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The Data Revolution: An Analysis of the Transformation of Efficiency and the Challenges of Automation in Financial Reporting in the Digital Era

Zefanya Puan Palentek[1], Bertha Beloan[2], Surya Anggraeni Sayitno[3]

[1,2,3] Accounting Study Program, Universitas Kristen Indonesia Paulus, Makassar

Email: bertha@ukipaulus.ac.id

Abstract

The data revolution has changed how organizations collect, process, and present financial information. This study analyzes how cloud accounting, Enterprise Resource Planning (ERP), Big Data, Artificial Intelligence (AI), and Robotic Process Automation (RPA) transform financial reporting, how automation contributes to efficiency, and the challenges of its implementation. A qualitative literature review with thematic analysis is employed, grounded in the Technology Acceptance Model (TAM) and the DeLone & McLean Information Systems Success Model. The findings show that automation improves reporting speed, accuracy, productivity, and transparency. However, implementation faces challenges of data security, cyber threats, data quality, human resource readiness, and reduced monitoring after automation. User acceptance is driven more by perceived ease of use and attitude toward technology. Automation should therefore support, rather than replace, the professional role of accountants.

Keywords: data revolution; automation; financial reporting; efficiency; digital transformation

INTRODUCTION

The development of digital technology over the past two decades has turned data into one of the most important resources in economic activity. This phenomenon, known as the data revolution, is marked by a surge in the volume, velocity, and variety of data generated by business transactions, connected devices, and digital platforms. The International Data Corporation projected that the volume of global data (the global datasphere) would grow from around 33 zettabytes in 2018 to 175 zettabytes in 2025 (Reinsel et al., 2018). Growth of more than fivefold in seven years shows that organizations no longer lack data; instead, they face new challenges in managing, filtering, and converting data into reliable information for decision-making.

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In accounting, the data revolution is changing the nature of the information on which reporting is based. Vasarhelyi et al. (2015) explain that Big Data broadens the sources of accounting information from structured transaction data to more diverse data, which calls for changes in measurement, disclosure, and auditing. Sun et al. (2024) affirm that the Big Data era opens up opportunities for deeper analysis, but also raises issues of privacy, security, and data integration.

The same phenomenon is occurring in Indonesia. The Indonesian Internet Service Providers Association (Asosiasi Penyelenggara Jasa Internet Indonesia, 2024) recorded 221,563,479 internet users, or 79.5% of the total population, in 2024, up from 64.8% in 2018. High internet penetration expands digital transactions and encourages organizations, including micro, small, and medium enterprises (MSMEs), to adopt digital accounting systems. Anjarwati et al. (2023) demonstrate that accounting digitalization has a positive effect on efficiency and cost reduction among MSMEs in the city of Bandung.

More specifically, the data revolution has given rise to a range of technologies that automate accounting processes, namely cloud accounting, Enterprise Resource Planning (ERP), Big Data analytics, Artificial Intelligence (AI), and Robotic Process Automation (RPA). Moll and Yigitbasioglu (2019) show that internet-based technologies such as cloud computing, Big Data, blockchain, and AI have the potential to change accountants' work fundamentally, from record-keeping to the provision of information for management. Kokina and Davenport (2017) add that AI-based automation has begun to take over structured and repetitive tasks in accounting and auditing. Empirical data reinforce this trend: a Gartner (2024) survey of 121 finance leaders found that 58% of finance functions were using AI in 2024, a sharp rise from 37% in 2023, with the most common uses being intelligent process automation (44%) and anomaly and error detection (39%).

These changes have a direct impact on the accounting profession. The World Economic Forum (2025) places bookkeeping and payroll clerks, as well as accountants and auditors, among the jobs projected to decline fastest by 2030 as a result of broadening digital access and AI. Alghafiqi and Munajat (2022) conclude that AI, Big Data, and machine learning require accountants to upgrade their competencies because routine work is increasingly easy to automate.

On the one hand, automation promises significant efficiency gains. Aditiarno and Rosalina (2025) report that the application of AI in financial reporting can increase operational efficiency by up to 85% through the automation of routine work such as data entry, reconciliation, and report preparation. Nugroho et al. (2024) find that accounting digitalization enables real-time access to financial data, thereby improving efficiency and transparency. On the other hand, automation carries considerable risks. Ashraf (2025),

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analyzing public companies, finds that automation in the financial reporting process is associated with fewer material weaknesses in internal control, but that monitoring of the reporting process declines after automation, and when control failures do occur, their impact is more material. This finding points to an efficiency paradox: technology that strengthens controls can at the same time create a false sense of security that weakens monitoring.

The urgency of this issue becomes even clearer when it is related to the state of cybersecurity in Indonesia. The National Cyber and Crypto Agency (Badan Siber dan Sandi Negara, 2024) recorded 403,990,813 traffic anomalies throughout 2023, as well as 1,674,185 data exposure findings affecting 429 stakeholders in Indonesia. Because digital accounting systems store sensitive financial data, these threats have direct implications for the reliability of financial statements. Beyond security, Gartner (2024) identifies inadequate data quality and a shortage of technical talent as the main barriers to AI adoption in the finance function. This means that the benefits of automation do not arise automatically, but depend on data quality, system security, and the readiness of human resources.

