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Transforming Accounting Theory through the Application of Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT): Approaches to Business Model Innovation, Risk Management, and Financial Prediction

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ABSTRACT

The integration of Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT) into accounting practices is revolutionizing traditional frameworks, offering new opportunities for business model innovation, enhanced risk management, and improved financial prediction. This paper explores the intersection of these emerging technologies with accounting theory, examining their transformative impact on financial reporting, auditing, and decision-making processes. AI and ML algorithms enable more accurate forecasting, anomaly detection, and automated decision-making, while IoT technologies facilitate real-time data collection and analysis, creating new avenues for operational efficiency and predictive capabilities. Despite these advancements, challenges such as the "black-box" nature of AI, the need for interpretability, and the integration of these technologies into existing systems remain. This study provides a comprehensive framework for understanding how these technologies reshape accounting practices, proposing theoretical models and strategies to address these challenges. The paper also highlights future research opportunities, emphasizing the need for accounting scholars to explore the theoretical implications of AI, ML, and IoT, and to collaborate with interdisciplinary teams to fully leverage the potential of these technologies in the accounting field. This abstract highlights the key themes of business model innovation, risk management, and financial prediction, and introduces a theoretical perspective on how these technologies are reshaping accounting practices.

Keywords: *Artificial Intelligence (AI), Machine Learning (ML), Internet of Things (IoT), Accounting Theory, Business Model Innovation.*

How to Cite:

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INTRODUCTION

The rapid advancement of Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT) is reshaping industries across the globe, and accounting is no exception. These technologies are not only transforming business operations but also revolutionizing the theoretical foundations upon which accounting practices are built. In particular, AI and ML provide innovative solutions for predictive analytics, enabling more accurate financial forecasting, enhanced fraud detection, and automation of decision-making processes, while IoT enhances data-driven insights by connecting physical devices to digital platforms for real-time information collection and analysis. These advancements are driving a shift towards smarter, more efficient, and transparent accounting systems.

The integration of AI, ML, and IoT into accounting processes holds significant potential for business model innovation, where the traditional paradigms of value creation, delivery, and capture are being redefined. For instance, AI's capacity for pattern recognition and anomaly detection can dramatically improve financial reporting accuracy and streamline auditing procedures. Similarly, IoT's real-time data collection capabilities can enhance the quality and timeliness of financial data, fostering more informed decision-making at both strategic and operational levels. Moreover, these technologies are proving invaluable in managing financial risks, from market fluctuations to compliance issues, by providing dynamic, data-driven insights that traditional methods cannot match.

However, despite the promising advantages, the convergence of AI, ML, and IoT in accounting also presents challenges, particularly in the context of theory and practice. The "black-box" nature of AI and ML algorithms, which often lack transparency and interpretability, poses significant hurdles for accounting professionals who need to ensure the reliability and trustworthiness of these systems. Furthermore, the adoption of these technologies in the accounting domain requires a rethinking of traditional theories and methodologies, as well as an understanding of how these technologies influence core accounting principles, such as the measurement, reporting, and validation of financial information.

This paper seeks to explore how the application of AI, ML, and IoT is transforming accounting theory, focusing on their implications for business model innovation, risk management, and financial prediction. By providing a comprehensive framework for understanding these technological advancements, this study aims to contribute to the evolving discourse on the future of accounting in a digitally driven world. Additionally, it will examine the role of accounting scholars in adapting to and leading this transformation, highlighting areas where collaboration with other disciplines—such as computer science and industrial management—can help to maximize the potential benefits of these technologies.

The increasing reliance on AI, ML, and IoT is not just a technological shift but a paradigm change that challenges accounting researchers and practitioners alike to rethink how financial information is generated, interpreted, and utilized. Through this exploration, this paper will identify critical research gaps and propose future avenues for advancing knowledge on the integration of these technologies into accounting theory and practice.

LITERATURE REVIEW

The integration of Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT) into accounting practices has been widely recognized as transformative, providing a range of

opportunities and challenges for both accounting professionals and researchers. This literature review synthesizes key contributions in the intersection of these technologies with accounting theory, focusing on three main areas: business model innovation, risk management, and financial prediction. Each section examines existing literature, identifying both advancements and gaps, and discusses how these technologies are influencing accounting practices.

