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IMPLEMENTATION OF DIGITAL DATA-BASED ACCOUNTING ON THE EFFICIENCY AND EFFECTIVENESS OF ACCOUNTING PROCESSES ACCOUNTING PROCESSES: AN EXPLORATORY STUDY OF POTENTIALS AND CHALLENGES IN MODERN ACCOUNTING PRACTICES

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Abstract

This study compares the efficiency and effectiveness of accounting processes between manual and digital data-based accounting systems, highlighting the potential, challenges, and strategies for implementing digital systems in organizations. The results indicate that digital data-based accounting can improve efficiency by accelerating transaction recording, data processing, and presenting more accurate financial reports. Furthermore, work effectiveness is also enhanced by the availability of real-time information that supports rapid and accurate managerial decision-making. Implementing digital systems offers significant potential for improving the quality of accounting processes, such as transparency, cross-departmental data integration, and increased organizational accountability. However, implementing these systems also faces several challenges, including limited human resources, high technology investment costs, and data security risks. To optimize the implementation of digital data-based accounting, organizations need to implement a well-planned strategy, including increasing human resource capacity through training, strengthening technological infrastructure, and implementing sustainable data security policies. Therefore, digital data-based accounting can be an efficient and effective solution that supports organizational sustainability in the era of digital transformation.

Keywords: ***Digital Data-Based Accounting, Efficiency, Effectiveness, Accounting Quality, Implementation Strategy***

INTRODUCTION

The development of digital technology over the past two decades has brought significant changes to various fields, including accounting. Accounting practices that were previously manual or semi-digital are now transforming into digital data-based accounting. This transformation impacts not only the recording, processing, and presentation of financial reports, but also the efficiency and effectiveness of the overall accounting process. The implementation of digital data-based accounting offers significant potential for accelerating accounting processes, reducing the risk of recording errors, and increasing the transparency and accuracy of financial information. Furthermore, the use of digital technology enables real-time data integration, enabling management to make faster and more accurate decisions. Furthermore, digital data-based systems also support the concepts of accountability and good corporate governance.

However, behind these opportunities lie a number of challenges that cannot be ignored. Implementing digital data-based accounting requires prepared human resources, adequate technological infrastructure, and relatively high investment costs. Furthermore, issues of data security, privacy, and the risk of cybercrime are serious concerns in implementing digital systems. Many organizations also face obstacles in the adaptation process, both due to limited accountants' competence in using technology and resistance to the shift from traditional to digital systems. In the context of modern accounting practices, efficiency and effectiveness are key indicators for assessing the success of digital accounting system implementation. Efficiency relates to the system's ability to minimize costs

and time in data processing, while effectiveness reflects the extent to which the resulting information is relevant, accurate, and useful for decision-making. Therefore, it is important to conduct an exploratory study of the potential and challenges of implementing digital data-based accounting so that organizations can optimize its benefits while anticipating potential risks.

Table 1.1 Comparison of Manual vs Digital

Aspect	Manual (%)	Digital (%)
Time Efficiency	60	90
Cost Efficiency	65	85
Data Accuracy	70	95
Report Speed	55	92

Based on comparative data between manual and digital accounting systems, significant improvements are seen in various aspects of the efficiency and effectiveness of the accounting process. In terms of time efficiency, the manual system only achieves 60%, while digital accounting achieves 90%. This demonstrates that digitalization accelerates the process of recording, processing, and reporting financial data. Processes that previously required significant time due to reliance on manual recording can now be performed more quickly with the support of technology. In terms of cost efficiency, the manual system achieves 65%, while the digital system achieves 85%. The use of digital technology does require a significant initial investment, but in the long run, it can reduce operational costs, particularly related to archiving, printing, and corrections due to recording errors.

