International Journal of Accounting and Economics Studies, 12 (SI-1) (2025) 244-251

SPC

International Journal of Accounting and Economics Studies

Website: www.sciencepubco.com/index.php/IJAES
https://doi.org/10.14419/642zzb93
Research paper

A Systematic Literature Review of Management Accounting Systems (MAS) in The Industry Revolution 4.0

Lou Yuxiao [1] *, Ruhanita Maelah [2]

[1] *Faculty of Economics and Management, Universiti Kebangsaan Malaysia, Selangor, Malaysia, School of Accounting, Shandong Women's University, Jinan, Shandong, China.*
[2] *Faculty of Economics and Management, Universiti Kebangsaan Malaysia, Selangor, Malaysia.*
**Corresponding author E-mail: P121136@siswa.ukm.edu.my*

Received: May 28, 2025, Accepted: June 14, 2025, Published: August 28, 2025

Abstract

Industry 4.0 encourages technologies like automation with AI, big data processing, and Internet of Things (IoT) capabilities, which fundamentally alter business operations across all industrial sectors. The modern evolution of MAS contributes to data-driven decisions and better process efficiency, which helps companies achieve a better competitive advantage. MAS leverages digital tools with systems and technologies to handle finance alongside non-financial data to support decision-making (DM) at the level of cost management, along with performance evaluation and strategic planning. Industry 4.0's growth has led to MAS definition changes that allow technology implementation for real-time monitoring and prediction analysis, and business process enhancement. A systematic evaluation of the literature examines MAS evolution by using the PRISMA framework within the framework of Industry 4.0. The review understands why businesses use digital MAS and analyzes their operation within Industry 4.0 settings and their influence on business results, as well as strategic success. It points out knowledge deficiencies as well as industry-specific challenges and opportunities that businesses encounter during their effort to unite traditional MAS with Industry 4.0 tools. It recommends performing additional investigations to identify how MAS can adapt to Industry 4.0 requirements, which will support organizations in their lasting business development.

***Keywords**: Business Process; Cost Management; Internet of Things (IoT); Management Accounting Systems (MAS); PRISMA Framework.*

1. Introduction

Industry 4.0 advances at a fast pace through automation, big data analytics, and artificial intelligence (AI). IoT plays a key role in transforming organizational operational systems (Zhang 2021; Safavi & Omidi, 2015). The innovations improve operational effectiveness at the same time to revolutionize how organizations make decisions (Piosik, 2022). Evaluation and strategic planning, as well as cost management, receive major support from MAS within this advancing digital era (Ratmono et al., 2023). MAS gathers financial and non-financial data through processing this information into meaningful presentations, which support managerial decisions (Inam et al., 2023; Manfredi et al., 2022). These traditional monitoring systems processed historical data while reporting statically until Industry 4.0 changed their functionality to add real-time analytics, predictive modeling, and automatic reporting functionality (Arkhipova et al., 2024). The increasing importance of digital MAS demands a systematic approach to the industrial implementation of these systems in Industry 4.0 operational environments. MAS, under the framework, experiences innovative transformations as a reaction to emerging technologies. It evaluates the fundamental reasons that drive digital MAS acceptance together with their role in time-sensitive DM and identifies organizational limitations during execution (Alnedawe et al., 2023). The knowledge gaps alongside future directions enable understanding of how MAS can best evolve for supporting sustainable business expansion (Abdullah & Almaqtari, 2024). Digital MAS creates a connection between management accounting methods and industrial technologies of the fourth industrial revolution to advance financial and strategic decision-making (Ramakrishnan et al., 2022; Juibari, 2016).

2. Methodology

The systematic review was conducted following the PRISMA framework to ensure methodological rigor, transparency, and reproducibility in the assessment of literature related to MAS within the context of Industry 4.0. The process involved a comprehensive database search; meticulous screening of relevant studies, and critical appraisal of their methodological quality. This structured approach facilitated an objective synthesis of existing findings, enhancing the reliability and validity of conclusions drawn regarding the transformation, implementation, and strategic impact of MAS in technologically advanced business environments. Fig. 1 shows the selection framework.

