Chapter 16

Integrating AI Innovation With Management Control Systems

Muhammad Ashar Asdullah[a] *and Hassan Yazdifar*[b]

[a]*York St John University, UK*
[b]*University of Derby, UK*

ABSTRACT:

The chapter explores AI-Management Control Systems (MCS) integration by examining how innovative AI applications revolutionize organizational performance measurement along with decision-making procedures. An overview of MCS starts with this section by describing its formal and informal parts. The role of MCS includes goal-goal alignment with resources as well as operational enhancement and data-based performance improvement.

The chapter presents AI technology as a vital instrument for organizational enhancement first explaining its core features which include Machine Learning and Natural Language Processing (NLP) alongside Robotic Process Automation (RPA). Such technological innovations let organizations handle extensive data by providing predictions for trend analysis while generating better managerial decisions. AI integration with MCS creates business operation streamlining along with efficiency reduction and real-time intelligence delivery.

The research investigates how AI supports MCS through its ability to manage intricate information and deliver time-sensitive relevant decisions. The implementation of AI within organizations creates operational efficiency gains, reduced human mistakes and maintains business activities' strategic goal compliance. AI adoption encounters multiple challenges because organizations face issues relating to data quality standards, privacy protection standards and complexity during implementation.

This chapter ends with an evaluation of future AI potentials in MCS combined with an overview of upcoming analytics trends and automated decision systems alongside optimized resource management. The introduction of AI transformation to MCS performs a profound advancement in business operational planning and control which creates competitive advantages in modern business markets. Despite its challenges, AI-driven MCS promises continuous innovation and significant improvements in performance measurement and management.

Keywords: Management Control System; artificial intelligence; decision making; firm performance; organisational performance; AI innovation

1. Introduction

The current organizational practices are highly emphasizing on the concept of Management Control Systems, which not only help the employees to enhance their efficiency, while focusing on the strategic targets to be achieved, but also helps in improving the overall performance of the organization. Concepts suggested by Alahi et al., (2023) mainly proposed that the overall framework of Management Control systems fall into two main categories i.e. the Formal and the Informal ones. The formal systems of MCS mainly include financial reporting, budgeting and measurement of performance metrics, whereas the informal systems of MCS include culture, leadership styles and initiatives taken for employee motivation. Both the formal and informal systems work alongside, so that a mutual goal and objectives for the firm can be achieved and a strategic pathway can be designed accordingly (Mahdi et al., 2019).

The concept of MCS is mainly implied in the organizations to ensure efficient resource allocation as well as reduce waste production. It helps in organizations to achieve their goals, whereas it also provides sufficient data for the company on the basis of which informed decision making can be performed. With the help of this data, the management often acquires the data related to firm performance, the individual performances of employees, on the basis of which further improvements are recommended to the employees. The data mainly highlights the areas of improvement for the company. The strategic management of organizations alongside control measures depends extensively on MCS functioning as a critical operational system. A company utilizes MCS to monitor its performance indicators including revenue growth and employee productivity and cost management which help determine operational effectiveness (Ismail et al., 2021). MCS establishes stakeholder accountability which keeps executives as well as frontline employees consistently focused on company strategic targets.

Organizational strategies need MCS for performance observation in the fast-moving business environments of today. Business expansion and market segmentation drives operations to become more complex to manage. The MCS establishes continuous alignment between distinct organizational departments and business units to share common targets. Strategic and operational control integration in an effective MCS produces necessary feedback data to allow strategic adjustments and risks assessment and opportunity spotting.

AI represents the computer systems development which enables machines to perform tasks that call for human cognitive abilities. Kauoache et al., (2020) explained that the computer performs several activities that consist of reasoning along with learning while mastering language along with solving complex problems. The concept of Artificial Intelligence mainly relies on three important components which include Machine Learning, Natural Language Processing and the Robotic Press Automation. All three elements of AI deliver different measures which help in improving the overall efficiency.

