Impact of Big Data Era, Big Data Analysis on The Quality of Accounting Information

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ABSTRACT
Modern trends with rapid advances in data science, the 4.0 industrial revolution, big data and big data analysis have become an important aspect of modern life. Accounting, auditing and analysis activities have been reshaped in the approach when integrating big data and big data analysis. Therefore, this article is conducted to analyze in depth the profound impacts of big data and big data analysis on accounting fields to assess the impact of big data and data analysis in improving the quality of accounting information. At the same time, the article also mentions the impacts of data and big data analysis on the accounting profession in the new era and thereby proposes some related implications as well as suggests future research directions

Keywords: *Big data, big data analysis, quality of accounting information,*

1. INTRODUCTION

Big data (BD) has become a buzzword in recent years and has made significant strides in many fields, from science to research, from business to government (Ajana, 2015). In 2007, IDC analysts (Fogelman Soulíe & Marcadé, 2008) reported the explosion of the digital universe, creating the need to use new units of measurement for big data such as Exabyte, Zettabyte instead of Megabyte, Terabyte with an estimated 161 Exabytes in 2006. BD is recognized in many different fields and creates many development opportunities (Verma & Bhattacharyya, 2017; Enget et al., 2017) but the concepts of BD are still confusing and quite vague in terms of use cases (Connelly et al., 2016). The accounting and auditing field is no exception in integrating BD into operations with huge data (semi-structured and unstructured). With the huge volume of data, the ability to mine and analyze big data brings accounting operations in processing, detecting fraud and is a powerful tool to protect financial integrity. Through advanced processing tools such as data mining, artificial intelligence, big data analytics (BDA) access to large data sets to detect hidden links, abnormalities, fraud that are difficult to handle with traditional techniques. At the same time, the existing literature provides evidence that traditional auditing has been and is being done to answer the question of audit quality to restore confidence in the effectiveness of the audit process (Power, 2003; Robson et al., 2007) through designed methods such as sampling statistics, audit risk models, and business risk-based assessment. Meanwhile, the important role of BD and BDA in auditing is clear (Wang & Cuthbertson, 2015) with the argument that the use of BDA is appropriate and valuable to ensure audit quality (Dubey & Gunasekaran, 2015, Brown – Liburd et al., 2015; Vasarhelyi et al., 2015). Traditional methods are being disrupted as big data technology infiltrates and permeates every aspect of work, bringing about a leap in efficiency and accuracy. Studies have discussed and analyzed the broad areas of BD, BDA in auditing and concluded that BDA can improve the efficiency and effectiveness of financial statement audits (Cao et al., 2015; Yoon et al., 2015; Gepp et al., 2018) through exploiting sophisticated algorithms and machine learning techniques to be able to identify patterns, trends and anomalies in financial data. Integrating BD into accounting and auditing activities facilitates real-time monitoring and risk assessment, identifying emerging risks and adjusting audit activities accordingly (Sun et al., 2024) and to achieve this, additional technological capabilities and capabilities are required to implement BDA (Enget et al., 2017; Dubey & Gunasekaran, 2015; Brown – Liburd et al., 2015; Appelbaum et al., 2018).

Meanwhile, the quality of accounting information is an important issue in recent times compared to the financial crises of organizations and the negative impact on users of financial statements. Accounting information is an important basis for investors to make decisions related to the organization's strategic plans and policies. Although integrating big data into accounting activities brings many benefits, one of the challenges that the unit must face is the difficulty in processing and using information. Therefore, this study was conducted to evaluate the role of big data analysis on accounting data as well as the impact of big data analysis on the accounting profession in the new era - the era of big data technology.