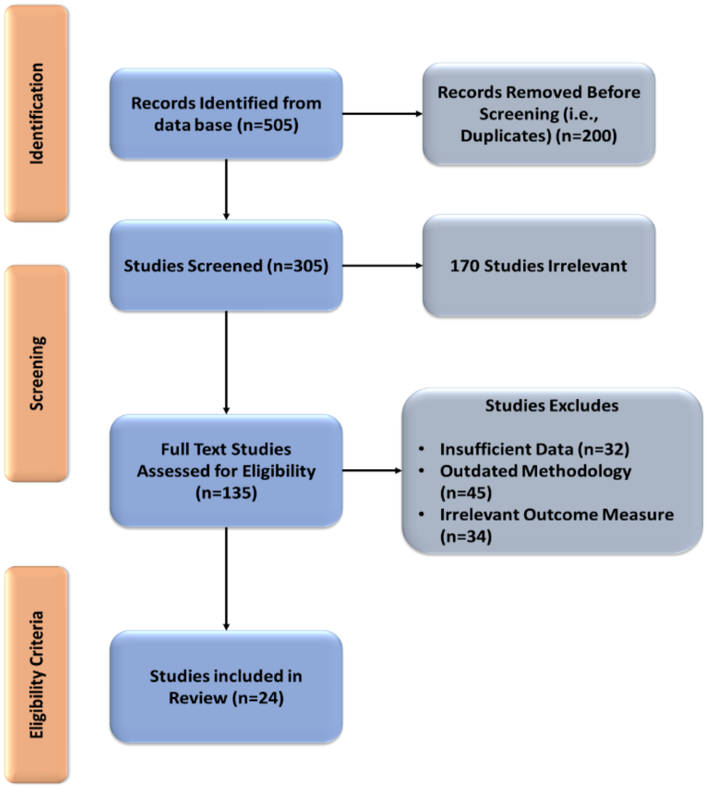

Fig.1: Selection Framework

2.1 Data Sourcing

The data for this systematic review were sourced from a comprehensive search of electronic databases, identifying 505 records. After removing 200 duplicates, 305 studies were screened based on titles and abstracts. Among these, 170 were excluded for irrelevance. The remaining 135 full-text articles were assessed for eligibility. Studies were excluded due to insufficient data (n=32), outdated methodology (n=45), or irrelevant outcome measures (n=34). In the end, 24 analytical studies were included in the evaluation after meeting the inclusion criteria. A strict and objective selection procedure in accordance with PRISMA recommendations for systematic reviews and meta-analyses was guaranteed by this methodical approach. Table 1 displays the data sourcing framework.

Table 1: Data Sourcing Framework

Journal Name	No. of Articles
IEEE Access	2
Conference Proceedings (ACBLETI 2020)	1
Journal of Information Systems and Management (JISMA)	1
Journal of Emerging Technologies in Accounting	1
Forecasting	1
International Arab Journal of Information Technology (IAJIT)	1
Economic Affairs	1
Sustainability	1
International Journal of Productivity and Performance Management	1
Doctoral Dissertation (West Virginia University)	1
Cogent Business & Management	1
Archives of Business Research	1
Management Systems in Production Engineering	1
Water	1
Applied Sciences	2
PeerJ Computer Science	1
Alexandria Engineering Journal	1
In Operations Research Forum	1
Malaysian Journal of Social Sciences and Humanities (MJSSH)	1
Journal of Education Technology	1
World Journal of Advanced Research and Reviews	1
Int J Multidiscip Res Growth Eval	1

2.2 Eligibility Criteria

Peer-reviewed journal papers and conference proceedings were considered in this review, and dissertations published between 2021 and 2024 that focus on MAS within the context of Industry 4.0. The combination of digital technologies, such as cloud computing, big data analytics, machine learning (ML), artificial intelligence (AI), and the IoT with MAS or associated accounting and financial systems, was the focus of eligible publications. Only English-language sources were considered. Studies were required to provide empirical data, conceptual frameworks, or systematic analyses relevant to MAS evolution or digital transformation. Articles unrelated to MAS or lacking relevance to Industry 4.0 environments were excluded.

2.3 Search Strategy

This systematic review employed a structured search strategy guided by the PRISMA framework. Using scholarly databases like Scopus, Web of Science, IEEE Xplore, ScienceDirect, and Google Scholar, a search was conducted for peer-reviewed publications released between 2021 and 2024. Keywords used included "Management Accounting Systems," "Industry 4.0," "digitalization," "AI in accounting," "IoT," and "smart manufacturing." Boolean operators (AND, OR) and truncation techniques were applied to refine results. Only English-language articles relevant to Industry 4.0 and MAS integration were selected. The revised literature base focuses on high-impact accounting and finance studies. As noted by Otley (2016), digital MAS must be evaluated in context-sensitive environments, as their effectiveness is shaped by organizational structure, strategy, and culture. Bhimani & Willcocks (2014) further argue that digitization requires a reassessment of accounting's strategic role, moving beyond traditional data processing toward a more analytical and decision-enabling function.

2.4 Data Extraction

Nineteen peer-reviewed publications and scholarly sources that focused on MAS in the context of Industry 4.0 and were published between 2021 and 2024 were systematically reviewed as part of the data extraction procedure. Key bibliographic details, study objectives, methodologies, technologies discussed (e.g., AI; IoT; machine learning); and findings related to MAS evolution were extracted. The spanned diverse sectors, including manufacturing, energy, auditing, and SMEs. Common themes such as predictive analytics, real-time monitoring, cloud accounting, and digital transformation were identified. The extracted data were synthesized to highlight the integration of Industry 4.0 technologies into MAS and their impact on organizational performance.