In particular, most of the organizations use **Machine Learning** techniques to deeply analyse and assess the previous datasets, with the help of which future predictions and forecasting can be done, on the basis of which decision-making capabilities of the firm can be improvised.

An additional application associated with Machine Learning is known as **Natural Language Processing**, and it basically serves as a mechanism, which helps the machines to not only translates the human language but also comprehend it into readable form, resulting in formation of a smooth user-machine communication and interface possibilities. The use of NLP technologies empowers chatbots and virtual assistants to provide improved customer service in different sectors of the market (Habbal et al., 2024).

Robotic Process Automation (RPA) represents a leading AI-driven technology that systematizes non-creative tasks throughout invoicing management and payroll procedures and data entry operations. Organization-wide task automation leads to more efficient processes which lower human errors and allows staff to pursue tasks of greater value.

In the past AI functions limited themselves to specific business areas yet its business impact has expanded significantly over recent times. Modern businesses use AI as their foundation to operate various operational functions which include customer services and marketing alongside supply chain management and decision processes. Various artificial intelligence systems are used to boost company productivity and improve business decisions while creating personalized customer interactions (Mihardjo et al., 2021).

Businesses now need to join traditional MCS with AI technology to work with complex operating conditions. Current businesses need AI to handle their large amounts of data to spot patterns and predict outcomes. Organizations can use AI integration in MCS to gain better insight and automatic performance improvement capabilities. AI tools automatically gather and process current data to help managers take speedier and better decisions. Managers can develop stronger MCS results through AI, thanks to its ability to provide advanced understanding of business processes and customer happiness levels (Mia & Shuford, 2024). The system can generate future trend forecasts that help companies develop effective plans ahead of time. Connecting AI to MCS brings both opportunities and difficulties for organizations. To efficiently use AI systems in MCS the most critical problem is obtaining trustworthy data that matches MCS goals. Organizations need to properly train their AI models for the systems to follow their established business targets. Organizations that stick to their previous MCS system will face resistance to change because they have used it for many years. Although integrating Artificial Intelligence into MCS faces barriers today it remains crucial for businesses to pursue as AI offers promising advantages like faster work processes alongside wiser choices and better match between business plans and operations (Khang et al., 2022).

2. The Role of AI in Business Decision Making

2.1 AI in Data Analytics and Business Intelligence

According to Hendrawan et al., (2023) Business AI is now playing a significant role in promoting data analysis & business intelligence within an organization. Formerly, organizations used their hands and basic instruments to deal with data that used to take much of their time and was always wrong sometimes. By using AI, organizations are now able to do

more predictions on the results of their operations through predictive analytics, data mining and real time reporting (Globocnik, 2020).

It is, therefore, important to understand that **predictive analytics** is one of the critical uses of Artificial Intelligence in making business decisions. Businesses will also be able to use the data analysis to make algorithmically derived predictions toward future events. For instance, in the retail sector, big data can predict the levels of demand which assists companies in the management of their stocks to avoid the experience of stockouts. In finance, it can predict the future trend of a market or its customer thus giving an opportunity to the firm to act appropriately Singh et al., (2022).

Whereas, Habbal et al., (2024) explained that, As for the data mining aspect, with the help of advanced data analysis, powered by Artificial Intelligence, it is possible to go through large chunks of structured and unstructured data to found out hidden patterns within the information nets. The report moves on to specify that, it entails the application of contextual analysis algorithms to uncover patterns between several factors, regarding the customer, risk and opportunities (McAdam et al., 2019). For instance, in the healthcare industry data mining can be used to analyse large databases of records and trials in order to modify the patterns of treatment for desired results.

Third, real-time reporting also shows decision-makers current status to be crucial in quickly moving industries as they are updated instantly by AI. Technology enhanced instruments such as artificial intelligence-based dashboards and analytics tools can collect significant amount of data from different sources and provide panels reflecting real time current activities. This also enables the managers to effectively respond to changes in the market, budget, or any other operational risks (Bharadiya, 2023).

