. International Journal of Administrative, Economic and Financial Sciences (IJAEFS), 4(13), 413–472.

Amirhum, G. A. (2020). The impact of Big Data Analysis on financial and operational performance in business organizations (An Empirical Study). Journal of Financial and Commercial Research, 21(2), 150–200.

Barney, J. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99–120.

Barzizza, E., Biasetton, N., Ceccato, R., & Salmaso, L. (2023). Big data analytics and machine learning in Supply Chain 4.0: A literature review. Stats, 6(2), 596–616.

Boddapati, V. N., Bauskar, S., Madhavaram, C. R., Galla, E. P., Sunkara, J. R., & Gollangi, H. K. (2025). Optimizing production efficiency in manufacturing using big data and AI/ML. In Proceedings of the 3rd International Conference on Optimization Techniques in the Field of Engineering (ICOFE-2024) (Nov 15, 2024).

Boukadoum, M. (2021). Measuring the quality of the accounting information system in the economic firm and its relationship to improving capital investment decision-making :An applied study on a construction company named "Powerful InchaatKobra", State of Jijel. Knowledge Aggregates Journal, 7(1), 670–685.

Darwiesh, A., Alghamdi, M., El-Baz, A. H., & Elhoseny, M. (2022). Social media big data analysis: Towards enhancing competitiveness of firms in a post-pandemic world. Journal of Healthcare

Engineering, 2022, Article ID 6967158, 1–14.
Delgosha, M., Hajiheydari, N., & Fahimi, S. M. (2021). Elucidation of big data analytics in banking: A four-stage Delphi study. Journal of Enterprise Information Management, 34(6), 1577–1596.
Elrasheeddy, T. A., & Radhy, F. Z. (2021). The Impact of Using Big Data Techniques on The Effectiveness of Internal Control in Companies Listed on The Egyptian Stock Exchange: An Empirical Study. Scientific Journal for Financial and Commercial Studies and Research, 2(2, Part 2), 591–642.
Falana, G. A., Igbekoyi, O. E., & Dagunduro, M. E. (2023). Effect of big data on accounting information quality in selected firms in Nigeria. International Journal of Research and Innovation in Social Science (IJRISS), 7(3), 789–806.
Farraj, M. H. (2021). Implications of digital system use on management accounting and the challenges faced by management accountants. Journal of Commercial Research, 43(4), 140–181.
Franke, F., & Hiebl, M. R. W. (2022). Big data and decision quality: The role of management accountants' data analytics skills. International Journal of Accounting & Information Management, Advance online publication.
Gao, J. (2022). Analysis of enterprise financial accounting information management from the perspective of big data. International Journal of Science and Research (IJSR), 11(5), 1272–1276.
Gärtner, B., & Hiebl, M. R. W. (2018). Issues with big data. In The Routledge Companion to Accounting Information Systems (pp. 161–172). Routledge.
Ghimire, P., Kim, K., & Acharya, M. (2024). Opportunities and challenges of generative AI in construction industry: Focusing on adoption of text-based models. Buildings, 14(1), 220.
González, G. A., Suárez Hernández, A., Gómez Vásquez, M., Vélez Uribe, J., & Alexis, B. A. (2022). Sustainable manufacturing in the fourth industrial revolution: A big data application proposal in the textile industry. Journal of Industrial Engineering and Management, 15(4), 614–636.
Gusc, J., Bosma, P., Jarka, S., & Biernat-Jarka, A. (2022). The big data, artificial intelligence, and blockchain in true cost accounting for energy transition in Europe. Energies, 15(3), 1089.
Hammad, M. E. H. (2021). The relationship between big data technology use and financial performance under the moderating effect of accounting information system quality: An applied study on companies listed on the Egyptian Stock Exchange. The Journal of Accounting and Auditing of AARU, 10(1), 377–426.
Hänninen, M., Smedlund, A., & Mitronen, L. (2018). Digitalization in retailing: Multi-sided platforms as drivers of industry transformation. Baltic Journal of Management, 13(2), 152–168.
Haoxiang, W., & Smys, S. (2021). Big data analysis and perturbation using data mining algorithm. Journal of Soft Computing Paradigm (JSCP), 3(1), 19–28.
Kabir, M. F., Rana, M. I. C., & Rahman, M. A. (2025). The role of information technology in improving the accuracy and efficiency of accounting data. International Journal on Science and Technology (IJSAT), 16(1), 1–24.
Kahla, A. A. M. (2025). The Role of Big Data Analysis in Rationalizing the Process of Making Financial Decisions "A Field Study on Companies Listed on the Egyptian Exchange". Journal of Alexandria University Administrative Sciences, 62(1), Article 9, 405–453.
Kamel, A. A. B. (2022). Statistical samples in experimental sciences. International Journal of Design and Applied Research (IJDAR), 1(1), 49–74.
Khalifati, J. (2018). The quality of accounting information – Between different accounting systems and the complexity of user needs. Economic Studies Journal, 29(1), 448–460.
Kholmirzaev, U. A. (2022). Improving methodological approaches to financial asset accounting. International Journal of Research in Commerce, IT, Engineering and Social Science, 16(4), 56–62.

