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The Digital Accounting Revolution: How AI and Machine Learning Are Changing the Role of Accountants

Loso Judijanto¹, Muhammad Irfan Aditma², Suhartono³, Ratih Andaningsih⁴

IPOSS Jakarta, Indonesia¹, Universitas Sains dan Teknologi Jayapura, Indonesia², Universitas Bina Sarana Informatika³, Universitas Borobudur Jakarta, Indonesia⁴

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Corresponding Author:

Author Name*: Loso Judijanto

Email*:

losojudijantobumn@gmail.com

Abstrak: *The development of digital technology, especially Artificial Intelligence (AI) and Machine Learning (ML), has significantly changed the accounting profession from manual work to more efficient and accurate process automation. This automation allows accountants to focus on data analysis and strategic decision-making, but also requires mastery of new digital skills such as data analytics and basic programming. However, current accounting education still relies heavily on conventional methods, resulting in a skills gap between graduates and industry needs. In addition, accounting professional organizations play an important role in encouraging retraining and improving digital competencies for their members. This study uses a qualitative literature study method with thematic analysis to examine the impact of AI and ML on the role of accountants and the responses of educational institutions and the profession to this digital transformation. The findings indicate the need for collaboration between educational institutions, professional organizations, and industry to overcome the challenges of technology adaptation. With joint efforts, the accounting profession can transform into a strategic partner in an increasingly complex and data-driven business world, while providing significant added value in modern financial management.*

Keywords : Artificial-Intelligence (AI); Digital-Accounting; Machine-Learning



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INTRODUCTION

The rapid development of digital technology has become a catalyst for transformation in various sectors, including the accounting sector which previously relied heavily on manual and routine processes. Artificial Intelligence (AI) and Machine Learning (ML) now enable automation of processes such as data input, transaction classification, and predictive analysis of financial reports. This technology not only speeds up work processes but also increases accuracy by reducing the potential for human error. According to a report by Desi et al (2025), 64% of companies have begun to adopt AI-based automation technology in their accounting processes, indicating that this digital transformation is no longer an option, but a competitive necessity in the information age.

However, although technology offers various conveniences, this development also poses structural challenges in the accounting profession. This change forces professionals to not only understand the technical aspects of accounting, but also to have adequate digital literacy. Ekuma (2023) stated that "reskilling" in the field of data and AI is one of the main priorities for the financial profession in the future. If not addressed adaptively, accountants who are still oriented towards conventional work models are at risk of being left behind. Therefore, it is important to view this digital revolution critically not only as a technological innovation, but also as a determinant of a new direction for the accounting profession and work ethics in the future.

In an era of increasingly tight and dynamic business competition, efficiency and accuracy in financial reporting are the main demands that cannot be negotiated. Financial reports are not just administrative documents, but the basis for strategic decision-making by management, investors, and regulators. In this context, AI and Machine Learning play an important role with their ability to manage and analyze large volumes of data in real-time. This

technology enables accounting systems to detect anomalies, validate transactions automatically, and compile reports with high precision in a short time. According to a report from Sari (2024), companies that adopt AI in their finance functions are able to increase operational efficiency by up to 40% and reduce reporting errors significantly.

However, the reliability of AI in financial reporting also raises new dilemmas, especially regarding transparency and supervision of the algorithms used. Although AI promises efficiency, algorithms that are not ethically supervised can create systematic bias or errors in financial reporting, which have the potential to harm stakeholders. As stated by Yusuf et al (2023), it is important for accounting professionals to understand and control how AI systems work to avoid "black box accounting", where the decision-making process becomes non-transparent. Therefore, the integration of AI in accounting must be accompanied by strong governance, professional supervision, and adjustments to reporting standards that reflect the digital era.

Digital transformation triggered by the presence of AI and Machine Learning fundamentally changes the traditional role of accountants from mere transaction recorders to data analysts and strategic advisors. The role of accountants now demands skills that go beyond conventional technical competencies, such as a deep understanding of data analytics, data visualization, and interpretation of predictive models. According to Hutabarat & Firdaus (2024), around 50% of routine accounting tasks can be automated, encouraging accountants to shift their focus to value-added activities such as data-driven decision making and financial risk mitigation. This indicates that today's accountants must be able to combine financial knowledge with technological literacy to stay relevant in the digital business ecosystem.