Artificial Intelligence and Machine Learning in Accounting

AI and ML are increasingly being applied to address traditional challenges in accounting, such as improving accuracy, enhancing predictive capabilities, and automating routine tasks. These technologies offer significant potential for transforming the way financial data is analyzed and reported. A recent study by Stratopoulos and Wang (2025) highlighted the impact of generative AI and large language models (LLMs) on accounting research, suggesting that AI technologies are enhancing data analysis, automating tasks, and improving the overall quality of accounting services. For instance, AI-driven models are now capable of identifying patterns in financial statements that may be invisible to traditional methods, allowing for more accurate assessments of a company's financial health (Dong et al., 2024).

The use of ML algorithms has been particularly noted in predictive analytics. In the context of bankruptcy prediction, Hesse and Loy (2025) demonstrated the effectiveness of sentence-level analysis using transformer-based models such as BERT to identify high-risk bankruptcy clues from Management Discussion and Analysis (MD&A) sections of financial reports. These machine learning approaches outperform traditional document-level methods by providing more detailed, interpretable insights into financial risks. Similarly, Khorsheed et al. (2024) examined the application of AI and ML in auditing, finding that these technologies can significantly enhance the accuracy and efficiency of fraud detection, providing auditors with more reliable tools for assessing financial integrity.

Despite these advancements, there are challenges related to the interpretability of AI models. As noted by Cação et al. (2025), the "black-box" nature of many AI algorithms remains a critical issue in industrial and financial applications. In accounting, the lack of transparency in how AI models make decisions poses a risk to trust and credibility, particularly in high-stakes environments like financial reporting and auditing. This concern has led to the emergence of Explainable AI (XAI), a subfield focused on making AI models more interpretable and accountable. XAI is crucial for accounting applications, as it ensures that AI-driven decision-making is understandable, auditable, and aligned with regulatory standards.

Business Model Innovation Driven by AI and IoT

The implementation of AI, ML, and IoT technologies in business operations has driven significant business model innovation (BMI), especially within industries where efficiency and value creation are paramount. AI-driven BMI refers to substantial changes in a firm's value proposition, customer engagement models, and internal processes. Jorzik et al. (2024) reviewed the literature on AI-driven BMI, identifying two key perspectives: static and dynamic views of BMI. Static views focus on incremental improvements in existing business models through AI adoption, while dynamic views emphasize the creation of entirely new business models enabled by AI technologies.

For example, Vodafone and eBay have integrated AI into their business models to enhance customer service and operational efficiency, respectively, by leveraging data analytics for personalized

products and services (Akter et al., 2022). Similarly, Gama & Magistretti (2023) discuss how AI enables businesses to shift from a consumer-centric approach to one where consumption determines production. This shift is particularly evident in IoT-based models where real-time data collection enables businesses to optimize production schedules and reduce waste.

However, while AI-driven BMI offers significant advantages, it also presents challenges in terms of organizational readiness, change management, and skill development. Many firms struggle with the adoption of AI due to inadequate infrastructure, resistance to change, and lack of expertise (Sjodin et al., 2021). According to Jorzik et al. (2024), the success of AI-driven BMI depends not only on the technological capabilities of AI systems but also on the firm's ability to adapt its organizational culture, processes, and workforce capabilities to support these innovations.

IoT and Financial Risk Management

The IoT plays a pivotal role in enhancing financial risk management by providing real-time data from interconnected devices, sensors, and systems. In accounting, IoT technologies enable organizations to track assets, inventory, and operational data in real-time, improving decision-making and risk mitigation. Hui and Xie (2024) explored how IoT and Industrial Internet technologies are transforming risk management by enabling better resource allocation and fostering risk-taking behaviors through improved data insights.

IoT's contribution to financial risk management is particularly relevant in industries with complex supply chains or high-value assets. Through IoT-enabled systems, businesses can monitor the performance of equipment, detect potential faults before they occur, and optimize inventory levels to prevent supply chain disruptions. This proactive approach to risk management allows for more informed decision-making, reducing the likelihood of costly operational failures and financial losses.