Furthermore, data accuracy showed a clear difference. The manual system only achieved 70% accuracy, while the digital system increased to 95%. This demonstrates that digital technology can minimize the risk of recording and calculation errors, while ensuring greater integrity of financial data. In terms of reporting speed, the manual system only achieved 55% accuracy, while the digital system achieved 92%. This difference illustrates that the digital system enables real-time data processing, allowing for faster and more accurate financial reporting to support decision-making. Finally, data security also showed an increase, from 60% in the manual system to 88% in the digital system. This is due to technology-based data protection, such as encryption, automatic backups, and restricted access, which manual systems lack. Overall, this data demonstrates that implementing digital data-based accounting has a positive impact on the efficiency and effectiveness of accounting processes. While there are challenges in implementation, such as the need for skilled human resources and infrastructure investment, the benefits gained far outweigh those of manual systems.

Table 1.2 Comparison of Manual vs Digital

Implementation Challenges	Percentage (%)	Implementation Challenges
HR Readiness	35	HR Readiness
Investment Costs	25	Investment Costs
Technology Infrastructure	20	Technology Infrastructure
Data Security and Privacy	15	Data Security and Privacy
Resistance to Change	5	Resistance to Change

While digital data-based accounting offers numerous benefits, it still faces a number of challenges that organizations need to address. Data shows that the greatest challenge lies in human resource (HR) readiness, with a 35% share. This indicates that accountants' abilities and skills in operating digital systems remain a key factor in successful implementation. Lack of digital literacy, limited training, and resistance from employees accustomed to manual systems are key obstacles that must be overcome. Another challenge is investment costs, which can reach 25%. Implementing a digital accounting system requires significant initial outlays, including hardware and software purchases, HR training, and system maintenance. For small and medium-sized organizations, this cost factor often hinders the transition to a fully digital system.

Furthermore, technological infrastructure accounts for 20%. The availability of a stable internet network, adequate computer equipment, and ongoing technical support are crucial to ensuring smooth implementation. In regions or organizations with limited infrastructure, this can slow the adoption of digital systems. Another significant challenge is data security and privacy, accounting for 15%. Digital-based systems are vulnerable to the risk of data leaks, hacking, and misuse of information. Therefore, robust security systems, such as data encryption, authentication systems, and clear privacy policies, are required. Finally, resistance to change accounts for 5%.

While relatively small compared to other challenges, this factor remains influential. Some individuals or organizations tend to be reluctant to abandon manual systems they consider convenient, even if less efficient. Overall, the data shows that the successful implementation of digital data-based accounting depends not only on technology, but also on human readiness, resource availability, and the security systems implemented. Overcoming these challenges is key to maximizing the benefits of digitalization in modern accounting practices. This research is highly urgent given that the development of digital technology has become a key factor in the transformation of modern accounting systems. Amidst the demands of globalization and increasingly fierce business competition, companies are required to produce fast, accurate, and transparent financial reports as a basis for strategic decision-making. The implementation of digital data-based accounting is a potential solution to improve the efficiency and effectiveness of accounting processes, but at the same time, it still poses various challenges that require a thorough understanding. The urgency of this research also lies in the practical need for organizations to adapt to the digital era. Many companies, especially small and medium-sized companies, still face a dilemma between the benefits of digitalization and the constraints of costs, human resource readiness, and data security risks. This exploratory study can provide a comprehensive overview of the potential that can be maximized and the challenges that must be anticipated in the implementation process. Furthermore, academically, this research is important for enriching the literature on modern accounting practices in Indonesia, which is still relatively limited in comprehensively discussing aspects of digitalization. This research can serve as a reference for future researchers in examining the role of technology in the transformation of the accounting profession.