However, this role shift does not come without challenges. Many professional accountants are still trapped in administrative work patterns that are no longer in line with



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industry needs. Lack of readiness in mastering technology and resistance to change are major obstacles in this transition. In fact, according to a survey conducted by Setiawan et al (2024), only 37% of accounting professionals feel confident in their abilities in the field of data and digital technology. This shows a gap between the competencies they have and those needed by the market. Therefore, this change requires not only accounting education reform, but also individual awareness to carry out continuous upskilling so that accountants do not only become complements to technology, but strategic partners in modern business management.

The need for adaptation in the world of education and professional training is becoming increasingly urgent amidst the digital transformation of accounting. Traditional accounting curricula that still focus on basic principles and manual processes are now considered inadequate in equipping graduates to face the challenges of technology-based industries. AI and Machine Learning require an understanding of algorithmic logic, big data processing, and the ethics of using technology in accounting—competencies that are rarely taught comprehensively in higher education institutions today. The integration of technology into business and accounting education curricula is one of the main indicators of workforce readiness to face the Industrial Revolution 4.0 era (Ayyasy & Melani, 2024). Without updating the education system, a skills gap will emerge between graduates and market needs.

In addition, professional organizations such as the IAI (Indonesian Institute of Accountants) or IFAC play a strategic role in driving this transformation through the development of competency standards and the implementation of continuous training. However, the approach taken still tends to be reactive and complementary, not integrative. AI and data analytics training are often optional and not a core part of professional development. This creates the risk of accountants being left

behind in responding to rapid technological changes. According to the Association of International Certified Professional Accountants (AICPA, 2022) report, digital transformation will only be successful if educational institutions and professional organizations synergize in creating an adaptive and progressive learning ecosystem. Thus, adaptation is not only a technical issue, but also a systemic reform that touches the roots of the formation of accountant professionalism in the digital era..

METHOD

This study uses a qualitative approach with a literature review method as a data collection and analysis technique. This approach was chosen to explore in depth how Artificial Intelligence (AI) and Machine Learning (ML) have influenced the role of accountants in the digital era and to examine the responses of educational institutions and professions to these changes. Literature review provides flexibility in examining various scientific sources, including academic journals, reports of professional institutions (such as IFAC, ACCA, AICPA), policy documents, and publications from global business consultants such as Deloitte and McKinsey.

Data collection was carried out by accessing relevant articles and reports from trusted databases such as Google Scholar, Scopus, ScienceDirect, and ProQuest with the keywords: "AI in accounting", "machine learning and financial reporting", "digital transformation in accounting", and "future accountant skills". Inclusion criteria include sources published in the last five years (2019–2024) and have a direct relationship to the topic of changes in the role of accountants due to the development of digital technology. The data obtained were analyzed using thematic analysis techniques, namely identifying, grouping, and interpreting the main themes that emerge from various literatures to gain a comprehensive understanding of the issues being studied. Data validity is maintained through source triangulation, namely by comparing findings



from various types of publications and institutional perspectives.

RESULTS AND DISCUSSION

Transforming the Role of Accountants in the Era of Artificial Intelligence: From Record Keeping to Strategic Decision Making

1. Accounting Process Automation and the Role of AI in Reducing Administrative Burden

In recent years, advances in artificial intelligence (AI) technology have become a major focus in the digital transformation of accounting. Scientific research and industry reports consistently show that the application of AI in accounting can significantly improve the efficiency and accuracy of financial processes. For example, a study conducted by Peng et al (2023) found that AI can automate up to 70% of administrative work in accounting, including tasks such as transaction recording and data reconciliation. This is supported by research by Turrahmi & Firdaus (2024) which confirms that AI-based automation can speed up the accounting process by up to 80%, as well as reduce the risk of human error that often occurs in manual data input. With AI's ability to process and analyze large volumes of data in real-time, tasks that previously took hours can now be completed in minutes with a much higher level of accuracy.

Technologies such as Optical Character Recognition (OCR) and Natural Language Processing (NLP) combined with machine learning algorithms enable AI systems to read and extract data from financial documents with high precision. A study by Pratama & Munandar (2025) showed that an NLP-based system was able to interpret unstructured financial documents effectively, which is a major improvement over traditional methods. In addition, Judijanto et al (2024) in the Journal of Accounting Research showed how machine learning improves automated reconciliation capabilities by detecting anomalies and discrepancies more quickly and accurately than manual methods.

From the perspective of the role of human resources, Murphy et al (2024) in the World Economic Forum report stated that automation with AI shifts the focus of the accounting profession from administrative tasks to strategic functions, such as data analysis and business decision-making based on richer information. However, the adaptation of this technology requires adequate HR readiness, continuous training, and risk management related to data security and privacy. Thus, digital transformation through AI is not only about operational efficiency, but also changes the way of working and the skills needed in the accounting profession.