Furthermore, the integration of IoT with AI and ML creates a powerful synergy for financial risk analysis. As noted by Ritala et al. (2024), AI algorithms can analyze vast amounts of IoT data to identify patterns, predict potential risks, and suggest corrective actions in real time. For example, predictive maintenance systems in industrial settings can forecast equipment failures and enable timely interventions, reducing the risk of costly breakdowns and minimizing downtime.

Financial Prediction and the Role of AI, ML, and IoT

Financial prediction is one of the most significant areas where AI, ML, and IoT technologies have had an impact. By analyzing historical financial data and real-time operational data collected through IoT systems, AI and ML models can predict future financial outcomes with greater accuracy than traditional methods. Hesse and Loy (2025) demonstrated that AI models trained on financial disclosures, such as MD&A sections, could predict bankruptcy with a high degree of accuracy, outperforming traditional statistical models.

The role of AI in financial prediction extends beyond bankruptcy forecasting. Machine learning algorithms have been employed to predict stock prices, detect financial fraud, and optimize investment portfolios. As AI continues to evolve, its predictive capabilities are expected to become even more accurate, providing businesses and investors with valuable insights for making data-driven financial decisions.

Challenges and Future Directions

Despite the promising applications of AI, ML, and IoT in accounting, several challenges remain. The primary issue is the **interpretability** and **transparency** of AI models, which are crucial for ensuring trust and compliance in financial reporting and auditing (Cação et al., 2025). Additionally, the integration of these technologies into legacy accounting systems presents technical and organizational hurdles. Firms must overcome resistance to change, develop new skills, and adapt their infrastructure to fully leverage AI and IoT technologies.

Future research should focus on advancing explainable AI in accounting, improving the collaborative frameworks between accounting scholars and computer scientists, and developing theoretical models that bridge traditional accounting principles with the capabilities of emerging technologies. Moreover, as IoT continues to evolve, future studies should explore its role in enhancing financial reporting, particularly in sectors where real-time data is critical.

METHODS OF RESEARCH

Research Design

The research design for this study follows a Systematic Literature Review (SLR) methodology to provide a comprehensive understanding of the current body of knowledge regarding the application of Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT) in accounting. This review systematically synthesizes existing studies to examine how these emerging technologies are transforming accounting theory, particularly in the areas of business model innovation, risk management, and financial prediction.

The SLR approach is selected to ensure a rigorous, transparent, and reproducible review process that helps to identify research gaps, theoretical advancements, and future research opportunities. The research design involves several key phases, including the formulation of research questions, the development of inclusion/exclusion criteria, data collection, and synthesis of findings.

1) Research Questions:

The central research questions guiding the SLR are:

1. How are AI, ML, and IoT technologies being applied in accounting practices, particularly in business model innovation, risk management, and financial prediction?
2. What theoretical frameworks are being used to understand the integration of these technologies in accounting?
3. What challenges and opportunities are identified in the literature regarding the use of AI, ML, and IoT in accounting?
4. How do AI, ML, and IoT technologies impact accounting theory, and what are the potential future directions for accounting research in this context?

2) Inclusion and Exclusion Criteria:

To ensure the relevance and quality of the studies included in the review, the following criteria are applied:

Inclusion Criteria:

- Studies published in peer-reviewed journals, conferences, and working papers.
- Articles published from 2015 to the present to capture the latest trends and developments in AI, ML, and IoT within accounting.
- Studies that focus on AI, ML, or IoT applications in accounting, specifically in relation to business model innovation, financial prediction, and risk management.
- Research that includes theoretical discussions, empirical evidence, or both, and addresses the integration of AI, ML, or IoT in accounting practices.

Exclusion Criteria:

- Articles that do not explicitly address the integration of AI, ML, or IoT in accounting or related fields.
- Research focusing solely on technological aspects without addressing accounting theory or practice.
- Studies with insufficient empirical data or theoretical analysis.
- Non-English language articles, unless translated or available with an English summary.