2.5 Environmental Monitoring and Accounting in Industry 4.0

The implementation of Industry 4.0 leads to business digital transformations through integrating IoT alongside IoS and CPS technology into manufacturing operations (Yu et al., 2023). The innovations improve engineering activities, together with material usage and supply chain processes. Various applications leverage sensors, IoT, and Geographic Information Systems (GIS) to design environmental reporting systems (Sira, 2024). Technologies like Google Street View, real-time sensor data sharing, decision support systems, RFID tags, and automated monitoring systems help to track environmental conditions, optimize resource use, and reduce carbon emissions in smart cities and industries. Fig.2 illustrates the impact of Industry 4.0 MAS.

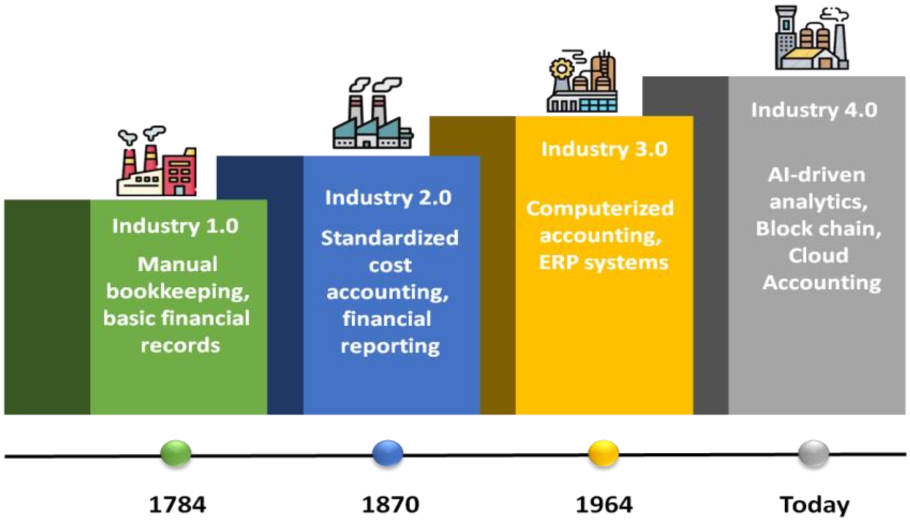

Fig. 2: Industry 4.0 Impact on Management Accounting

2.6 Digital Transformation of MAS

The impact of Industry 4.0 on higher education in Vietnam: discussing challenges and opportunities arising from technological advancements. While their focus is on education, their insights are relevant to MAS in Industry 4.0. It draws attention to the increasing demand for automation, AI-driven decision-making, and digital transformation—all of which are essential for contemporary MAS. By encouraging the combination of cloud computation, blockchain, and big data insights with accounting, Industry 4.0 improves operational effectiveness and financial transparency (Mohd Faizal et al., 2022). The highlights challenges such as technological adaptation, workforce upskilling, and cybersecurity, which also apply to accounting systems. The shift towards digital education aligns with the need for real-time financial reporting and predictive analytics in MAS, ensuring accuracy, efficiency, and strategic DM in Industry 4.0 environments. While the integration of Industry 4.0 technologies is central to this review, it is equally important to re-emphasize the foundational functions of MAS, such as cost control, budgeting, variance analysis, performance measurement, and strategic planning. These functions are being reshaped—not replaced—by digital tools. For example, real-time variance analysis is enabled by IoT-driven performance dashboards; budget forecasting now integrates ML models; and cost control is increasingly automated through AI-enhanced procurement systems. The evolution of MAS lies in enhancing these traditional functions with precision, speed, and data transparency.

2.7 Leveraging Smart Technologies for Strategic Decision-Making

MAS is changing quickly in the age of Industry 4.0 to integrate smart technologies like artificial intelligence (AI), big data analysis, cloud computing, and the IoT. These innovations are transforming traditional accounting processes into dynamic, data-driven systems that support real-time DM (Villar et al., 2023). By leveraging these technologies, MAS can provide more accurate forecasts, detect inefficiencies, and deliver strategic insights that drive business performance. The integration of automation and predictive analytics enhances the role of management accountants, enabling them to move into strategic advisory positions from transactional tasks (Razali et al., 2024). As businesses navigate a complex, fast-paced digital environment, MAS empowered by Industry 4.0 tools becomes essential in delivering value-added insights and supporting long-term strategic planning (Basiru et al., 2023). Ultimately, smart technologies give businesses the agility and vision they need to be competitive in a global market that is changing quickly, in addition to increasing efficiency.

2.8 Adapting Financial Insights for a Digital Transformation Era

The emergence of Industry 4.0 has brought rapid advancements in digital technology, including automation, big data analysis, the IoT, and AI. These innovations are reshaping traditional business processes, including the role of MAS (Odonkor et al., 2024). In this digital transformation era, MAS must evolve beyond conventional financial reporting to provide real-time data that supports strategic decision-making. Accountants are currently required to interpret complex datasets, forecast trends, and offer forward-looking guidance rather than merely recording historical performance (Atianashie et al., 2024). The integration of smart technologies into MAS enhances the accuracy, speed, and relevance of financial information, enabling organizations to react to operational difficulties and market shifts more skillfully. As such, the function of management accounting is transitioning from a reactive to a proactive role, where financial insights are not just recorded but strategically adapted to efficiency, drive innovation, and long-term value in the Industry 4.0 landscape.