Overall, scientific evidence supports that AI is a crucial tool in the modern accounting revolution, enabling reduced administrative burdens while increasing added value through more advanced analytical and strategic functions. When implemented properly, AI helps organizations improve data quality, accelerate business processes, and optimize decision-making based on accurate and reliable financial information.

2. The New Role of Accountants as Data Analysts and Strategic Business Partners

The rapid development of digital technology, including automation, big data, and artificial intelligence, has brought about fundamental changes in the functions and roles of accountants. Deya et al (2025) explained that this technology allows the process of recording and reporting financial data that was previously time-consuming and prone to errors to be automated, so that accountants now have more space to focus on value-added activities such as data analysis and strategic decision making. This shifts the role of accountants from mere bookkeepers to data analysts who must be able to process large and complex data into information that is relevant to business management. This transformation not only changes technical activities, but also requires accountants to master analytical software and basic programming languages in order to build predictive models and present insights that support management in dealing with



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increasingly rapid and complex business dynamics.

In line with these changing roles, Purba et al (2024) emphasized that today's accountants must transform into strategic business partners who actively contribute to the planning and managerial decision-making process. They argue that accountants are no longer sufficient in providing data and reports, but must also act as facilitators of inter-departmental communication that can help explain the financial impact of strategic decisions, as well as manage risks more proactively. This study also highlights the importance of effective communication and collaboration skills as key competencies for modern accountants so that the insights conveyed can be understood and implemented by various stakeholders who do not have a financial background. This shows that the accounting function has expanded and become increasingly integrated into the strategic management process, so accountants must be able to convey data storytelling that is inspiring and motivates appropriate action.

In addition, other literature also highlights the importance of data literacy and analytical skills as the main capital for accountants in the digital era. Natanael et al (2025) emphasized in their research that the ability to use analytical technology and financial modeling based on big data is a crucial aspect for accountants to be able to transform data into valuable information. Furthermore, Muhammad & Dabell (2021) show how companies that utilize data-based decision making have a greater chance of achieving competitive advantage and superior financial performance. Here, the role of accountants as providers of data-based financial and business insights becomes very strategic. This is reinforced by Hasanah & Dinalestari (2024) who emphasize that modern accountants must not only master technical aspects, but also have multidisciplinary abilities that combine financial knowledge, information technology, and business understanding to support fast and accurate decision making amidst high market uncertainty. Overall, these studies consistently show that the role of accountants has evolved to

be more strategic and technical, making them key actors in shaping a more adaptive and data-driven business future.

Challenges of Adapting the World of Education and the Accounting Profession to the Digital Revolution

1. The Accounting Curriculum is Lagging in Accommodating Digital Skills

Various academic studies show that the current accounting curriculum still relies heavily on conventional approaches that are less responsive to rapid advances in digital technology. Isharyani et al (2024) highlighted that traditional accounting education still emphasizes learning basic theory and manual bookkeeping practices, without sufficiently including the use of cutting-edge technologies such as cloud-based accounting software and data analytics applications that are now very important in the world of work. This study shows that the slow adoption of technology in the curriculum causes graduates to lack adequate digital skills, making it difficult for them to adapt to the needs of the industrial world that increasingly relies on information technology. In addition, Abdullah & Almaqtari (2024) stated that the integration of artificial intelligence, machine learning, and big data analytics in accounting education is a must so that graduates are able to compete in the digital era. They emphasize that this technology is not just a supporting tool, but is at the core of the data-based decision-making process and automation in modern accounting.

Daulay et al (2024) empirical data supports these findings by stating that less than 30% of accounting educational institutions actively incorporate digital technology into their core curriculum. This creates a significant skills gap between what is taught on campus and the real demands in the workplace. This imbalance not only harms graduates who have to spend additional time and money on retraining, but also the industrial world which has difficulty finding a ready-to-use workforce



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with adequate digital skills. This phenomenon is in accordance with the analysis of Brynjolfsson and McAfee (2014) in *The Second Machine Age*, which highlights how the technological revolution has created a new need for digital skills, while formal education is still lagging behind. They show that the acceleration of technology is causing major disparities in the labor market, and professions such as accounting must quickly adapt so as not to be left behind in the era of automation and big data.

