The effect of big data on financial reporting quality

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CHRONICLE	ABSTRACT
	The current manuscript aimed to explain the impact of big data on the financial reporting quality of the industrial sector in Jordan. To achieve the manuscript goals and validate hypotheses, a field study was conducted by distributing a questionnaire to 325 financial managers in industrial companies listed on the Amman Stock Exchange during a specific period. Gathered data were analyzed using structural equation modeling (SEM). The manuscript concluded that the big data dimensions, including variety, volume, and velocity, had a positive impact on financial reporting quality. Therefore, a set of recommendations were provided to managers of the industrial companies in Jordan to put in place an extensive data governance system to as-sure data quality, security, privacy, and compliance. To ensure the integrity and dependability of financial reporting, define data ownership, create data quality standards, and develop processes for data access, use, and preservation.

1. Introduction

High-quality financial reporting is essential for stakeholders such as investors, lenders, and regulators to make rational decisions and evaluate a company's financial health. Financial reporting quality refers to how accurately financial information depicts a company's financial performance, company situation and cash flows (Bai et al., 2023). Hsu and Yang (2022) claimed that increasing financial reporting quality is an effort that necessitates a continual improvement strategy and extensive monitoring. Additionally, accounting professionals must keep up with modifying accounting standards and regulatory requirements, such as Generally Accepted Accounting Principles (GAAP) and International Financial Reporting Standards (IFRS), in order to take the most appropriate measures to ensure the highest standards of financial reporting quality (Wahlen et al., 2022). Accounting has recently seen a dramatic transition as a result of the enormous amount of structured and unstructured data that are collected from different sources, including financial transactions, social networks, and interactions with customers (Faccia et al., 2022). Considering its tremendous speed, diversity, and complexity, this data is challenging to handle and evaluate using traditional methods (Alrashidi et al., 2022). Big data offers huge potential to improve financial decision-making, risk management, fraud detection, and operational efficiency (Sihombing et al., 2023). Accountants could extract important insights from massive data sets using advanced analytics and data mining techniques, resulting in more appropriate and timely financial reporting (Xie, 2022). However, Nissim (2022) pointed out that the advantages of big data are accompanied by challenges, as accountants must be responsible for data privacy and security while also complying with regulatory frameworks such as the General Data Protection Regulation (GDPR) to maintain important financial data confidentially.

The emergence of big data presents both benefits and difficulties for Jordan's industrial sector, notably in terms of financial reporting quality. This industry is critical to the country's economy, contributing to job creation, exports, and overall economic growth. Stakeholders rely on reliable and accurate financial information in their decisions. The industrial sector creates an abundance of information from many sources, such as manufacturing processes, supply chain activities, and market trends, so managing and evaluating it becomes complex. As a result, concerns such as data quality, data discrepancies, and data integration challenges may arise, undermining the dependability and accuracy of financial information presented in reports. However, big data provides the potential to improve financial information of relevance to internal and external users through advanced analytical tools and capabilities.

Accordingly, this investigation will investigate the impact of big data on financial reporting quality in Jordan's industrial sector. It will evaluate the challenges and opportunities involved with incorporating big data into financial reporting procedures, inquire about its impacts on data quality, timeliness, and accuracy, and recommend ways for overcoming hurdles. The findings of this study will give useful insights to Jordanian industrial enterprises, regulators, and policymakers, allowing them to improve the quality of financial reporting in the age of big data.

2. Literature Review

2.1 Big data

The logical decision-making process used to improve the company's performance, particularly its operational and financial performance, is built on information. According to systems theory, data is the raw material for information creation since it is subjected to categorization, filtering, and analysis procedures to generate comprehensible and perceptible outcomes (Sun, 2023). Big data is the distinguishing feature of the business environment of today. Big data is described as an extremely vast and complicated collection of structured and unstructured data that are difficult to manage, handle, or analyze using typical data processing methods (Sihombing et al., 2023). According to Hasan et al. (2020), big data is knowledge that is too massive, complicated, and dynamic for traditional technologies, skills, and infrastructure to process in a reasonable amount of time. Whereas Xie (2022) suggested that big data refers to a new generation of technologies and architectures that enable the high-speed acquisition, discovery, and/or analysis of huge amounts of a variety of data. Big data contains enormous amounts of data created by numerous sources such as social media, sensors, internet transactions, and so on. Ghasemaghaei and Calic (2020) argued that big data refers to the volume, velocity, and variety of information assets that necessitate novel and cost-effective information processing methods to increase insight and decision-making effectiveness. Therefore, big data has three fundamental attributes:

- Volume: big data contains huge amounts of data that outnumber the processing capabilities of traditional database systems. This information can come from an array of sources, including websites, sensors, machines, and other digital means.
- Velocity: big data is created and gathered at a rapid pace. It contains data streams that must be processed and analyzed in real-time or semi-real time to gain insights and make smart choices.
- Variety: big data comprises a wide range of data forms and formats, including structured data (e.g., databases), semi-structured data (e.g., XML files), unstructured data (e.g., text documents, videos, photos), and streaming data (e.g., social media feeds), which complicates data analysis.