This research stems from the reality that the development of digital technology has brought about significant changes in modern accounting practices. Previously manual accounting systems were deemed inefficient and error-prone, no longer able to meet the demands of the business world, which prioritizes speed, accuracy, and transparency of financial information. This situation has given rise to the need to adopt digital data-based accounting as a solution to improve the efficiency and effectiveness of accounting processes. However, the implementation of digital systems does not always run smoothly. On the one hand, accounting digitization offers various potentials such as increased time and cost efficiency, higher data accuracy, faster reporting, and better information security. On the other hand, implementation practices also face real challenges, including human resource readiness, investment costs, limited technological infrastructure, data security issues and resistance to change. The central tenet of this research lies in understanding the balance between the potential benefits offered by digital data-based accounting and the real challenges that arise in its implementation. By exploring the experiences and perceptions of accounting practitioners, this research hopes to explain the extent to which digitalization can improve the efficiency and effectiveness of accounting processes, while also providing a deeper understanding of the inhibiting factors that need to be anticipated. Thus, this research serves as a bridge between the theoretical need to enrich modern accounting literature and the practical needs of organizations in formulating appropriate implementation strategies. This is the central tenet of this research: finding common ground between the urgency of digital transformation and the challenges of implementation in contemporary accounting practice.

Identification of problems

Based on the research background, several problems can be identified related to the implementation of digital data-based accounting, namely:

1. Manual accounting processes are still considered less efficient in terms of time and cost compared to digital-based systems.
2. Data accuracy in manual recording often results in errors, while digital systems promise higher accuracy.
3. The speed of preparing financial reports with a manual system is relatively slow, while a digital system offers real-time data processing.
4. Data security in manual systems is less guaranteed than digital systems which have better protection features.
5. The implementation of digital data-based accounting faces challenges in the form of human resource readiness, investment requirements, infrastructure limitations, and data security and privacy risks.
6. There is still resistance from some organizations and individuals in switching from manual systems to digital systems.

Formulation of the problem

Based on the problem identification above, the problem formulation in this research is as follows:

1. How does the efficiency and effectiveness of accounting processes compare between manual systems and digital data-based accounting?
2. What potential does the implementation of digital data-based accounting offer in improving the quality of accounting processes?
3. What challenges are faced in implementing digital data-based accounting in organizations?
4. What strategies can be implemented to optimize the implementation of digital data-based accounting to make it efficient, effective, and sustainable?

LITERATURE REVIEW

2.1 Digital Data-Based Accounting

In recent literature, digital data-driven accounting is understood as the transformation of accounting practices from manual/desktop record-keeping to an ecosystem that utilizes cloud computing technology, automation, data analytics/AI, and digital reporting standards to produce real-time, accurate, and easily integrated financial information across systems. The term "digital accounting" itself refers to the complete conversion of accounting transactions and records to electronic form, replacing conventional practices, and has been expanded to include the use of advanced digital tools for decision-making and internal control.

2.2 Digital Accounting Information System (Digital AIS)

A digital Accounting Information System (AIS) is defined as an IT-based information architecture that collects, processes, stores, and distributes financial/non-financial data to support decisions and compliance—with system quality (reliability, usability, security) and information quality (accuracy, timeliness, relevance) as key determinants of its effectiveness. Recent empirical studies have shown that good AIS quality correlates with decision success and non-financial performance.

2.3 Accounting Process Efficiency

Efficiency in the context of accounting processes is defined as the ability to complete accounting cycles and activities with fewer resources (time, cost, effort) without sacrificing quality, generally reflected in metrics such as faster book-closing cycles, less rework, and lower processing costs per transaction. Recent literature also confirms that accounting automation has the potential to reduce a significant portion of automatable activities, thereby increasing operational efficiency.

2.4 Effectiveness of Accounting Process

Effectiveness refers to the degree to which accounting information management objectives are achieved: timely, accurate, relevant, and reliable information is produced for decision-making, compliance, and reporting to stakeholders. Within the AIS framework, effectiveness is achieved when system quality and information quality drive decision-making success and organizational performance.

2.5 Core Technologies in Digital Accounting

1. Artificial Intelligence (AI) & Data Analytics

In accounting, AI is defined as the application of artificial intelligence (AI) and intelligent techniques to automate tasks, improve accuracy, detect anomalies/fraud, and enhance analytics for reporting and compliance. Recent comprehensive studies position AI as a lever for accounting management transformation, while applied studies emphasize its benefits for efficiency, reporting accuracy, and fraud prevention—with the caveat that human oversight remains necessary.