Previous studies have examined various aspects of this phenomenon. Natanael et al. (2023) and Sofa (2023) conclude that AI improves the efficiency, productivity, and accuracy of accounting, but that its adoption is hindered by infrastructure, cultural resistance within organizations, and regulations that are not yet ready. Lusiana (2024) shows that technology, AI, and digitalization reduce errors and increase the accuracy and speed of reporting. Fajariah and Wardana (2025) demonstrate that ERP implementation and audit quality have a positive effect on the presentation of financial statements. With regard to user behavior, research based on the Technology Acceptance Model (TAM) has produced mixed results: Sugahara et al. (2024) emphasize the importance of perceived usefulness in the acceptance of cloud accounting, whereas Tikaromah et al. (2024) find that perceived usefulness has no significant effect on the intention to use accounting information systems, unlike perceived ease of use and attitude toward use.

Based on this review, several research gaps can be identified. First, most studies discuss technologies separately, for example only AI, only ERP, or only cloud accounting, and therefore do not portray the data revolution as a driver of the transformation of financial reporting as a whole. Second, studies in Indonesia tend to highlight efficiency benefits, while control risks such as the decline in monitoring after automation found by Ashraf (2025) have received little discussion. Third, findings on the factors behind user acceptance remain inconsistent, and few studies combine the technology acceptance perspective (Davis, 1989) with the information systems success perspective (DeLone & McLean, 2003) to assess the success of financial reporting automation. Moll and

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Yigitbasioglu (2019) also stress that the impact of technology on accountants' day-to-day work still receives too little academic attention.

This topic is therefore important to study. Theoretically, this study synthesizes scattered findings into a framework that combines TAM and the DeLone & McLean model, so that the success of automation is assessed in terms of system quality, information quality, user acceptance, and net benefits, not only process speed. Practically, the results can serve as a reference for organizations, regulators, and accounting educators in designing automation that is both efficient and secure. This study aims to: (1) analyze how the data revolution and digital technology change the process of preparing financial statements; (2) analyze the contribution of automation to the efficiency of financial reporting; and (3) identify the challenges of implementing automation, including data security, control, human resource readiness, and user acceptance.

LITERATURE REVIEW

The Data Revolution and Big Data in Accounting

The data revolution is a fundamental change in the way data are generated, stored, processed, and used, commonly characterized by the dimensions of volume, velocity, variety, veracity, and value. Big Data broadens the scope of accounting information and requires adjustments to measurement and audit methods (Vasarhelyi et al., 2015), but must be balanced by data governance and information security (Sun et al., 2024).

Automation of Financial Reporting

Financial reporting automation is the use of technology to carry out some or all of the processes of collecting, processing, checking, and presenting financial data while reducing manual work. ERP integrates data across functions, cloud accounting provides access to accounting information over the internet, RPA automates routine rule-based tasks, and AI extends automation to pattern recognition such as anomaly detection (Kokina & Davenport, 2017; Moll & Yigitbasioglu, 2019). The resulting efficiency is reflected in the speed of report preparation, fewer errors, cost savings, and productivity, although professional judgment and oversight still require humans (Natanael et al., 2023).

The Technology Acceptance Model and the DeLone & McLean IS Success Model

The Technology Acceptance Model (TAM) explains that technology acceptance is determined by perceived usefulness and perceived ease of use, which shape attitude and intention to use (Davis, 1989). The DeLone & McLean Information Systems Success Model assesses system success through system quality, information quality, service

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quality, use, user satisfaction, and net benefits (DeLone & McLean, 2003). TAM explains why users accept a technology, whereas the DeLone & McLean model explains whether that technology produces quality information and benefits.

RESEARCH METHOD

This study uses a qualitative method with an integrative literature review approach, that is, synthesizing the findings of various studies to build a complete conceptual understanding (Snyder, 2019). Secondary data in the form of journal articles and institutional reports were searched through Google Scholar, GARUDA, and journal portals using keywords such as “automasi laporan keuangan” (financial reporting automation), “digitalisasi akuntansi” (accounting digitalization), “cloud accounting”, and “Technology Acceptance Model”.

Priority was given to literature published in 2019–2026, except for sources of foundational theory. Each source was verified through its DOI or the publisher's official page; sources whose identity could not be confirmed were excluded. Thematic analysis (Braun & Clarke, 2006) was carried out by: (1) coding the findings of each source; (2) grouping the codes into the themes of efficiency, accuracy and transparency, risk, and technology acceptance; (3) interpreting the themes through TAM and the DeLone & McLean model; and (4) preparing a synthesis.

RESULTS AND DISCUSSION

The selection process yielded twelve empirical studies and literature reviews that form the basis of the synthesis. A summary of the findings and their thematic grouping is presented in Table 1.