Data Collection Method

The data collection process for this SLR follows a structured and systematic approach to gather relevant articles and ensure comprehensive coverage of the subject matter. The following steps outline the data collection process:

1) Literature Search:

A comprehensive literature search is conducted across multiple academic databases to capture a broad range of relevant studies on the intersection of AI, ML, IoT, and accounting. Key databases include:

- Google Scholar
- ScienceDirect
- JSTOR
- SpringerLink
- Wiley Online Library
- IEEE Xplore
- Emerald Insight

Search terms include combinations of keywords such as:

- "Artificial Intelligence in Accounting"
- "Machine Learning in Financial Prediction"
- "Internet of Things in Risk Management"
- "AI-driven Business Model Innovation"
- "Financial Prediction with AI"
- "Accounting Theory and AI/ML/IoT"
- "Technological Advancements in Accounting"

The initial search will include broad terms, and results will be refined based on the inclusion and exclusion

criteria mentioned above.

2) Screening of Articles:

The search results are first screened by title and abstract to assess relevance. Articles that meet the initial inclusion criteria are then examined in full to ensure they contribute meaningfully to the research questions. Duplicate articles, or those that do not meet the full criteria, are excluded at this stage.

3) Data Extraction:

For each relevant study, the following data is extracted:

- **Study details**: Author(s), year of publication, title, and source (journal, conference, etc.).
- **Research focus**: The application of AI, ML, or IoT in accounting (business model innovation, financial prediction, or risk management).
- **Methodology**: Whether the study is empirical, theoretical, or a combination of both.
- **Key findings**: Key insights on how AI, ML, and IoT are transforming accounting theory and practice.
- **Theoretical framework(s)**: Any theories used to understand the impact of these technologies on accounting.
- **Research gaps**: Identified areas where further investigation is needed.

4) Data Synthesis:

The extracted data is then synthesized into thematic categories based on the research questions. The following key themes are expected to emerge:

- **Theoretical frameworks**: Identification of key accounting theories that are impacted by AI, ML, and IoT technologies.
- **Applications in accounting**: Detailed examination of how AI, ML, and IoT are used in accounting processes like financial prediction, risk management, and business model innovation.
- **Challenges and opportunities**: Analysis of the barriers to and drivers of the adoption of these technologies in accounting, including regulatory, organizational, and technical challenges.
- **Future research directions**: Suggestions for future studies, including new technologies, unexplored areas in accounting theory, and the potential for interdisciplinary collaboration.

5) Quality Assessment:

To ensure the quality of the studies included in the review, each article is assessed using standard quality criteria, such as:

- Relevance to the research questions
- Rigor of the methodology (empirical or theoretical)
- Impact on the field of accounting
- Clarity of findings and contribution to the body of knowledge

This quality assessment ensures that only studies of high methodological and theoretical standards are included in the final synthesis.

RESULT AND DISCUSSION

Results

The systematic literature review (SLR) conducted for this study provides a comprehensive overview of the current body of research on the application of Artificial Intelligence (AI), Machine Learning

(ML), and the Internet of Things (IoT) in accounting. The analysis identifies key findings related to the transformative impact of these technologies on business model innovation, risk management, and financial prediction. The results are organized into four main themes, reflecting the contributions of AI, ML, and IoT to accounting theory and practice.

1) Business Model Innovation Through AI, ML, and IoT

The integration of AI, ML, and IoT into business models is driving significant changes in accounting practices. AI and ML technologies are enabling businesses to enhance their value propositions, create more personalized products and services, and improve operational efficiency. The application of AI in business model innovation allows firms to analyze large datasets, providing deeper insights into customer behavior and market trends. For instance, companies like Vodafone have used AI-driven data analysis to personalize customer interactions, improving service delivery and creating new revenue streams (Gama & Magistretti, 2023).

IoT further supports this transformation by facilitating real-time data collection, which is crucial for making agile, data-driven decisions. Real-time data from IoT sensors allows businesses to optimize inventory management, track assets, and adjust production schedules to meet consumer demand more effectively (Akter et al., 2022). These developments signify a shift from traditional accounting models, which typically focused on financial reporting and cost control, to dynamic models that integrate operational data, predictive analytics, and customer-centric value creation.

2) Enhancement of Risk Management through AI, ML, and IoT

The use of AI, ML, and IoT technologies has notably improved **risk management** in accounting, enabling firms to assess, monitor, and mitigate financial and operational risks more effectively. AI and ML are employed in detecting anomalies in financial transactions, identifying fraud, and predicting potential financial risks. Studies, such as those by Khorsheed et al. (2024), have shown that AI and ML models can enhance the accuracy of fraud detection and financial compliance by analyzing historical and real-time data to detect patterns indicative of irregularities.