2.2 Financial reporting quality (FRQ)

The extent to which the financial statements appropriately represent the company's financial condition, performance, and cash flows reveals the financial reporting quality. It refers to the validity, transparency, and dependability of financial information displayed in the company's financial statements and reports that are relevant to various stakeholders (Muttakin et al., 2020). The International Accounting Standards Board (IASB) defines financial reporting quality as the extent to which financial statements represent the economic essence of transactions and events and give vital information to users for them to make economic decisions (Chen & Gong, 2019). Likewise, it is defined by the Financial Accounting Standards Board (FASB) as the credibility, completeness, confidence, and transparency of financial information stated by an entity in its financial statements (Hairston & Brooks, 2019). These concepts underline the importance of financial statements in portraying the economic substance of transactions, assisting decision-making, and instilling trust in stakeholders in the information reported.

Abed et al. (2022) stated that the financial reports quality revolves around four characteristics that enable users and stakeholders to make the appropriate financial decisions. (1) Relevance is the ability of accounting information to influence user decisions by assisting them in making forecasts, confirming, or correcting past assumptions, or providing feedback. (2) Financial information that is honestly represented describes the transactions and events that it purports to represent. Complete, neutral, and error-free representation results in faithful representation. (3) Understandability is the level of clarity of financial information that allows it to be recognized by users with a basic understanding of business and economic activity. (4) Comparability is the qualitative attribute that allows users to discover and comprehend similarities and differences between several sets of financial information.

2.3 Big data and financial reporting quality

Big data adds new sources of information by boosting analytical skills and the speed and quality of financial reports. In a field study of 154 academics, financial analysts, accountants, and experts in the field of big data analysis in the Kingdom of Saudi Arabia for the year 2019, Younis (2020) revealed that while business organizations face numerous obstacles when analyzing data, big data analytics plays a significant part in achieving high competitiveness for enterprises, enhancing the quality of accounting information, and providing appropriate information that helps rationalize decisions. Using semi-structured interviews with 127 auditors, financial analysts, and accountants from Canadian auditing and accounting firms, it was discovered that big data analysis has a significant impact on improving the quality of financial reports, as big data improves accounting reports and expert judgment by providing professionalism (Saleh et al., 2022). Furthermore, by studying 139 responses from employees at Jordanian telecommunications businesses, Zraqat (2020) sought to discover the link between big data and financial reporting quality through the moderating effect of business intelligence. The study concluded that the usage of big data has an effect on increasing financial reporting quality, as business intelligence contributes to enhancing the impact of big data on financial reporting quality. Accordingly, research hypotheses could be formulated to include:

Hypotheses 1 (H1): *Variety has an impact on financial reporting quality.*
Hypotheses 2 (H2): *Volume has an impact on financial reporting quality.*
Hypotheses 3 (H3): *Velocity has an impact on financial reporting quality.*

Fig. 1 depicts the conceptual model of the research and the hypotheses that the researchers are trying to evaluate and verify.
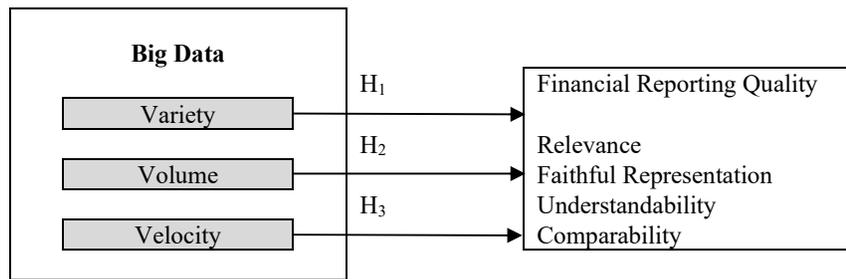

Fig. 1. Research model and hypotheses.