2.2 AI and Operational Efficiency

The power of computers to boost operations stands out at its strongest. AI tools and systems let organizations cut expenses while running their operations better and put their resources to best use.

The major role AI plays today is to automate work procedures. RPA acts as an AI-based system to automate repetitive rule-based jobs better performed by people. The system performs clerical duties such as handling data input, handling invoices and managing payroll. When organizations use automated systems, they enable their staff to concentrate on important projects while improving reaction times while decreasing wrong entries. AI automation in finance systems performs financial work faster and handles it more affordably than manual management (Jardioui et al., 2019).

On the contrary, Kasanen et al., (2023) suggested that, AI tools help organizations enhance their operation procedures. The system aids manufacturing companies in enhancing supply chain management by examining sales forecasting numbers and production plans. Using machine learning the system indicates optimal delivery paths while finding production problems and providing ideas to save materials and handle materials better. The energy

sector benefits from AI when it manages resources since AI technology predicts customer needs before changing power output to make better use of available supplies.

Also important is the management of resources where AI performs extremely well. The system examines past results to steer resources toward present operations while foreseeing how much they will be needed in the future (Ismail et al., 2020a). This management system helps businesses make the most of their capacity with lower spending. AI systems assist project teams by organizing work based on project dates and targets to place them on essential assignments when needed.

2.3. *AI for Strategic Decision Support*

Through strategic decision support AI helps businesses and organizations understand their market needs to reach better long-term planning outcomes.

The main way AI helps strategy development includes market forecast analysis. The system uses its analysis skills to find patterns between market developments and client conduct plus outside influences from economics and competitor actions. Organizations use these knowledge points to set product costs, introduce items, and expand their operations across multiple markets. The consumer goods sector company employs AI technology to forecast product demand for the next quarter then optimizes their production and shipping systems (Dharmayanti et al., 2023).

AI creates valuable business intelligence about market competition on top of its market prediction services. Through efficient analysis of news articles social media updates financial records and public databases AI provides organizations useful insights about their competitors and market trends. Advanced computers can read competitor trends in pricing and market performance while reviewing products simultaneously to help businesses find the right market position. Companies gain a competitive benefit by understanding what competitors will do next and making suitable changes to their approach .

3. Fundamentals of Management Control Systems (MCS)

3.1. Key Components of MCS

Organizations use Management Control Systems (MCS) to connect business operations with strategic targets while achieving better performance results. An MCS functions with four key elements which are planning, budgeting, evaluating results and making adjustments. These elements make it possible to handle business resources and check if projects meet expected outcomes.

To set up MCS, planning requires creating precise targets and strategy definitions. The organization defines its future path through strategic planning that shows how to reach specific outcomes at particular times. Organizations create both long-term strategies and

daily action plans that contain key timepoints to direct their business operations (Mahdi et al., 2019).

Budget management is essential to MCS as it uses allocated resources according to set plans. An organization defines its main targets and direction through financial budgets. MCS creates a plan to handle money that helps predict future money and guide investment selections. Through budgeting the firm tracks spending results to keep the enterprise on track with its financial requirements.

Performance Measurement tracks if the organization meets its target goals. It consists of identifying business goal-related key performance indicators (KPIs). Quality performance depends on three key measures such as sales expansion, investment return and customer satisfaction ratings. Managers rely on these numbers to measure operation quality and performance and to locate performance issues that need attention (Aguilar et al., 2021).

The performance measurement system works best when performance data returns directly to managers for analysis. The system enables regular monitoring to make changes using up-to-date performance results. Managers receive feedback to recognize how performance matches targets and decide what needs adjustment (Mihardjo et al., 2020). The system lets companies make adjustments to their operations as they handle changing business conditions and works towards optimal performance.