Table 1. Summary of Findings from Previous Studies

No	Source	Main Findings	Theme
1	Ginting et al. (2026)	Cloud accounting supports digital transformation and efficiency in accounting management.	Efficiency
2	Aditiarno & Rosalina (2025)	AI increases reporting efficiency by up to 85%; constraints lie in data security, human resources, system integration, and regulation.	Efficiency & Challenges
3	Lusiana (2024)	Technology, AI, and digitalization reduce errors and increase the accuracy and speed of reporting.	Accuracy

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No	Source	Main Findings	Theme
4	Khasanah et al. (2026)	Cybersecurity is the main challenge in implementing digital accounting systems.	Risk
5	Tikaromah et al. (2024)	Ease of use and attitude have a significant effect on the intention to use accounting information systems (AIS); perceived usefulness is not significant.	TAM
6	Nazmeen (2025)	Digitalization reduces errors and increases precision, but creates risks of data protection and workforce disruption.	Benefits & Risks
7	Jatiwardani et al. (2025)	Financial literacy increases, whereas usage risk decreases, interest in using fintech payment.	Acceptance
8	Nugroho et al. (2024)	Accounting digitalization improves efficiency and transparency through real-time data access.	Efficiency & Transparency
9	Anjarwati et al. (2023)	Accounting digitalization has a positive effect on efficiency and cost reduction among MSMEs.	Efficiency
10	Fajariah & Wardana (2025)	ERP and audit quality have a positive effect on the presentation of financial statements.	Reporting Quality
11	Sofa (2023)	AI improves accuracy and efficiency; barriers include infrastructure, organizational culture, and regulation.	Efficiency & Challenges
12	Ashraf (2025)	Automation reduces material weaknesses in internal control, but monitoring declines after automation.	Control

Transformation of the Financial Statement Preparation Process

The data revolution is changing the preparation of financial statements from a sequential manual process into an integrated one. ERP unifies transaction data across functions (Fajariah & Wardana, 2025), cloud accounting enables access to data from various locations (Ginting et al., 2026), and AI and RPA take over data entry, reconciliation, and anomaly detection (Aditiarno & Rosalina, 2025; Gartner, 2024). The accountant's role is likewise shifting from recorder of transactions to analyst and guarantor of information quality.

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Contribution of Automation to Efficiency, Accuracy, and Transparency

The majority of the literature affirms the positive contribution of automation. Aditiarno and Rosalina (2025) report efficiency gains of up to 85%, and Anjarwati et al. (2023) demonstrate the positive effect of digitalization on efficiency and cost reduction among MSMEs. Lusiana (2024), Nazmeen (2025), and Sofa (2023) show fewer errors and greater precision in reports, while Nugroho et al. (2024) emphasize transparency through real-time data access. Within the framework of DeLone and McLean (2003), this reflects improvements in system and information quality that generate net benefits.

Implementation Risks and Challenges

These benefits are accompanied by risks. Khasanah et al. (2026) and Nazmeen (2025) identify data security and cyber threats as the main challenges, consistent with the high number of traffic anomalies in Indonesia (Badan Siber dan Sandi Negara, 2024). Sofa (2023) and Aditiarno and Rosalina (2025) add barriers relating to infrastructure, human resource readiness, system integration, and regulation. Ashraf (2025) shows that automation strengthens internal control, but that monitoring tends to decline, so that the failures that do occur are more material. Automation therefore in fact demands more careful monitoring.

Technology Acceptance from a TAM Perspective

Tikaromah et al. (2024) find that perceived ease of use and attitude toward use have a significant effect on the intention to use accounting information systems, whereas perceived usefulness is not significant. By contrast, Sugahara et al. (2024) emphasize the role of perceived usefulness in the acceptance of cloud accounting. This difference indicates that when system use is mandatory, ease of use is the more decisive factor, whereas in a learning context, an understanding of the benefits is more prominent. Jatiwardani et al. (2025) add that financial literacy increases, whereas perceived risk decreases, interest in using financial technology.

Synthesis of the Discussion

Overall, automation improves the efficiency, accuracy, and transparency of financial statements, but its benefits are optimal only when supported by data quality, system security, adequate monitoring, human resource readiness, and user acceptance. Automation should support, not replace, the professional role of accountants.

CONCLUSION

The data revolution and digital technologies, namely cloud accounting, ERP, Big Data, AI, and RPA, have turned the preparation of financial statements into an integrated

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and automated process. Automation contributes positively to speed, accuracy, error reduction, cost savings, productivity, and transparency. However, its implementation faces challenges of data security, cyber threats, data quality, human resource readiness, and the risk of reduced monitoring after automation. User acceptance is determined more by ease of use and attitude toward technology than by perceived usefulness alone.

Organizations are advised to balance investment in automation with the strengthening of internal control, cybersecurity, data governance, and the digital competence of human resources, and to maintain the monitoring function. Future research is advised to test the relationships among automation, efficiency, control quality, and technology acceptance quantitatively or through field studies in Indonesia.

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