In addition to curriculum and teaching material constraints, structural barriers are also important factors that slow down the integration of technology in accounting education. A study by Indadihayati & Hariyanto (2023) showed that limited resources, such as lack of facilities and access to the latest technology, as well as cultural resistance to change in educational institutions, are the main obstacles to curriculum renewal. Furthermore, lecturer competence is also a problem, because not all teachers have sufficient skills or experience in digital technology to teach the material effectively. This condition is exacerbated by the lack of national regulations governing the integration of digital literacy in accounting education curriculum standards. Therefore, the proposed solutions include ongoing training for lecturers, updating educational technology infrastructure, and close collaboration with industry and technology providers to create relevant and applicable learning materials. With these steps, it is hoped that accounting graduates can be equipped with digital skills that not only meet academic standards, but are also ready to compete in a job market that is constantly changing and increasingly demands the speed of technological adaptation.

2. The Role of Professional Organizations in Encouraging Reskilling and Upskilling of Accountants

Digital transformation has brought fundamental changes to the accounting profession, requiring accountants to master

various advanced technologies such as automated data processing, blockchain, machine learning, and big data analytics. Arie (2024) emphasized that these technological advances have changed the traditional role of accountants from recorders and reporters to strategic analysts who must be able to provide complex and real-time data-based insights. This requires accounting professionals to continuously reskill and upskill in order to remain relevant in facing the demands of the digital era. In this context, professional organizations such as IFAC, AICPA, and IAI have a strategic role as directors and primary facilitators in developing the digital competencies of their members. IFAC (2022) emphasized that professional organizations are not only responsible for setting ethical and competency standards, but must also ensure access to cutting-edge technology training so that their members can adapt effectively. The AICPA has even initiated a Digital CPA program that focuses on mastering technologies such as cloud computing, robotic process automation (RPA), and cybersecurity, which are primary needs in the modern accounting industry. In Indonesia, IAI plays an active role by developing training programs based on accounting information systems and ERP integration, which are part of a national effort to strengthen the digital capacity of accountants. These programs are concrete evidence that professional organizations globally are trying to accelerate digital transformation in the world of accounting.

However, various studies show that accountants' participation in technology training programs is still relatively low and uneven across regions. One of the main obstacles is the lack of awareness of the importance of digital skills and the lack of incentives that encourage accountants to actively engage in continuous learning (Jackson & Allen, 2024). In addition, external factors such as limited access to quality training and technological infrastructure are also barriers in developing countries. Li, L (2024) added that



the success of a reskilling program is highly dependent on the existence of a clear reward system and the integration of digital training into career paths and professional certification. Without progressive policy support, accountants tend to view technology training as an additional option, not a requirement. Another study from the OECD (2021) emphasized the need for a national policy that requires digital training to be part of the professional certification requirements so that competency transformation can take place systematically and sustainably. In Indonesia, although there is already synergy between the IAI and the Ministry of Education in adjusting the accounting education curriculum to digital needs, stronger regulations and concrete incentives are still needed to encourage accountants to take part in technology training on a massive scale.

Overall, scientific evidence supports the argument that professional organizations play a central role in bridging the digital competency gap for accountants through the development of relevant training programs and the formulation of supportive policies. This role is not only as a setter of professional standards, but also as an agent of change that ensures accountants are able to survive and thrive in a digitalized and increasingly complex work landscape. Technological literacy, data analytics skills, and an understanding of disruptive technologies must be an integral part of accountants' professional competencies. By integrating digital training into certification and licensing processes, and strengthening incentives and access to training, professional organizations can help accelerate the adaptation of digital transformation globally. These steps are essential for the accounting profession to remain relevant and able to provide optimal added value in the era of the industrial revolution 4.0 and beyond. Without systemic and collaborative efforts from professional organizations, the risk of competency disconnection and a decline in the quality of professional services will increase, thus threatening the sustainability and credibility of the accounting profession in the future.

CONCLUSIONS

The development of artificial intelligence (AI) and digital technology has fundamentally changed the role and function of accountants. AI-based automation significantly reduces administrative burdens, increases the efficiency and accuracy of accounting processes, and allows accountants to focus on value-added activities such as data analysis and strategic decision-making. Accountants must now transform into strategic business partners who master analytical technology, big data, and basic programming to provide relevant financial insights and support risk management and business strategy. However, this transformation requires human resource readiness and educational adaptation that have not been fully met. Many accounting education curricula are still conventional and have not integrated digital skills and cutting-edge technology adequately, creating a competency gap between graduates and industry needs. In addition, professional organizations have an important role in encouraging accountant reskilling and upskilling through relevant technology training and supportive policies so that accounting professionals can remain relevant and competitive in the digital era. With collaboration between the world of education, professional organizations, and industry, as well as progressive curriculum and policy adjustments, the accounting profession can adapt quickly to the digital revolution. This is important to maintain the sustainability, credibility, and added value of the accounting profession amidst increasingly complex and data-driven business dynamics.

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