3. Result

The following sections present a contrastive analysis of different models and methods suitable for MAS in Industry 4.0. The results of the performance comparison are discussed, highlighting the efficiency and limitations of AI-driven analytics, blockchain, and cloud-based accounting solutions in cost management and DM support.

3.1 Evolution of MAS in Industry 4.0

Table 2 provides various ML and AI methods applied across industries, detailing their characteristics, forecasting algorithms, and performance. Ali et al. (2024) used a CNN machine vision model for defect detection in smart manufacturing, achieving 96.5% accuracy. Baierle et al. (2024) leveraged AdaBoost for raw material yield prediction in tanneries, reporting an RMSE of 0.057. Achouch et al. (2022) applied CNN, LSTM, and ARIMA for industrial equipment failure prediction. Bouazizi et al. (2024) utilized Random Forest and Linear Regression for supply chain inventory forecasting, with 93.2% accuracy. Tian & Ji (2024) implemented XGBoost for ride comfort prediction, achieving $R^2 = 0.96$. Choi et al. (2023) u`sed SVR-RBF for temperature control in steel plants, with RMSE = 18.99. Abba et al. (2023) applied LSTM-CSA for desalination, achieving RMSE = 0.1890. These studies highlight AI's role in optimizing industrial processes, improving forecasting accuracy, and enhancing DM efficiency. Fig. 3 shows the MAE of MAS in Industry 4.0. While AI- and blockchain-enhanced MAS demonstrate strong predictive capabilities and real-time responsiveness, their implementation is not without limitations. For instance, cloud MAS platforms offer cost-efficiency but often suffer from security concerns and customization challenges in smaller firms. Sector-specific challenges also persist: the manufacturing industry adopts predictive models more readily than public sector organizations, which face regulatory inertia and lower digital maturity. Moreover, contradictions exist in the literature—some studies report productivity gains, while others show negligible returns due to integration lags or workforce resistance.