Koudia, I., Elhari, K., & Saidi, R. (2023). Toward a new framework of strategic alignment of big data projects: Literature review. EHEI - Journal of Science & Technology, 3(1), 28–49.

Kroon, N., Alves, M. C., & Martins, I. (2021). The impacts of emerging technologies on accountants' role and skills: Connecting to open innovation—A systematic literature review. Journal of Open Innovation: Technology, Market, and Complexity, 7(3), 163.

Liu, R., Wang, Y., & Zou, J. (2022). Research on the transformation from financial accounting to management accounting based on Drools rule engine. Computational Intelligence and Neuroscience, Article ID: 9445776.

Miles, L. A. (2021). An analysis of the combined effects of advanced information technologies and enterprise risk management on organizational performance (Doctoral dissertation, Drexel University, USA).

Mostafa, N. F. (2023). A proposed approach for developing the role of accounting information systems from a perspective of Big Data Analytics for Decision Support purposes An exploratory study of big data environment in Egypt and its relationship to accounting information systems. Scientific Journal of Financial and Commercial Studies and Research, 4(1), 1210–1261.

Muhammed, K. B., & Abu-Shaghfa, F. M. (2025). Accounting problems that hinder the adoption of cloud computing in Libyan industrial companies: A survey study from the point of view of employees of the National Cement Company. Humanities and Natural Sciences Journal, 6(1), 229–252.

Muhammed, H. S. (2022). Big Data: Definition, Importance, Elements. Arab International Journal of Knowledge Management, 1(2), 99–148.

Nissim, D. (2022). Big data, accounting information, and valuation. The Journal of Finance and Data Science, 8, 69–85.

Oesterreich, T. D., & Teuteberg, F. (2019). The role of business analytics in the controllers and management accountants' competence profiles: An exploratory study on individual-level data. Journal of Accounting & Organizational Change, 15(2), 330–356.

Okeke, N. M., & Eze, A. A. (2025). Assessment of the effect of big data analytics on accounting information quality in Nigeria. Journal of Global Accounting, 11(1), 64–83.

Oranefo, P. C., Eke, C., & Egbunike, C. F. (2024). Factors affecting cloud ERP and big data analytics adoption in Nigeria: Perception of accountants in Nigeria. Journal of Comprehensive Business Administration Research, 1(3), 124–134.

Othman, M. A. (2020). Implications of the integration between Big Data Analytics and Enterprise Resource Planning systems on developing the role of managerial accountants and improving of managerial accounting functions. Accounting Thought Journal, 24(3), 1–60.

Perdana, A., Lee, H. H., Koh, S., & Arisandi, D. (2022). Data analytics in small and mid-size enterprises: Enablers and inhibitors for business value and firm performance. International Journal of Accounting Information Systems, 44, 100547.

Rahardja, U., Miftah, M., Rakhmansyah, M., & Zanubiya, J. (2025). Revolutionizing financial services with big data and fintech: A scalable approach to innovation. ADI Journal on Recent Innovation, 6(2), 118–129.

Raj, A., Sharma, V., Rani, S., Balusamy, B., Shanu, K., & Alkhayyat, A. (2023). Revealing AI-based ed-tech tools using big data. In 2023 3rd International Conference on Innovative Practices in Technology and Management (ICIPTM) (pp. 1–6).

Saldana, M. A. R. (2021). Exploring the strategies of decision-makers to improve business decisions using business intelligence and analytics tools (Doctoral dissertation, Colorado Technical University, USA).