IoT plays a complementary role in risk management by offering real-time monitoring capabilities for physical assets, such as machinery, equipment, and inventory. This real-time data allows businesses to identify potential risks before they materialize, reducing operational disruptions and financial losses. For example, predictive maintenance powered by IoT sensors can forecast equipment failures, enabling firms to perform repairs before costly breakdowns occur (Hui & Xie, 2024). This proactive approach to risk management offers a more dynamic and timely way to handle financial and operational risks compared to traditional methods.

3) Financial Prediction Using AI, ML, and IoT

The integration of AI and ML into financial prediction has improved the accuracy and scope of forecasting models. Machine learning algorithms, especially those based on deep learning techniques, are capable of analyzing vast amounts of structured and unstructured data to predict financial outcomes such as bankruptcy, stock prices, and credit risk. For instance, Hesse and Loy (2025) demonstrated that AI models could predict bankruptcy with greater precision by analyzing the textual content of financial reports,

such as Management Discussion and Analysis (MD&A) sections. Their findings suggest that ML algorithms trained on these textual data are able to identify risk factors that traditional numerical models overlook, offering more accurate predictions of financial distress.

Similarly, studies by Dong et al. (2024) have shown that ML models outperform traditional stock price prediction models by incorporating a wider range of variables, including market data, news sentiment, and financial statements. These predictive models are enhanced further by the integration of IoT data, which provides real-time operational data that can be used to adjust financial forecasts in response to current conditions. This integration allows for more accurate, up-to-date financial predictions, which is crucial for making informed decisions in today's fast-paced and dynamic business environment.

4) Challenges in AI, ML, and IoT Integration into Accounting

Despite the promising potential of AI, ML, and IoT, several challenges hinder their effective integration into accounting practices. One of the primary challenges identified in the literature is the lack of interpretability in AI and ML models. As AI models, particularly deep learning models, are often described as "black boxes," it is difficult for accounting professionals to understand how these models make decisions. This lack of transparency poses a significant issue in accounting, where accuracy, compliance, and accountability are paramount. Cação et al. (2025) highlight the need for Explainable AI (XAI) to ensure that AI-driven decisions in accounting can be understood, audited, and aligned with regulatory standards.

Another challenge is the integration of these technologies into legacy accounting systems. Many firms face technical barriers when trying to adopt AI, ML, and IoT due to outdated infrastructure, lack of technical expertise, and organizational resistance to change. As pointed out by Jorzik et al. (2024), successful adoption of these technologies requires not only technological investment but also a cultural shift within the organization to embrace data-driven decision-making and continuous learning. Additionally, firms must invest in training their workforce to develop the necessary skills to work with these advanced technologies.

Discussion

The integration of Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT) into accounting practices is driving a profound transformation in the field, reshaping traditional models and methodologies. While the results from the systematic literature review (SLR) clearly highlight the potential of these technologies to enhance business model innovation, risk management, and financial prediction, several challenges remain that must be addressed for the effective implementation and adoption of these technologies in accounting. This discussion synthesizes the results and explores the implications of these findings for accounting theory and practice, emphasizing the potential opportunities, challenges, and future research directions.

1) Impact of AI, ML, and IoT on Business Model Innovation

AI, ML, and IoT have provided substantial opportunities for business model innovation in accounting, enabling firms to shift from traditional financial models to dynamic, data-driven approaches. AI-driven analytics offer the ability to create personalized customer experiences, optimize processes, and improve decision-making efficiency. The ability of AI to analyze vast amounts of data provides businesses

with insights that were previously difficult to obtain using traditional methods. As highlighted by Jorzik et al. (2024) and Gama & Magistretti (2023), AI and IoT have not only facilitated customization of services but have also enabled companies to redefine their value propositions, especially in industries that are data-intensive or customer-focused.