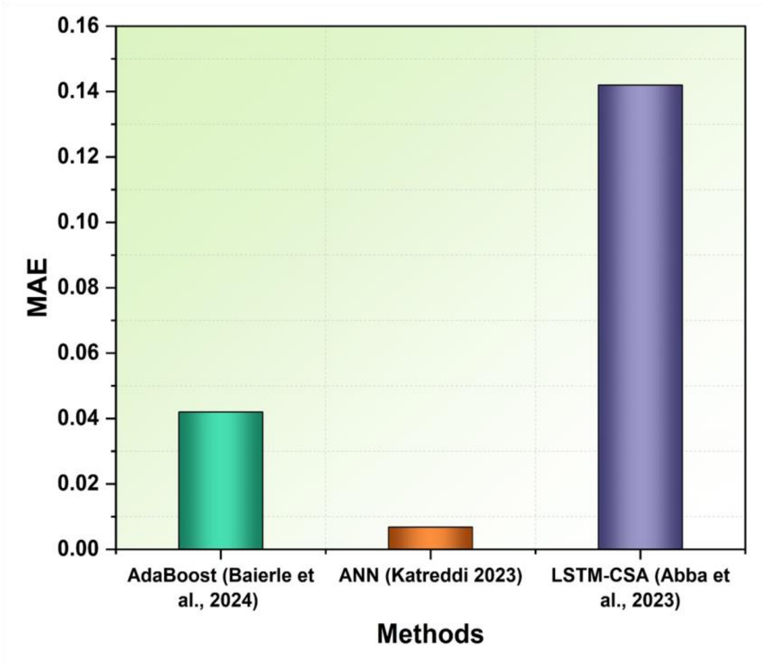

Fig. 3: MAE of MAS in Industry 4.0

Table 2: Forecasting and Analytics in Industry 4.0

References	Characteristics	Types	Techniques for Feature Selection and Extraction	Databases	Forecasting Algorithms	Forecasting Targets	Performance Measurements
Ali et al., (2024)	Industrial quality control parameters; smart manufacturing data	Machine learning, deep learning	PCA; LASSO; Mutual Information	Smart factory datasets	CNN Machine Vision model	Defect detection; product quality assessment	Accuracy: 96.5%; Precision: 96.8%; Recall: 96.7%; F1-score: 97%
Baierle et al. (2024)	Historical production data from a tannery in southern Brazil focuses on prediction.	Machine Learning	-	Tannery's management system data	AdaBoost (best performer); Random Forest; Gradient Boosting; Neural Networks	Raw material yield prediction	MAE: 0.042; MSE: 0.003; RMSE: 0.057; R²: 0.331
Achouch et al., (2022)	Industrial equipment data, sensor readings, IoT data in smart manufacturing	Machine learning, deep learning, statistical	PCA; LASSO; Mutual Information	Industrial datasets	CNN; LSTM; Random Forest; ARIMA	Equipment failure prediction; remaining useful life estimation	-
Bouazizi et al. (2024)	Supply chain 4.0 inventory data considering districts and seasons	Machine learning; predictive analytics	-	Detailed datasets considering districts and seasons	Random Forest, Linear Regression, and SVM model	Incoming and outgoing inventory quantities	Random Forest (OUT inventory): MSE = 0.000517; Linear Regression (IN inventory): MSE = 0.001685
Tian & Ji, (2024)	Real-time adaptive tractor ride comfort adjustment system using IoT and ML	Machine Learning	-	IoT-enabled tractor data	XGBoost	Ride comfort prediction	Accuracy=93.2% R²: 0.96; RMSE: 0.015
Choi et al., (2023)	Tap temperature prediction and power consumption optimization in EAF steel plants.	Machine learning, deep learning	PCA; Mutual Information	Industrial steel plant datasets	SVR-RBF	Temperature control; energy efficiency improvement	RMSE:18.99 MAE:14.46;R2: 0.334
Alnor, (2024)	MAS is incorporating cutting-edge technology including cloud computing, blockchain, and AI	AI; Blockchain; Cloud Computing; Big Data Analytics	-	-	MLAlgorithms	Organizational performance metrics	Error reduction: significant decrease; Task automation: increased efficiency; Predictive accuracy: improved forecasting
Alabadi & Habbal, (2023)	AI-driven analytics; blockchain integration; cloud accounting; real-time data processing	Financial reporting; cost management; DMsupport	PCA; Feature Scaling; Dimensionality Reduction	Cloud-based financial data, ERP systems, and Blockchain ledgers	ML(ML); Deep Learning (DL); Econometric Models	Cost forecasting, financial risk prediction, and budget optimization	RMSE: 0.0022
Katreddi, (2023)	Data on medium- and heavy-duty cars' fuel usage and maintenance expenses	Machine learning	-	Data collected in collaboration with fleet management companies operating medium- and heavy-duty vehicles on diesel and alternative fuels	Artificial Neural Networks (ANN); Random Forest; XGBoost; Super Learner	Fuel consumption per trip; maintenance cost per mile	MAE: 0.0068; RMSE: 0.0086; R²: 97.28%
Abba et al., (2023)	AI-based desalination; hybrid NF–RO process; permeate conductivity prediction; uncertainty analysis	Deep Learning; AI Models	Monte Carlo Simulation	Desalination process data	LSTM; Optimized Metaheuristic Crow Search Algorithm (LSTM-CSA)	NF–RO system performance prediction (permeate conductivity)	RMSE = 0.1890; MAE = 0.1420

3.2 Enhancing MAS with AI and Blockchain

Table 3 presents a comparison of various fraud detection methods in cybersecurity, demonstrating their performance using important measures like F1-score, recall, accuracy, and precision. Alijoyo (2024) proposed a CNN-IoT-based framework, achieving the highest precision (92%) and recall (85%), leading to an accuracy of 88%. Chi et al. (2024) employed BERT, attaining an accuracy of 86.6% and a macro F1-score of 79%, indicating strong text-based fraud detection. Chernysh et al. (2024) utilized a Random Forest with an accuracy of 85% and an F1-score of 84%, balancing prediction stability. The findings highlight the efficiency of deep learning, traditional machine learning, and data-balancing techniques in cybersecurity, emphasizing the importance of selecting the right model based on accuracy, precision, and recall trade-offs. Fig. 4 displays the outcome of enhancing MAS in Industry 4.0.

Table 3: Performance of MAS in Industry 4.0

Reference	Method	Results (Key Parameters & Values)
Alijoyo (2024)	CNN –IoT-based framework	Accuracy: 88%; Precision: 92%; Recall: 85%; F1-score:88%
Chi et al.(2024)	BERT	Accuracy: 86.6%; Macro F1-score: 79%
Chernysh et al. (2024)	Random Forest	Accuracy: 85%; F1-score: 84%