3.2 Traditional Approaches to MCS

Traditional management controls depend on established systems that use financial data inside a formal hierarchy controlled at the top. Most organizations have depended on basic management tools while overseeing their daily operations.

Traditional Systems of Measurement consist of regular use of financial documents and performance evaluations. Organizations track performance by using standard financial methods that include budget tracking and cost comparisons with report results. Managers at lower levels must support their workforce and make scheduled choices using set plans and measurement standards (Alahi et al., 2023).

Time-tested business tools helped enterprises thrive but struggle to handle present business conditions effectively. The speed of technological progress combined with worldwide market competition and complex market changes make typical management systems unable to adapt to new conditions quickly. A business needs to make fast choices on problems today or risk losing speed and market success.

3.3. Traditional MCS and Barriers

According to Ismail et al., (2021) Modern organizational requirements exceed the operational capabilities which traditional MCS can manage effectively in current fast-moving business environments. Several limitations contribute to this:

Traditional management systems take a long time to plan budgeting and they do not change fast enough with new business circumstances. The business needs strategic changes because market conditions and customer tastes evolve rapidly but traditional infrastructure leads to delayed decision processes.

Current MCS base their performance assessment on static financial measures together with historical data that does not deliver proper results in constantly changing business environments. Such measurement techniques generally ignore untraditional company assets such as customer loyalty together with innovation and employee engagement because these non-tangible aspects have become increasingly crucial for market success (Mia & Shuford, 2024).

The inability to handle complicated data structures remains a problem for the traditional MCS which were built for basic straightforward data analysis. Traditional systems fail to process and analyse current extensive data sets needed for strategic decision-making because big data and complex analytics have dramatically increased in popularity.

4. AI Powered Human Resource Management

Recent years have witnessed widespread interest in using technology to transform Human Resource Management (HRM) operations because it brings many benefits to HR process optimization. Advanced technologies lead to improved operational efficiency as well as better decision-making outcomes for the overall Human Resource operations.

4.1 Automation and Accuracy

Technology in HRM proves most advantageous through its automation of administrative work. The tasks of job opening advertisement, candidate selection and interview management along with employee record handling become smoother when technology is employed. Automation of repetitive HR work enables staff to dedicate efforts towards strategic tasks and decision-making while reducing human failure in decisions.

4.2 Advanced Algorithms and Data Insights

Through machine learning together with advanced algorithms companies acquire better decision-making capabilities that bring precise results. These technological systems operate swiftly through extensive data analysis to generate meaningful workplace intelligence about acquiring talent and maintaining staff members along with managing employees. The employment selection improves alongside broader employee management enhancements supported by this process.

4.3 Enhanced Computing Capacity

Business organizations can execute real-time analysis of extensive datasets because of modern technology advances in computing power. Continuous employee performance assessment using this method allows HR managers to develop specific training initiatives specifically tailored towards each employee. Big data enables organizations to maximize their resources which results in better productivity levels.

4.4 Real-time Engagement and Feedback

Real-time systems that measure employee engagement and feedback now recreate workplace interactions. Digital tools allow organizations to maintain quick employee interaction which results in immediate feedback for workers. The instant feedback tools help detect problems early to prevent their growth while contributing to better employee workplace contentment.

4.5 Personalization of HR Practices

The application of technology enables HR departments to deliver individualized support programs to their personnel. These tools create better employee satisfaction through customized compensation packages along with personalized training regime. The customized approach to human resources practices results in decreased employee turnover combined with superior maintenance of high-level skills experts throughout the organization.

4.6 Time and Cost Savings

The automation of different HR processes enables organizations to decrease operational expenses through reduced costs. Technology integration in HRM makes the completion of routine work easier while decreasing hiring expenses and enhancing supervisory efficiency. The implementation of these technologies leads to both enhanced organizational productivity and market leadership positions for adopting organizations.