In this study, the author used the systematic literature review method according to the PRISMA 2020 method. The study used this method to identify, evaluate and synthesize research data comprehensively to collect a complete picture of the research problem (Petticrew & Roberts, 2008; Cook et al., 1997). The PRISMA 2020 method solves the weaknesses in systematic literature reviews (Agusti & Orta-Pérez, 2022). The author followed the steps suggested by PRISMA 2020 such as: (1) step 1: Identify the research problem; (2) step 2: identify the research question; (3) step 3: identify keywords; (4) step 4: identify and search for documents by keywords; and (5) Step 5: reading and accessing publications; and Step 6: publishing the findings. Therefore, in this study, the important keyword groups used are "big data"; "big data analysis", "accounting information quality", "accounting profession". At the same time, the searched documents must be journals in the prestigious journal category.

Therefore, although the study only provides literature reviews, the study still has the following contributions: (1) Providing an assessment of the role of big data, big data analysis; (2) The impact of big data and big data analysis on accounting data and (3) Assessing the impact of big data, big data analysis on the accounting profession in the future.

2. THEORETICAL FRAMWORK

2.1. Concepts

Big data concept: Big data (BD) and big data analytics (BDA) have been defined by researchers (Dagiliene & Kloviene, 2019). The concept of BD is quite popular, but the concept is quite new, and its origin is uncertain (Gandomi and Haider, 2014). The term big data is a huge dimension of structured and unstructured data originating from many sources (Ernst & Young, 2014). Structured data refers to organized information stored in relational databases of spreadsheets, while unstructured data refers to data from unorganized sources such as photos, videos, presentations, social media posts but makes up 85% of the world's information today (Mills et al., 2012). According to Laney (2001), BD has 3 characteristics: volume (large quantity), velocity (high-speed processing), variety (heterogeneous data). Meanwhile, Gartner, Inc. has defined big data as assets with large, high-velocity and diverse information, requiring innovative, cost-effective forms of information processing to enhance insights and decision making. Similarly, Tech America Foundation defines big data as a term describing large volumes of high-velocity, complex and changing data, requiring advanced techniques and technologies to enable collection, storage, distribution, management and analysis of information (TechAmerica Foundation's Federal Bid data commission, 2012). Volume refers to the size of the data and is measured in Terabytes, Petabytes. Data larger than Terabyte is considered big data (Schroeck et al., 2012) and Terabyte stores 1500 CDs or 220 DVDs or about 16 million photos stored on Facebook and a Petabyte is equal to 1,024 Terapytes. However, Gadonmi & Haider (2015) argue that the standard of big data volume is relative and varies depending on factors. Therefore, the definition of big data also depends on the industry, and it is impractical to define a specific threshold for big data volume. Variety is the second characteristic of big data. Data is structured, semi-structured and unstructured with the structured portion accounting for only 5% of the total data (Cukier, 2010). Text, images, audio and video are examples of unstructured data while language with XML, a text language for exchanging data on the web is semi-structured data (Gadonmi & Haider, 2015). A third characteristic used to define big data is the speed of data. The rate of data generation has reached unprecedented levels due to the proliferation of digital devices such as Wal-Mart processing more than a million transactions per hour (Cukier, 2010). This is why this huge source of data cannot be processed through traditional data management systems. Therefore, big data technology comes into play and allows companies to create real-time from large volumes of data. However, as larger amounts of data became available, the concept of big data was expanded and developed to include additional dimensions such as authenticity (IBM, 2019); value (Anuradha, 2015), variability (Fan & Bifet, 2013) or also comprehensiveness (Mayer-Schönberger & Cukier, 2013), extensibility (Warren & Marz, 2015) and complexity (Perry, 2017).

Big data analytics concept: Data analytics are the processes by which insights are extracted from operational, financial, and other forms of electronic data within or outside an organization (KPMG, 2016). The three distinct characteristics of data analytics are data, analysis, and presentation of results that deliver commercial value (Gantz & Reinsel, 2012). According to Cao et al. (2015), big data analytics is the process of examining, cleaning, transforming, and modeling big data to discover and communicate useful information and patterns, suggest conclusions, and support decision making. Meanwhile, Mikalef et al. (2015) argue that data analytics is the process of visualizing and presenting data using tools, infrastructure, and methods to gain insights from big data. Thus, to make decisions, managers need information that has been processed using various techniques such as statistical and quantitative analysis as well as explanatory and extrapolation models to investigate structured and unstructured data. At the same time, data analysis is used by managers to evaluate performance (Dai et al., 2010) or as tax experts use BDA to detect tax fraud (DaBruzzo et al., 2013)