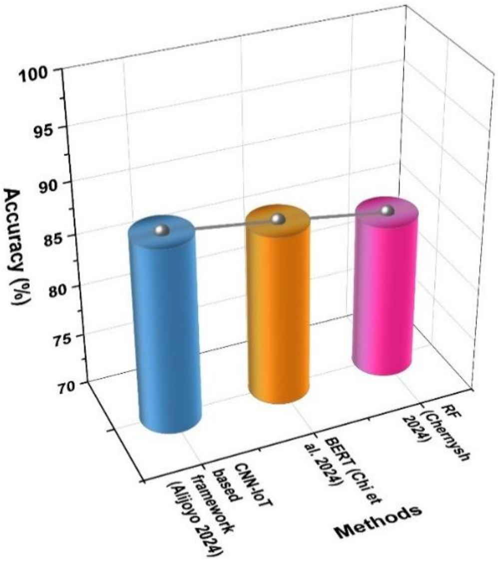

Fig. 4: Outcome of Enhancing MAS in Industry 4.0

4. Discussion

The sector of Accounting Information Systems (AIS) serves Industry 4.0 by supplying advanced financial decision support combined with automated processes and accurate data analyses. The discussed AI was combined with blockchain and cloud computing, which assists in restructuring accounting procedures and enhances both processing efficiency and security functions. AIS implementation within modern industries produces three significant advantages: it lowers manual mistakes; it enables instant reporting functionality; and it strengthens strategic planning capabilities. Digital transformation in accounting stands as an essential requirement for organizations to succeed against modern technological changes, according to their discussion. Malau (2021) examined digital disruption along with its influence on accounting education within both Industry 4.0 and Society 5.0. The authors emphasize how accounting education requires learning models that unite technology, along with automation and AI, to improve educational practices. Future accountants need digital literacy alongside critical thinking, according to the education standards discussed. The discussion sheds light on training obstacles such as educators' reluctance to change, along with curriculum adjustments, while analyzing the educators' contribution to preparing students for emerging technological environments. The cloud accounting system leads to a transformation of accounting information systems within Industry 4.0, according to Salem & Nurdayadi (2022). The present examples that demonstrate cloud solutions make data accessible and automated while offering enhanced security capabilities, which allow financial decisions to be made in real-time. Blockchain technology combined with artificial intelligence (AI) improves financial reporting by enabling more precise and effective operations. The authors examine cybersecurity dangers alongside implementation obstacles that make businesses require digital transformation to maintain competitive positions. The (Demartini & Taticchi, 2022) has changed performance management and measurement in the Industrial Revolution 4.0 framework. The current performance metrics are derived from management principles through the inclusion of digital transformation and automation systems with time-efficient analytics. A transition occurs in business performance measurement because organizations at present base their choices on analytical data enhanced through Artificial Intelligence. Industry 4.0 creates efficient systems with adaptable structures and strategic frameworks that help organizations optimize their operations by resolving issues related to excessive data complexity and technology adoption for sustainable development. Gwala & Mashau (2022) examined the way corporate governance influences organizational performance in Industry 4.0. Innovation advances and operational efficiency, and sustainability are enhanced by governance systems. The ethical leadership, together with digital evolution and strategic planning, is are essential element to boost corporate excellence during the modern technological transformation. The adoption of digital MAS brings tangible benefits, including reduced reporting time, improved forecasting, and better compliance. However, these benefits come with significant upfront costs in terms of hardware, training, and cybersecurity. From a policy perspective, governments and regulators must establish unified digital accounting standards and provide support mechanisms for SMEs transitioning to cloud-based MAS. Furthermore, accounting education needs urgent reform—curricula should now include AI literacy, data visualization, and ERP-MAS integration to prepare graduates for the evolving role of management accountants.

5. Conclusion

Predictive analytics, real-time information processing, and improved strategic DM are all being revolutionized by the incorporation of Industry 4.0 technologies into MAS. The increasing use of automation, AI, large-scale data, and IoT in MAS is highlighted in this systematic analysis. These technologies help firms enhance resource optimization, cost control, and performance assessment. While digital MAS offers significant benefits, challenges such as technological adaptation, cybersecurity risks, and workforce upskilling must be addressed for successful implementation. The identified knowledge gaps, particularly in aligning MAS with rapidly evolving digital infrastructures, need to be addressed. Further investigations ought to examine the long-term effect of digital MAS on financial sustainability; integration challenges across industries; and the development of AI-driven, adaptive accounting models. As businesses continue their digital transformation, MAS must evolve to provide greater accuracy, efficiency, and strategic value, ensuring its role as a key driver of organizational growth and competitiveness in Industry 4.0. Future research should prioritize comparative studies across MAS platforms (e.g., SAP, Oracle, Zoho) to understand cost-performance trade-offs. Additionally, under-researched sectors such as nonprofits, healthcare, and education offer rich opportunities to explore digital MAS adoption. Finally, longitudinal studies measuring the causal impact of AI-based MAS on financial outcomes (e.g., ROI, variance reduction, strategy alignment) are essential for empirical validation.

References

[1] Abba, S. I., Usman, J., Abdulazeez, I., Lawal, D. U., Baig, N., Usman, A. G., & Aljundi, I. H. (2023). Integrated modeling of hybrid nanofiltration/reverse osmosis desalination plant using deep learning-based crow search optimization algorithm. Water, 15(19), 3515.

[2] Abdullah, A. A. H., & Almaqtari, F. A. (2024). The impact of artificial intelligence and Industry 4.0 on transforming accounting and auditing practices. Journal of Open Innovation: Technology, Market, and Complexity, 10(1), 100218.