3. Research Methods

3.1 Data collection

The cross-sectional design was used to collect information regarding the impact of big data on the financial reporting quality of the industrial sector in Jordan. This design is based on collecting primary data using a questionnaire distributed to the study population during a specific period (Mukherjee, 2019). Accordingly, an electronic questionnaire was designed and sent via e-mail to 380 financial managers in industrial companies listed on the Amman Stock Exchange during the period from May 9, 2023, to June 7, 2023. 347 questionnaires were answered, however, they included 22 responses with a duplicate pattern that was removed from the responses received. Therefore, the final sample of this search included 325 responses which constitute 85.5% of the overall questionnaires sent.

3.2 Measures

The electronic questionnaire used in the current research was composed of an introduction and two parts. The introduction used explains the objectives of testing the impact of big data on financial reporting quality and the author's obligation to research ethics. On the other hand, the research parts included 25 items to measure the exogenous and endogenous constructs of the research. Big data was the exogenous construct of the research containing 13 items corresponding to Ghasemaghaei and Calic (2020). This construct was formed through three dimensions that express the characteristics of big data: four items for variety, five items for volume, and four items for velocity. Financial reporting quality was the exogenous construct of the research composed of 16 items compatible with Abed et al. (2022). This construct was formed through four dimensions: five items for relevance, four items for faithful representation, three items for understandability, and four items for comparability.

4. Research Findings

4.1 Validity and reliability

Confirmative factor analysis (CFA) is the statistical technique used to check the validity and reliability of big data and financial reporting quality constructs. CFA is a type of structural equation modelling frequently utilized when researchers have a particular theory or previous comprehension of the latent constructs and their interactions. Moreover, it determines if the observed data matches their theoretical assumptions. Table 1 provides insight into the results of the validity and reliability of the measurement model associated with big data and financial reporting quality.

Table 1
Measurement model assessment.

	1	2	3	4	5	6	7
1. Variety	**0.718**						
2. Volume	0.251	**0.760**					
3. Velocity	0.314	0.471	**0.742**				
4. Relevance	0.531	0.514	0.482	**0.767**			
5. Faithful Representation	0.662	0.552	0.551	0.612	**0.763**		
6. Understandability	0.471	0.681	0.538	0.604	0.553	**0.788**	
7. Comparability	0.582	0.568	0.625	0.582	0.571	0.583	**0.750**
Variance Inflation Factor	1.664	1.871	1.535	---	---	---	---
Factor Loadings Range	0.642-0.814	0.671-0.827	0.712-0.764	0.705-0.813	0.663-0.834	0.768-0.811	0.722-0.781
Average Variance Extracted	0.516	0.578	0.551	0.588	0.582	0.621	0.563
Maximum Shared Variance	0.347	0.366	0.341	0.426	0.406	0.488	0.469
Composite Reliability	0.809	0.872	0.830	0.877	0.847	0.831	0.837

Table 1 results reveal a robust connection between the observable variables and their latent constructs based on factor loadings that were within the range between 0.642 to 0.834, which is more than the lower limit of 0.50. The average variance extracted (AVE) values were greater than the least limit of 0.50, which confirms that convergent validity was achieved. Besides, it was proved that the discriminant validity of the measurement model was achieved based on the fact that the values of AVE were greater than the values of maximum shared variance (MSV), along with the square root values of AVE exceeding the minimum of 0.70 and the correlation values among constructs (AL-Zyadat et al., 2022). The results demonstrated that the values of these coefficients were within the range of (0.809-0.877), indicating that they exceeded the 0.70 thresholds used for composite reliability. On the other hand, the results of the above table verified that the exogenous constructs, i.e., big data dimensions, were free from multicollinearity since their values of the variance inflation factor (VIF) were extremely less than the upper threshold of 5.