4.7 Benefits of AI-powered Performance Management

- Efficient data processing through automated systems enhances the performance management process so HR professionals along with their managers can focus on strategic development.
- AI-driven analytics produces data-based results which decreases human error during performance evaluations and promotional processes and development decisions.
- It is important to provide constant feedback and recognition to the employees on their efforts, along with customized growth plans, so that higher employee engagement can be ensured, which ultimately leads to improved satisfaction and retaining talent.
- Organizations obtain the ability to change rapidly according to business conditions through real-time insight access which strengthens their organizational agility.
- A whole system view of talent management enables employees to achieve optimal business results through work performance activities which create superior organizational outcomes.

5. AI-Driven Tools and Technologies in MCS

With AI powered tools and technologies being integrated with the Management Control Systems (MCS), they are being used by organizations in monitoring performance, optimizing operations and making strategic decisions. Organizations can use AI abilities in information investigation, mechanization and continuous bits of knowledge to refine cycles, guide choices and accomplish maximum effectiveness and exactness. In this section, different AI driven tools and technology like AI base analytical tools, automation technology, AI in financial control system, Natural Language Processing or NLP (NLP), AI powered dashboard are explored.

AI plays a crucial role in bettering the effectiveness of MCS by means of AI based analytical tools, allowing businesses to look into the operations and performance of these companies. Using machine learning algorithms, they analyse large amounts of data, identify patterns, determine anomalies and they can predict trends – capabilities that are extremely useful in many decisions (McAdam et al., 2019).

Machine Learning Algorithms allow detecting parameter with the data, which may not be immediately apparent, or vice versa (Pattern Recognition). These algorithms study the historical data and unveil the hidden pattern in sales, customer behaviour, operational efficiency and all other performance indicators. For example, a retailer could utilize AI tools to understand customers buying patterns and predict demand for specific products which would allow the business to adjust the figures for product inventory.

On the Contrary, Jardioui et al., (2019) suggested that AI systems are good at detecting anomalies and comparing it to current data against the historical norms to detect discrepancies that may indicate possible issue. In anomaly detection, we use anomaly detection in MCS to inform about anything not normal such as a fraudulent transaction, unplanned cost overrun, changes in employee performance, etc. Identifying these anomalies early lets organizations take corrective actions before the problem gets out of hand and hence, enhances the overall risk management and financial control.

Trend forecasting happens to be one of the most powerful capabilities of an AI based analytical tool. AI systems can predict future trends by using machine learning algorithms, to analyse historical performance data and other factors of those that may have an impact on such future trends. Trend forecasting in MCS allows organizations to foresee market changes, customer preferences and business outcomes and hence let businesses take the lead in adjusting their business and business operations. For example, with the use of seasonality, promotions or market conditions, AI is able to predict future demand of products helping companies to better manage inventory and improve their supply chain (Globocnik et al., 2019).

The routine tasks of MCS are transformed by using AI driven Robotic Process Automation (RPA). Basically, RPA is about using AI powered robots to automate routine and rule-based task which were usually performed manually. This enables freeing up human employees from mundane tasks allowing them to focus on value adding, strategic activities, increase productivity, reduce the likelihood of human error, etc.

In MCS, RPA can make use of data collection, reporting and analysis tasks that are routine in nature and can be automated. For example, AI robots can automatically get data from various sources, for example, financial statement, sales data, and inventory level and then fill it to MCS platforms without manual info data entry. In addition, RPA can automate creating periodic reports and flagging issues that command attention with regards to KPIs.

RPA streamlines financial management – automation of invoice processing, accounts payable and receivable, reconciliation is what it will do. RPA helps reduce manual intervention and, as a result, speed, quality and efficiency of financial processes. Furthermore, RPA can serve the purpose of automating tasks related to compliance, so that the businesses can comply with regulatory norms without increasing risk of human error.