2.2. The role of big data, big data analytics

Big data and big data analytics play a significant role in economic activities. Studies (Sun et al., 2018; Salijeni et al., 2019; El Hadi, 2018; Quashi & Al – Awadi, 2018; Janssen et al., 2017) acknowledge that big data has several important aspects: (1) Big data with huge volumes of data, full of information should provide a comprehensive overview of the company and develop business strategies through big data analytics; (2) Provide high competitive advantages for businesses; (3) Big data greatly supports businesses in creating effective integrated reports through ERP tools with both financial and non-financial data; (4) Big data and big data analytics help businesses manage risks effectively, explore many opportunities to reduce costs.

Companies can better understand customer behavior through big data analysis, thereby taking appropriate corrective measures to increase customer satisfaction, increase business efficiency, increase sales, and increase the ability to innovate in the product development process (Lotaby, 2018). At the same time, big data analysis helps increase the value of financial information on reports when deciding on investment portfolio allocation (Aldridge, 2019).

Big data contributes to the development of management control systems and improves the efficiency of the budgeting process (Janvrin & Waston, 2017), improving the quality and relevance of accounting information, thus increasing transparency. At the same time, big data creates and improves accounting standards, helping accountants provide accurate and useful information in a global, dynamic and growing economy.

3. THE IMPACT OF BIG DATA, BIG DATA ANALYTICS ON THE QUALITY OF ACCOUNTING INFORMATION

Big data does not affect the role of providing useful information to internal and external stakeholders provided by accountants, but big data can affect accounting work (Janvrin & Waston, 2017). Because there is an increase in financial data such as video data, image data, audio, email, accountants need to be aware of the impacts of big data on accounting, specifically:

3.1. Big data, big data analytics impact accounting data processing

With the development of BD technology, accounting data sources have changed significantly compared to the beginning. According to the traditional accounting perspective, accountants rely on data generated within the enterprise to process, analyze and check and are the foundation for creating key data related to daily financial transactions, inventory turnover, employee salaries, fixed asset depreciation costs (Yang, 2023) and thereby providing a clear view of the operating status, finance and cash flow of the enterprise. However, with the strong development of BD, external data has become a quite important source of information for accounting activities to make appropriate decisions. Specifically, external data is data related to information about the industry, competitors, market price fluctuations, and consumer behavior trends. This data provides invaluable information about the market and competition, helping businesses gain a deeper understanding of business opportunities and related challenges to make informed decisions through the analysis of these data sets (Sun & Associates, 2024). Therefore, it places great demands on accountants in processing accounting data. Accountants must change the way they process and adjust their speed to respond to real-time data, ensuring timely provision of information in a rapidly changing market context. Therefore, big data poses a huge change for accountants, requiring them to closely monitor the constant fluctuations of data, optimize analysis methods, and maintain the timeliness and accuracy of accounting data throughout the entire accounting system.

3.2. Big data, big data analytics impact accounting standards and systems

In the context of the 4.0 industrial era, conventional accounting standards and systems for processing and analyzing data can only handle small, well-defined data sets proficiently and effectively. When big data explodes exponentially in volume and complex structure with a huge unstructured data warehouse (text, images and videos), accountants are not capable of processing it to honestly describe the financial situation and performance of the business in the usual way. At the same time, issues related to data ownership, usage rights, and privacy have not been addressed in standards or in traditional accounting systems. Therefore, a requirement in the big data era to create conformity is that traditional accounting standards and systems need to be adjusted and upgraded with the support of new techniques in BD technology. Through the powerful data mining and analysis power of big data technology, valuable knowledge has been collected from huge files to provide comprehensive support for adjusting accounting standards and systems. In addition, the implementation of big data technology will quickly access information on

financial statements, detect abnormalities and prevent fraudulent behavior, ensuring greater integrity and transparency in financial statements.