4.2 Hypotheses testing

Structural equation modeling (SEM) was used for testing how big data impacts financial reporting quality. This technique allows the testing of hypotheses about direct and indirect effects between latent constructs (Hair et al., 2019). Moreover, they provide different fit indicators to assess the goodness of the assumed model to the observed data. Fig. 2 illustrates the structural model used for tracking the impact of big data on financial reporting quality.
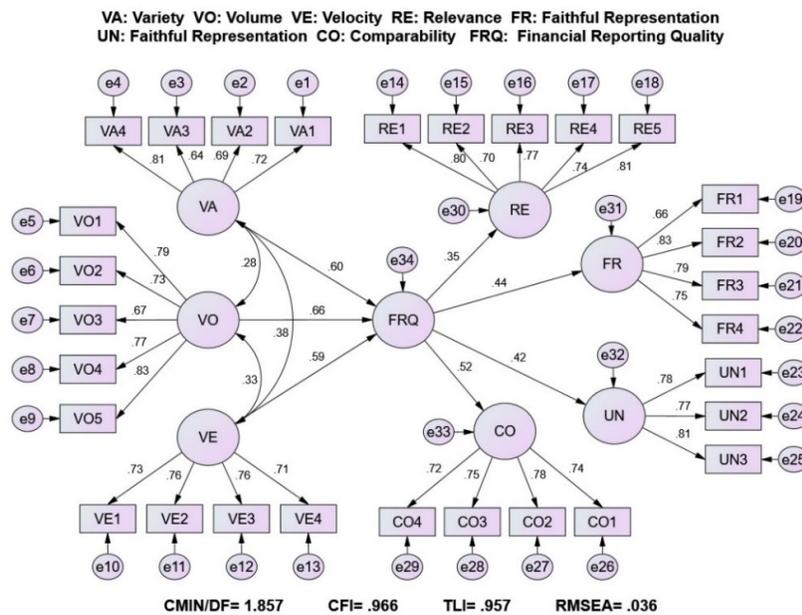

Fig. 2. SEM for testing the impact of big data on financial reporting quality.

The results of Fig. 2 demonstrated that the chi-squared test (CMIN/DF) obtained a value of 1.875, which is less than the highest accepted value of 3. Both the comparative fit index (CFI) and the Tucker-Lewis index (TLI) had values greater than the lower threshold of 0.90. Moreover, the results indicated that the root mean square error of approximation (RMSEA) was 0.036, thus it did not surpass the upper value of 0.80. Accordingly, the previous results were considered evidence of the fitness of the structural model to test the impact of internal audit governance factors on risk-based auditing. Table 2 lists the results

of the path coefficients extracted to evaluate the hypothesized impacts between big data dimensions and financial reporting quality.

Table 2
Path coefficients for the relationship between big data and financial reporting quality.

Relationship	B	S.E	Beta	t	p
Variety→ FRQ	0.644	0.060	0.605	10.73	0.000
Volume→FRQ	0.671	0.058	0.662	11.57	0.000
Velocity →FRQ	0.611	0.061	0.593	10.02	0.000

The results presented in Table 2 indicated support for research hypotheses related to the impact of big data dimensions, i.e., variety, volume, and velocity, on financial reporting quality. Moreover, the results showed the size of the discrepancy in the effect between these dimensions, where the greatest effect was for volume(β= 0.662, t= 11.57, p= 0.000), followed by variety (β= 0.605, t= 10.73, p= 0.000), and finally velocity (β= 0.593, t= 10.02, p= 0.000).

5. Conclusions and recommendations

The results of the research demonstrated that big data, as indicated by variety, volume, and velocity, has a beneficial impact on financial reporting quality for Jordan's industrial sector. Even though the industrial sector is different, this conclusion aligns with Alrashidi et al. (2022). Thus, the industrial companies listed on the ASE rely on more complete and reliable financial reporting based on an extensive amount of data on the sector's numerous operations, including manufacturing systems, supply chains, and consumer contacts. The Jordanian industrial sector may acquire important insights into financial performance, operational efficiency, and recent market developments by using the benefits of big data. This enables more informed strategic and operational decision-making, which leads to improved financial performance and disclosure techniques. Moreover, big data may assist in the enforcement of financial rules and reporting obligations. Financial reports can detect possible compliance concerns, monitor compliance with rules, and provide timely and accurate reports for regulatory agencies by processing huge volumes of data.

A series of proposals might be explored to harness the beneficial influence of big data on financial reporting quality in Jordan's industrial sector. First, build a robust data architecture that allows for efficient data gathering, storage, integration, and analysis. Handle the massive amounts of data created in the industrial sector, this may entail modernizing IT systems, building data warehouses, and using cloud-based solutions. Second, put in place an extensive data governance system to assure data quality, security, privacy, and compliance. To ensure the integrity and dependability of financial reporting, define data ownership, create data quality standards, and develop processes for data access, use, and preservation. Third, develop systems for monitoring and evaluating the quality and accuracy of data used in financial reports on a regular basis. Implement data validations, conduct frequent audits, and resolve any data quality concerns as soon as possible to ensure the integrity of financial information. Finally, to make use of modern analytics approaches for financial reporting, create a competent team of data analysts or cooperate with data analysis service providers. To extract valuable insights from large data, and develop skills in areas such as data mining, machine learning, and predictive analytics.

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