The implications for accounting theory here are significant. Traditional accounting models, which often emphasize historical financial data and periodic reporting, are being challenged by the need for real-time financial reporting and dynamic performance metrics that integrate non-financial data (e.g., customer satisfaction, real-time market conditions). Accounting theory must evolve to account for this shift from historical reporting to continuous data analysis. This includes integrating predictive models, which leverage AI and ML to offer forecasts based on real-time data, into accounting standards and reporting frameworks.

However, the shift toward AI-driven business models presents challenges for accounting professionals. The adoption of AI and IoT necessitates new skills, not only in data analysis and machine learning but also in adapting to new business models that may require accountants to focus on non-financial performance indicators (e.g., customer behavior, process efficiency). As firms increasingly rely on these technologies, accountants will need to develop competencies in managing and interpreting real-time data, requiring the education and training of accounting professionals in these emerging technologies.

2) AI, ML, and IoT in Risk Management

AI, ML, and IoT have dramatically enhanced risk management practices in accounting by enabling firms to assess and mitigate risks in real-time, rather than relying on historical data alone. The use of AI and ML in fraud detection, compliance monitoring, and risk prediction provides accountants with powerful tools to identify potential risks early and make proactive decisions. As Khorsheed et al. (2024) suggest, AI models can uncover hidden risks in large datasets that traditional manual audits might miss, which is crucial in today's fast-paced, data-driven financial environments.

Furthermore, IoT enables real-time monitoring of physical assets, allowing businesses to predict equipment failures, supply chain disruptions, or other operational risks before they occur. The integration of AI and IoT for risk management provides a comprehensive approach to managing both financial and operational risks, offering firms a more dynamic and timely method for risk mitigation.

Despite these advancements, one of the major barriers to effective risk management with AI and IoT is the lack of interpretability of AI models. As noted in the literature, AI-driven risk management systems often operate as "black boxes," making it difficult for accounting professionals to fully understand and trust the decision-making process. This is particularly problematic in industries like accounting, where transparency and auditability are critical. The challenge for accounting theory is to incorporate explainable AI (XAI) into risk management models, ensuring that AI models provide transparent, understandable, and auditable insights. Without these capabilities, accounting professionals may hesitate to adopt AI-driven solutions, limiting their potential for improving risk management practices.

3) Financial Prediction with AI, ML, and IoT

AI and ML have proven to be invaluable in **financial prediction**, offering significant improvements over traditional forecasting models. By utilizing AI's ability to process vast amounts of structured and unstructured data, businesses can more accurately predict financial outcomes, including

bankruptcy, stock prices, and market trends. Hesse and Loy (2025) demonstrated that AI models, particularly those based on deep learning techniques like BERT, outperform traditional models in predicting bankruptcy, as they analyze the contextual meaning of financial disclosures rather than relying solely on numerical data. This provides a richer, more nuanced understanding of financial health.

The integration of IoT with financial prediction models further enhances their accuracy by incorporating real-time operational data. IoT devices collect data that can be used to adjust financial forecasts and provide more accurate predictions about future performance. For example, in manufacturing, IoT sensors can monitor inventory levels and production conditions, helping accountants forecast costs, revenues, and cash flow with greater precision (Dong et al., 2024). These advancements suggest that predictive analytics will become a central element of future accounting practices, enabling more proactive and informed decision-making.

However, the adoption of AI, ML, and IoT for financial prediction introduces new challenges for accounting theory. As these technologies rely on real-time data and dynamic, predictive models, traditional accounting practices that emphasize static reporting based on historical financial data must evolve. Accounting models will need to incorporate predictive capabilities, and theoretical frameworks must adapt to consider real-time data and future projections rather than just past performance. Furthermore, the ethics of AI in financial decision-making must be carefully considered. Algorithms that drive financial predictions must be transparent, free from bias, and capable of providing explainable outputs to ensure they are used responsibly in financial contexts.

CONCLUSION

The integration of Artificial Intelligence (AI), Machine Learning (ML), and the Internet of Things (IoT) into accounting is ushering in a new era of innovation, efficiency, and predictive capabilities. This study highlights the transformative impact these technologies are having on key areas of accounting, particularly business model innovation, risk management, and financial prediction. The findings from the systematic literature review (SLR) reveal that AI, ML, and IoT are not only enhancing the accuracy and efficiency of accounting practices but are also reshaping the theoretical foundations of the field.

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