[3] Achouch, M., Dimitrova, M., Ziane, K., Sattarpanah Karganroudi, S., Dhouib, R., Ibrahim, H., & Adda, M. (2022). On predictive maintenance in Industry 4.0: Overview, models, and challenges. Applied Sciences, 12(16), 8081. https://doi.org/10.3390/app12168081

[4] Alabadi, M., & Habbal, A. (2023). Next-generation predictive maintenance: Leveraging blockchain and dynamic deep learning in a domain-independent system. PeerJ Computer Science, 9, e1712. https://doi.org/10.7717/peerj-cs.1712

[5] Ali, Y., Shah, S. W., Arif, A., Tlija, M., & Siddiqi, M. R. (2024). Intelligent framework design for quality control in Industry 4.0. Applied Sciences, 14(17), 7726. https://doi.org/10.3390/app14177726

[6] Alijoyo, F. A. (2024). AI-powered deep learning for sustainable Industry 4.0 and Internet of Things: Enhancing energy management in smart buildings. Alexandria Engineering Journal, 104, 409–422.

[7] Alnedawe, B. M., Ibraheem, W. E., & Al-Abbasi, Z. Q. (2023). Modelling and compensation of SIC imperfection in IRS-NOMA-based 5G system. Journal of Internet Services and Information Security, 13(3), 31–40.

[8] Alnor, N. H. A. (2024). Applications of Modern Technology in Developing Management Accounting Systems and How They Affect the Organizational Performance. wseas Transactions on Business and Economics, 21, 2591-2601.

[9] Arkhipova, D., Montemari, M., Mio, C., & Marasca, S. (2024). Digital technologies and the evolution of the management accounting profession: A grounded theory literature review. Meditari Accountancy Research, 32(7), 35–64.

[10] Atianashie, M., Adaobi, C. C., Adinkrah-Appiah, K., & Obeng-Ofori, D. (2024). Digital technologies: A congregating pan-African public management on the Fourth Industrial Revolution for employability and sustainable growth. Journal of Education Technology, 8(1), 1–11.

[11] Baierle, I. C., Haupt, L., Furtado, J. C., Pinheiro, E. T., & Sellitto, M. A. (2024). Forecasting raw material yield in the tanning industry: A machine learning approach. Forecasting, 6(4), 1078–1097.

[12] Basiru, J. O., Ejiofor, C. L., Onukwulu, E. C., & Attah, R. U. (2023). Optimizing administrative operations: A conceptual framework for strategic resource management in corporate settings. International Journal of Multidisciplinary Research and Growth Evaluation, 4(1), 760–773.

[13] Bouazizi, E., Khedr, A., Elfaioumy, S., & Belal, M. (2024). Inventory optimization using data science technologies for Supply Chain 4.0. International Arab Journal of Information Technology, 21(6). 996-1005.

[14] Chernysh, O., Smishko, O., Koverninska, Y., Prokopenko, M., & Pistunov, I. (2024). The role of artificial intelligence in financial analysis and forecasting: Using data and algorithms. Economic Affairs, 69(3), 1493–1506.

[15] Chi, W. W., Tang, T. Y., Salleh, N. M., Mukred, M., AlSalman, H., & Zohaib, M. (2024). Data augmentation with semantic enrichment for deep learning invoice text classification. IEEE Access, 12, 57326-57344.

[16] Choi, S. W., Seo, B. G., & Lee, E. B. (2023). Machine learning-based tap temperature prediction and control for optimized power consumption in stainless electric arc furnaces (EAF) of steel plants. Sustainability, 15(8), 6393. https://doi.org/10.3390/su15086393

[17] Demartini, M., & Taticchi, P. (2022). Performance measurement and management: A literature review focused on the role played by management theories with a deep dive into the Industry 4.0 environment. International Journal of Productivity and Performance Management, 71(4), 1008–1033.

[18] Gwala, R. S., & Mashau, P. (2022). Corporate governance and its impact on organisational performance in the fourth industrial revolution: A systematic literature review. Corporate Governance and Organizational Behavior Review, 6(1), 98–114.

[19] Inam, U., Ali, Q. M., Ahmed, Q., & Bat, L. (2023). Morphological description of megalopal stages of three portunid species (Decapoda: Brachyura: Portunidae) from Indus Deltaic Area (northern Arabian Sea). Natural and Engineering Sciences, 8(1), 46–60.

[20] Juibari, A. M. (2016). Abu Saeed Abu Al Kheir and his place in the Sunni and Shia interpretations. International Academic Journal of Social Sciences, 3(2), 170–174.

[21] Katreddi, S. (2023). Development of a machine learning-based approach to predict fuel consumption and maintenance cost of heavy-duty vehicles using diesel and alternative fuels [Doctoral dissertation, West Virginia University].

[22] Malau, M. (2021). Analysis of the accounting learning digital disruptive in Industrial Revolution 4.0 and Society 5.0. In 2nd Annual Conference on Blended Learning, Educational Technology and Innovation (pp. 276–281).

[23] Manfredi, S., Ceccato, M., Sciarretta, G., & Ranise, S. (2022). Empirical validation on the usability of security reports for patching TLS misconfigurations: User- and case-studies on actionable mitigations. Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications, 13(1), 56–86.