Salma, F. (2022). Information technology and Big Data (Application of information systems, business intelligence and cloud computing). Virtual International Symposium on: Big Data and Digital

Economy as a Mechanism for Economic Take-off in Developing Countries – Opportunities, Challenges, and Prospects, Faculty of Economic, Commercial and Management Sciences, University of Martyr Hamma Lakhdar – El Oued, Algeria. December 21, 2022. Retrieved from:
Sebbar, A., Zkik, K., Belhadi, A., Benghalia, A., Boulmalf, M., & El Kettani, E. C. (2022). BDA-enabler architecture based on cloud manufacturing: The case of chemical industry. International Journal of Supply and Operations Management, 9(3), 251–263.
Shabbir, M. Q., & Gardezi, S. B. W. (2020). Application of big data analytics and organizational performance: The mediating role of knowledge management practices. Journal of Big Data, 7(1), 47.
Shahnawaz, M., & Kumar, M. (2025). A comprehensive survey on big data analytics: Characteristics, tools and techniques. ACM Computing Surveys, 57(8), Article No. 196, 1–33.
Shalhoob, H., Halawani, B., Alharbi, M., & Babiker, I. (2024). The impact of big data analytics on the detection of errors and fraud in accounting processes. RGSA: Revista de Gestão Social e Ambiental, 18(1), 1–25.
Shan, S., Luo, Y., Zhou, Y., & Wei, Y. (2019). Big data analysis adaptation and enterprises' competitive advantages: The perspective of dynamic capability and resource-based theories. Technology Analysis & Strategic Management, 31(4), 406–420.
Strang, K. D., & Sun, Z. (2022). ERP staff versus AI recruitment with employment real-time big data. Discover Artificial Intelligence, 2(1).
Su, X., Zeng, W., Zheng, M., Jiang, X., Lin, W., & Xu, A. (2021). Big data analytics capabilities and organizational performance: The mediating effect of dual innovations. European Journal of Innovation Management, 25(4), 1142–1160.
Wang, Y., Wang, T., Zhao, R., & Lun, X. (2022). Research on the construction of accounting informatics system and risk assessment method in big data's era. Discrete Dynamics in Nature and Society.
Wei, X. (2024). Data-driven revolution: Advancing scientific and technological innovation in Chinese A-share listed companies. Journal of the Knowledge Economy, 15(3), 9975–10002.
Wu, Q., & Chao, X. (2022). Automatic correction method of ERP data entry errors based on big data. In 2022 2nd International Conference on Management Science and Software Engineering (ICMSSE 2022) (pp. 75–80). Atlantis Press.
Yang, S., & Zhou, K. (2015). Management issues in big data: The resource-based view of big data. Journal of Management Sciences in China, 18(5), 1–8.
Yoshikuni, A. C., Dwivedi, R., Dultra-de-Lima, R. G., Parisi, C., & Oyadomari, J. C. T. (2023). Role of emerging technologies in accounting information systems for achieving strategic flexibility through decision-making performance: An exploratory study based on North American and South American firms. Global Journal of Flexible Systems Management, 24, 199–218.

Websites Sources:

Aramco, (Rebecca Wallace, 2020). Big data, big insights. Retrieved January 30, 2023, from https://www.aramco.com/en/magazine/elements/2020/big-data-big-insights
Aramco, (2019). Spearheading innovation: Aramco unveils new 'Fourth industrial revolution center'. Retrieved January 30, 2023, from https://www.aramco.com/en/news-media/news/2019/fourth-industrial-revolution-center
Al Rajhi Bank – Fintech Saudi. (n.d.). About Fintech Saudi – Al Rajhi Bank. Retrieved February 1, 2023, from https://fintechsaudi.com/directory/al-rajhi-bank-2/?lang=eg
Shepherd, D. (2020). STC to launch 3 mega data centers in Saudi Arabia. Retrieved January 30, 2023, from https://www.tahawultech.com/vendor/stc-to-launch-3-mega-data-centres-in-saudi-arabia/
SPA (Saudi Press Agency). (2019). Saudi Electricity gains two awards for best media work highlighting

operations sector and best entity applying big data. Saudi Press Agency. Retrieved February 2, 2023, from https://www.spa.gov.sa/w1213176

STC. (n.d.). otn e/o-line. Retrieved February 1, 2023, from https://www.stc.com.sa/content/stc/sa/en/wholesale/capacity/connectivity-services/otn-e-o-line.html.