In addition to this, RPA in MCS aids to enhancing operational efficiency by lessening the bottlenecks and delays in the normal processes. For instance, in supply chain management, AI robots can automatically trace shipments, adjust inventory records, and tune up procurement schedules on the real time basis in order to reduce delay and enhance performance as a whole (Alahi et al., 2023).

6. Natural Language Processing (NLP) and AI

Natural Language Processing (NLP) is a branch of the AI which focuses on the human and the computer exchanging natural words. NLP is used in MCS to access qualitative data (employee feedback, customer sentiment, social media) and used to gain a deeper understanding of an organization's performance.

Employee Feedback Analysis: NLP can be used to analyse employee feedback collected through surveys, reviews or through an internal communication platform. AI can go through and understand the open-ended response to not only get themes or sentiments but also find the areas that are of concern. For example, if employees continuously complain about management practices or work culture, NLP can assist the managers in determining the actual problems and subsequently correcting them (Aldoseri et al., 2023).

NLP can also be used to undertake Customer Sentiment Analysis, it can be used to analyse customer feedback such as reviews, the content of social media posts, and survey responses. AI is able to obtain customer satisfaction, product or service issues and detect emerging trends through processing of unstructured data. You can use this information to make an improvement in the customer service, improve the products that are provided and change marketing approaches.

NLP is applied to competitive intelligence and market research as well. Use of AI driven tools can read through thousands of unstructured texts like that of news articles, press releases, financial reports, etc., to extract key information related to competitor, industry trends and market conditions etc. It allows organizations to be updated and take strategic decisions based on current market intelligence (Habbal et al., 2024).

Dashboards and decision support systems which are powered by AI are interactive tools for managers to learn real time insights into the performance of the organization. The AI is used here to integrate with data visualization techniques to present an easily comprehensible form of dynamic advances data which can be actioned upon (Esenoghu et al, 2022).

Managers can view performance of units in real time with the help of AI dashboards and change key performance indicators (KPIs) as and when needed. The dashboards are dynamic, which means they may update once fresh data is added to the system. Considering the examples, it has been analysed that AI powered Dashboards can successfully provide the details relevant to the latest stats, inventory levels, and the scores of customer satisfaction (Rehman et al., 2021). With the help of this information, the management can acquire a bird's eye of the entire business at any time.

AI decision support system particularly helps the managers in making informed decisions, as they can acquire all the relevant data related to the decisions and actional insights. This mainly occurs as the system provides information for the managers related to the current trends in market, past trends in markets and performances of their organization, on the basis of which future predictions can be made. With the help of these predictions, appropriate measures can be taken timely. The actions can be used to improved tactical and strategic level decision makings. For example, a decision support system can provide all the relevant details to the managers on the basis of which appropriate actions, following the course of action can be taken, like based on predictive analytics, solutions like improving the inventory level, or reassignment of resources to support the changing demand can be implemented (Dharmayanti et al., 2024).

In addition to this, the application of AI powered Dashboards can also be used for scenario planning, as it has the capability to create different future scenarios, based on the current information and past trends provided to it. The software makes assumptions, and on the basis of that it provides possible and expected outcomes of certain strategies. For instance, the AI powered dashboards can provide appropriate suggestion to the organizations related to their future investments in particular sector or area, as it predicts the future success rate on the basis of revenue and costs and risks prediction (Yang et al., 2021).

7. Challenges and Risks of Integrating AI with MCS

The concept of integration of Artificial Intelligence into Management Control Systems provide numerous benefits to the users, like informed decision making, automation, efficiency, accuracy, but it has also been determined that this is also associated with certain risks and challenges. Some of the challenges which are often observed in developing data warehouses, include guarantee of quality data, managing change resistance, complexities associated with implementation of the software, and ethics and compliance issues. Some of the key challenges and risks have been further discussed in detail below:

7.1 Data Quality and Privacy Concerns

This should be one of the most difficult problems to solve in the incorporation of MCS into AI. The data processed in AI systems is very dependent on the reliability and of the AI model quality. Data that is of poor quality can have imprecise insights, poor predictions, and finally, poor business decisions (Ismail et al., 2020a).