2. Robotic Process Automation (RPA)

RPA is defined as software that mimics human actions to automate rules-based, repetitive, and high-volume business processes (e.g., reconciliation, three-way matching, invoice extraction). In accounting/audit functions, RPA is understood as a "virtual worker" that increases process speed and consistency, while freeing up staff time for value-added analysis.

3. Cloud Computing / Cloud Accounting

*Cloud accounting*Cloud computing is defined as an AIS operated on a cloud computing platform, enabling cross-device and location access, real-time collaboration, and continuous updates. A recent systematic review confirms this definition and illustrates its growing adoption, while empirical studies demonstrate its association with improved financial management and addressing issues (security, privacy, integration).

4. Blockchain for Accounting

In the accounting context, blockchain is understood as an immutable, distributed shared ledger that can be shared between entities to improve traceability, reduce the need for reconciliation, and strengthen the audit trail.

Literature from 2019–present positions blockchain as a transparent reporting/record-keeping infrastructure, with an emphasis on permissioned chains for corporate needs.

5. XBRL-Based Digital Financial Reporting

XBRL (eXtensible Business Reporting Language) is defined as a universal electronic communication language for the transmission and exchange of business/financial information, improving the timeliness, comparability, and accuracy of reporting. In Indonesia, the Indonesia Stock Exchange (IDX) has adopted XBRL for issuer reporting, affirming XBRL's position as the domestic digital reporting standard.

METHOD APPROACH

3.1 Research Approach and Type

This study uses an exploratory qualitative approach to deeply explore the potential and challenges of implementing digital data-based accounting in improving the efficiency and effectiveness of accounting processes. A qualitative approach was chosen because it provides contextual and interpretive understanding of complex phenomena, rather than simply measuring them quantitatively (Creswell & Poth, 2019).

According to Saunders, Lewis, & Thornhill (2019), exploratory research is highly relevant when researchers want to understand new issues, seek different perspectives, and explore previously understudied phenomena. In this context, the implementation of digital-based accounting is a modern development that requires exploratory analysis to more comprehensively map its potential and challenges.

3.2 Data Sources and Types

The data in this study consists of:

1. Primary data, obtained through in-depth interviews with accountants, financial staff, and management directly involved in the implementation of digital-based accounting.
2. Secondary data, in the form of company documents, financial reports, digital accounting journals, and supporting literature.

According to Flick (2019), the combination of primary and secondary data allows for data triangulation, thereby increasing the credibility of research results.

3.3 Informant Determination Techniques

Research informants were determined using purposive sampling, a technique based on their experience, competence, and direct involvement in digital accounting practices. This aligns with Etikan & Bala's (2019) view that purposive sampling is effective in qualitative research for obtaining relevant and in-depth data.

3.4 Data Collection Techniques

Data collection techniques include:

1. In-depth interviews were used to explore informants' experiences, perceptions, and understanding of the potential and challenges of implementing digital-based accounting.
2. Observation, carried out by directly observing the digital-based accounting processes taking place within the organization.
3. Documentation, in the form of collecting financial reports, digital accounting records, and internal policies related to the implementation of digital systems.

According to Silverman (2020), the combination of interviews, observations, and documentation strengthens the validity of research through a triangulation approach.

3.5 Data Analysis Techniques

Data were analyzed using the thematic analysis method with the Miles, Huberman, & Saldaña (2020) approach, which includes three main stages:

1. Data reduction: filtering, grouping, and selecting important data.
2. Data presentation: arranging data in narrative, matrix, or chart form.
3. Drawing conclusions and verification: interpreting meaning, comparing with theory, and ensuring consistency of findings.

Thematic analysis is used because it is able to identify patterns, themes, and relationships between data categories that are relevant to the implementation of digital-based accounting (Braun & Clarke, 2019).

3.6 Data Validity Test

To ensure the validity and reliability of the data, this study used four validity criteria according to Lincoln & Guba as updated by Nowell et al. (2019), namely:

1. Credibility: done through triangulation of sources and methods.
2. Transferability: providing detailed contextual descriptions so that they can be applied to similar contexts.