3.3. Big Data, Big Data Analytics Impact Accounting Security and Privacy

Security issues, against unauthorized access and data are important issues (Borky & Bradley, 2018). While BDA can revolutionize accounting by providing improved tools for decision making and streamlined processes, there are still obstacles and concerns regarding its use (Bose et al., 2022). BDA can support better accounting decision making, increased operational efficiency, and more accurate predictive analytics (Novita & Anissa, 2022). However, integrating BDA into accounting poses challenges related to data privacy and security risks because when integrating BD, accountants must handle a large amount of sensitive financial information (Ikegwu et al., 2022). In an environment with a huge amount of data, the scope of accounting data is no longer the usual financial statements and ledgers but will include a lot of data such as customer transaction records, supply chains, market analysis, etc., all of which have commercial value. The potential risks increase as the value of data skyrockets, so the possibility of unauthorized access and leakage of internal confidential information increases. Therefore, businesses need to take practical and effective measures to create data security barriers related to accounting information, and data encryption technology becomes an important strategy. Delegating separate access rights to the system for each different user and limiting access to sensitive data is the basis for reducing risks in the context of big data, protecting the inherent integrity of accounting data.

4. THE IMPACT OF BIG DATA, BIG DATA ANALYTICS ON THE ACCOUNTING PROFESSION

The role and tasks of accounting are greatly affected by big data. Big data integrated into all business sectors will provide opportunities for accountants to move into new roles – strategic roles (Cockcroft, 2018) and decision-making roles. With the strong development of big data, big data analysis, accounting becomes an important link between analysts and senior management. However, big data and big data analysis also pose risks to the accounting profession because more than 94% of accounting functions will be automated by 2025 (Richins et al., 2017) but this can also increase the value of accounting through the function of analyzing financial statement data to assess the performance of the company. Therefore, to meet the requirements of being able to use unstructured data, accountants need to possess big data analysis skills. Therefore, future accountants who are still in university need to be taught knowledge about big data analysis, learn new techniques to be able to access and process big data best.

Some studies have been conducted to analyze the role of accounting in the new era - the era of big data. Accountants have very little understanding of the steps needed to turn big data into useful data (Coyne et al., 2018) while the demand for big data analysis is very high. Accountants need to be aware of the importance of big data by improving their ability and skills to interpret and analyze to create more value for the organization. Accountants need to develop the accounting profession with an increased role in the aspect of big data management, the ability to identify information for decision making. At the same time, big data also changes the role of financial accounting because big data provides opportunities for accountants to take on a more strategic role in the future through the collection and analysis of financial information and its application to non-financial information. Big data analysis has a high ability to explain information on company reports, so the role of accountants will increase (Al – Htaybat & Alberti, 2017). In addition, according to Gamagea (2016), the position of accountants in the new era has management statistics skills and big data analysis skills, so they will receive the highest salary in business organizations. Therefore, accountants need to be aware of the changes created by big data such as cloud computing, social media, cybercrime, digital services and artificial intelligence. For this reason, accounting training programs should include the development of skills and knowledge related to data generation, data management and data analysis, data reporting, and data security (AACSB, 2019).

5. CONCLUSION

The advent of the big data era has profoundly reshaped the accounting landscape, bringing with it significant opportunities and challenges. With the enormous impacts of big data and big data analytics, businesses, governments and relevant agencies need to take advantage of the inherent advantages of big data technology to promote development and innovation in the accounting field. In addition, to meet the new trend, it is necessary to strengthen accounting standards and systems, strengthen security and privacy measures, and enhance the capacity and qualifications of accountants. Furthermore, accounting schools need to integrate courses related to information technology skills and knowledge to be able to process, store, manage and analyze data appropriately. At the same time, the findings in this study are also a suggestion for further research in the future.

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