[24] Mohd Faizal, S., Jaffar, N., & Mohd Nor, A. S. (2022). Integrate the adoption and readiness of digital technologies amongst accounting professionals towards the fourth industrial revolution. Cogent Business & Management, 9(1), 2122160. https://doi.org/10.1080/23311975.2022.2122160

[25] Odonkor, B., Kaggwa, S., Uwaoma, P. U., & Farayola, O. A. (2024). A review of US management accounting evolution: Investigating shifts in tools and methodologies in light of national business dynamics. World Journal of Advanced Research and Reviews, 21(1), 189–204.

[26] Piosik, A. (2022). The intensity of the use of management accounting systems under Industry 4.0 conditions: Confirmation from Poland. Procedia Computer Science, 207, 1598–1610.

[27] Ramakrishnan, J., Ravi Sankar, G., & Thavamani, K. (2022). Bibliometric analysis of literature in the field of surgical gastroenterology during 2010–2019. Indian Journal of Information Sources and Services, 12(2), 37–49.

[28] Ratmono, D., Frendy, & Zuhrohtun, Z. (2023). Digitalization in management accounting systems for urban SMEs in a developing country: A mediation model analysis. Cogent Economics & Finance, 11(2), 2269773. https://doi.org/10.1080/23322039.2023.2269773

[29] Razali, F. A., Ahmad, N. L., & Jamaluddin, N. S. A. (2024). Accountant in the Industry 4.0 era: The need for multidisciplinary skills. Malaysian Journal of Social Sciences and Humanities, 9(10).

[30] Safavi, R., & Omidi, F. (2015). Effects of Core Self-Evaluations and Psychological Climate on Work Engagement (Case Study: Hotel Employees Khuzestan.). International Academic Journal of Organizational Behavior and Human Resource Management, 2(2), 7–20.

[31] Salem, S., & Nurdayadi, A. (2022). Cloud accounting: The development of accounting information system in Industry 4.0 in Indonesia. Archives of Business Research, 10(6).

[32] Sira, M. (2024). Potential of advanced technologies for environmental management systems. Management Systems in Production Engineering, 32(1), 33-44.

[33] Tian, H., & Ji, A. (2024). Real-time adaptive tractor ride comfort adjustment system based on a machine learning method. IEEE Access, 13, 3274-3283.

[34] Villar, A., Paladini, S., & Buckley, O. (2023, July). Towards supply chain 5.0: Redesigning supply chains as resilient, sustainable, and human-centric systems in a post-pandemic world. In Operations Research Forum, 4(3), 60.

[35] Yu, W., Gu, Y., & Dai, J. (2023). Industry 4.0-enabled environment, social, and governance reporting: A case from a Chinese energy company. Journal of Emerging Technologies in Accounting, 20(1), 245–258.
[36] Zhang, X. (2021). Application of data mining and machine learning in management accounting information system. Journal of Applied Science and Engineering, 24(5), 813–820.
[37] Otley, D. (2016). The contingency theory of management accounting and control: 1980–2014. Management Accounting Research, 31, 45–62. https://doi.org/10.1016/j.mar.2016.02.001
[38] Bhimani, A., & Willcocks, L. (2014). Digitization, 'Big Data' and the transformation of accounting information. Accounting and Business Research, 44(4), 469–490. https://doi.org/10.1080/00014788.2014.910051
[39] Sindhu, S. (2025). Comparative Analysis of Battery-Supercapacitor Hybrids for Fast EV Charging Infrastructure. Transactions on Energy Storage Systems and Innovation, 1(1), 26-33.
[40] Vishnupriya, T. (2025). Grid-Connected Inverter Topologies for High-Penetration Solar PV Systems: A Comparative Study. Transactions on Power Electronics and Renewable Energy Systems, 44-50.
[41] Poornimadarshini, S. (2025). Topology Optimization of Brushless DC Machines for Low-Noise and High-Torque Applications. National Journal of Electrical Machines & Power Conversion, 45-51.
[42] Muralidharan. J. (2025).Condition Monitoring of Electric Drives Using Deep Learning and Vibration Signal Analysis. National Journal of Electric Drives and Control Systems, 23-31.
[43] Madhanraj. (2025).AI-Powered Energy Forecasting Models for Smart Grid-Integrated Solar and Wind Systems.National Journal of Renewable Energy Systems and Innovation, 1-7.
[44] Velliangiri, A. (2025). Reinforcement Learning-Based Adaptive Load Forecasting for Decentralized Smart Grids. National Journal of Intelligent Power Systems and Technology, 1(1), 21-28.
[45] EMIRZON, J., & WAHYUDI, H. (2025). Protection of Customers from Unlawful Acts by Banks through Synergy of Legal Principles. Quality-Access to Success, 26(206).
[46] Salwadkar, M. (2025). AI-enabled network slicing orchestration for scalable 6G edge–cloud architectures. Electronics, Communications, and Computing Summit, 3(2), 62–69.