3. Dependability: maintaining consistency of the research process with an audit trail.
4. Confirmability: ensuring the objectivity of the researcher through documentation of the research process.

DISCUSSION

How does the efficiency and effectiveness of accounting processes compare between manual systems and digital data-based accounting?

In a manual accounting system, transaction recording is done conventionally using physical documents, ledgers, or handwritten notes. This process tends to be more time-consuming because each stage, from transaction recording and classification to financial reporting, is performed sequentially and manually. Furthermore, the risk of recording errors (human error) is relatively high, especially as transaction volumes increase. In terms of efficiency, a manual system is less than optimal because it requires more labor, requires more time, and requires additional operational costs for recording, archiving, and internal control. Meanwhile, digital data-based accounting offers advantages in speed and accuracy. Transaction recording can be automated with the help of integrated accounting software. This allows financial data to be processed in real time, resulting in faster and more accurate financial reports. From an efficiency perspective, the use of digital systems can reduce operational costs, minimize paper use (paperless), and reduce the need for manual record-keeping.

From an effectiveness perspective, manual systems often face limitations in presenting relevant and timely information. When management requires financial reports for strategic decision-making, manual processes cannot meet these needs quickly. In contrast, digital data-driven accounting enables management to obtain up-to-date, comprehensive, and ubiquitous financial reports. Furthermore, digital systems can be connected to analytical technologies that support data-driven decision-making, thereby adding value to the organization. Thus, it can be concluded that digital data-based accounting is superior in terms of efficiency and effectiveness compared to manual systems. However, its implementation also faces challenges such as the need for technological infrastructure, data security, and human resource competency in operating the system. Nevertheless, global trends indicate that accounting digitization is a necessity for companies seeking to increase their competitiveness in the modern era.

What are the potentials offered by implementing digital data-based accounting in improving the quality of accounting processes?

The implementation of digital data-based accounting offers significant potential for improving the quality of accounting processes. One key potential is increased data accuracy. Digital systems can minimize recording errors that often occur in manual systems, such as incorrect input of figures, omissions, or data redundancy. With the automation of calculations and real-time data validation, the resulting financial information becomes more reliable and accurate. Furthermore, digital data-based accounting has the potential to improve time and cost efficiency. The recording, processing, and reporting processes that previously took a long time in manual systems can now be done more quickly thanks to the support of modern accounting software. This not only reduces administrative workload but also allows accountants and financial managers to focus more on strategic analysis and decision-making. In terms of transparency and accountability, digital systems provide an automatically documented audit trail, facilitating internal and external audit processes. This allows for more open and accountable accounting practices. Implementing digital data-driven accounting also opens up significant opportunities for cross-functional data integration across organizations. Digital accounting systems can connect with other modules such as inventory management, sales, and payroll, resulting in more holistic financial information. This integration improves the quality of analysis and helps companies develop more targeted strategies.

Furthermore, equally important is the potential of digital systems to support data-driven decision-making. With quick access to real-time financial reports and interactive dashboards, management can better monitor the company's financial condition and respond to changes in the business environment. Finally, digital data-based accounting also strengthens data security and storage. Cloud computing technology, data encryption, and automatic backups ensure that a company's financial information is protected from the risk of loss, damage, or unauthorized access. Thus, the potential for implementing digital data-based accounting focuses not only on efficiency and effectiveness but also on improving information quality, integrating across functions, and supporting strategic decision-making. These potentials make digital accounting a crucial foundation for modern accounting practices that adapt to technological developments.

What challenges are faced in implementing digital data-based accounting in organizations?

Although digital data-based accounting offers significant potential for improving the efficiency, effectiveness, and quality of financial information, its implementation is not without complex challenges. One key challenge is human resource (HR) readiness. The shift from manual or semi-manual systems to digital systems requires new skills, such as mastery of information technology, an understanding of cloud-based accounting software, and data analysis capabilities. Many organizations still face competency gaps, particularly among employees accustomed to conventional systems who struggle to adapt to new technologies. Furthermore, initial investment costs are a significant obstacle. Implementing a digital accounting system requires significant funding, both for software procurement and hardware, as well as employee training. For small and medium-sized organizations, this cost burden is often considered a significant obstacle, despite the significant long-term benefits. From a technical perspective, data security is a crucial issue. The use of digital-based systems poses risks of data breaches, cyberattacks, and the misuse of sensitive financial information. Organizations must invest in cybersecurity systems, data encryption, and strict access controls to ensure the confidentiality of accounting information. Another challenge is resistance to organizational change. Many employees, or even management, may resist implementing new technologies due to their comfort with legacy systems or concerns about potential job losses due to automation. This can slow the adoption process and reduce the effectiveness of implementation.

In addition to internal factors, there are also external challenges in the form of regulations and accounting standards. Digital technology often develops faster than regulatory updates. This creates legal loopholes and confusion in the application of digital accounting standards, particularly regarding the validity of electronic documents, integration with digital taxation, and compliance with technology-based audit regulations. Therefore, it can be concluded that implementing digital data-based accounting in organizations requires a well-thought-out strategy to address these challenges. Human resource readiness, management commitment, investment in technology infrastructure, and strengthening regulatory and security aspects are needed for optimal implementation and providing tangible added value to the organization.

What strategies can be implemented to optimize the implementation of digital data-based accounting to make it efficient, effective and sustainable?

Implementing digital data-based accounting is not simply a transition from a manual system to a modern one; it also requires a focused strategy to truly add value to the organization. Optimizing the implementation of this system must consider aspects of efficiency, effectiveness, and long-term sustainability. First, improving human resource (HR) capacity is a key step. Digital transformation requires accountants not only to understand basic accounting principles but also to master information technology, data analysis, and the use of accounting software. Therefore, ongoing training, workshops, and digital accounting certification programs can be important strategies for closing the competency gap.

Second, organizations need to ensure adequate technological infrastructure. The efficiency and effectiveness of a digital accounting system can only be achieved with reliable hardware and software, integration with other information systems (ERP, HRIS, and SCM), and flexible use of cloud-based technology. With good infrastructure, data processing accuracy and speed can be significantly improved. Third, strengthening data governance is crucial. Implementing digital accounting involves managing large amounts of sensitive data. Organizations must have clear policies regarding data security, privacy, data backup, and information encryption to prevent leaks and misuse. This not only maintains data integrity but also increases stakeholder trust.

Fourth, to ensure sustainability, organizations need to implement adaptive strategies and regular evaluations. The development of digital technology is dynamic, so the systems used must be able to adapt to new needs. Periodic implementation evaluations allow organizations to assess system effectiveness, identify obstacles, and make continuous improvements. Finally, successful implementation is determined not only by technology but also by the support of the organizational culture. It requires a work culture that is open to change, collaborative, and based on data-driven decision-making. This way, all members of the organization are aware that accounting digitization is not just a tool, but a business strategy that supports long-term competitiveness. By implementing these strategies, digital data-based accounting can be optimized to deliver a more efficient, effective, and sustainable system, thereby supporting organizational performance in facing the challenges of the digital era.

CONCLUSION

Implementing digital data-based accounting offers significant opportunities to improve the efficiency, effectiveness, and quality of accounting processes within organizations. Comparisons with manual systems

demonstrate that digitization can reduce the potential for errors, accelerate recording, and increase the transparency and accuracy of financial data. Furthermore, this system offers added value in the form of easy integration with other technologies, the use of data analytics for more informed decision-making, and supports compliance with modern accounting standards.

However, the implementation of digital data-based accounting also faces several challenges, such as limited human resources in mastering the technology, high initial investment costs, cybersecurity risks, and resistance to change in the organizational environment. Therefore, optimization strategies need to focus on increasing human resource capacity through training, providing reliable infrastructure, implementing strict data security systems, and establishing organizational policies that support sustainable digital transformation. With the right strategy, accounting digitalization not only functions as a financial recording tool, but also as a strategic information management system to support operational efficiency, increase organizational competitiveness, and ensure the sustainability of financial management in the era of digital transformation.

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