***7.2 Inconsistency or Incompleteness*:** As Mia & Shufford (2024) suggested, this could have a disastrous effect on the effectiveness of the AI models. For instance, if financial reports contain missing or incorrect data or operational metrics are incorrect, forecasts would be incorrect and therefore inefficiencies would exist in budgeting or resource allocation. It is very important to ensure the accuracy, consistency, and up to date nature of the data fed into the AI models. It includes robust implementation of data collection and cleansing process for getting rid of errors and standardizing information across the organization.

***7.3 Data Integrity*:** Integrity of data is also very important when AI driven decision making is involved in fields such as financial control and performance measurement. Manipulation of data or anomalies of data sources could render the AI system untrustworthy and analytics obtained would be biased. There is need for organization to embrace rigorous data governance frameworks in order to safeguard the integrity of data used by AI systems to be sure that the information used is valid, secure and reliable (Shah & Asad, 2018).

***7.4 Privacy Concerns*:** Given that AI depends on huge amounts of personal and sensitive data, issues such as data privacy and security are reasons for concern. The General Data Protection Regulation (GDPR) in the European Union and there are data protection laws globally impose strict measures for when organizations collect, store and process data. In its applicable jurisdictions, companies must make sure that their AI systems are compliant to such regulations and their customer, employee, and financial data, sufficiently protected. Failure to take these things into account can result in legal consequences and reputational damage as well as loss of trust (Aguila et al., 2021).

7.5 Complexity of Implementation: Another cause of major challenge is that, even though AI is not a black box, the technical and operational complexity of integrating AI with existing MCS infrastructure is very considerable. Usually, the legacy systems and business processes need to be compatible with the AI systems and that can prove to be hard to do unless a large number of adjustments to the current technology stack are done (Habbal et al., 2024).

7.6 Traditional Systems: The primary challenge is that the implementation of AI is not something 'standalone' as it has to be integrated with the organization existing MCS infrastructure. Legacy or traditional MCS may run on a relational database, reporting system, and legacy software that are not optimized for deployment of modern AI technologies. These legacy systems are usually not integrated with AI powered tools as the integration requires a lot of technical modifications, data transfer, and in many cases even a total revamp of the existing infrastructure. Both time-consuming and expensive, which becomes expensive, very expensive, for large organization with complicated IT ecosystem.

***7.7 Data Silos*:** In many organizations, data is scattered across different departments, systems, and platforms, creating data silos that make it difficult for AI tools to access comprehensive, unified data. Overcoming these silos requires investments in data integration technologies, such as data warehouses or cloud-based platforms, which can facilitate seamless access to data across the organization. Without effective data integration, AI tools may not be able to process the necessary data sets, limiting their effectiveness in MCS (Mia & Shuford, 2024).

7.8 Scalability: it is essential that with increasing business revenue and expansion of an organization, the AI model should adapt itself to the new and advanced changes and must grow its features accordingly. It must be capable of handling big data and more complex operations. Hence, it is important to incorporate certain scalable actions with the course of time in organizations, implementation of such scalable actions can be a bit daunting, especially when it comes to industries, which demand rapid growth and possess diverse operational needs. In order to ensure that AI tools can successfully scale without compromising the performance or accuracy, careful planning, resource allocation and continuous monitoring (Mandala & Vaka, 2022).

7.9 Ethical and Compliance Issues

Businesses need to handle ethical and legal compliance matters when they merge AI technology into their Management Control Systems.

CT systems make choices using data but critics may view these selections as improper or unjust. An AI program will uphold any biases it learns from the training dataset even if those biases were present in historical employee hiring records. Businesses need to actively implement measures that prevent AI networks from having unfair choices and making biased decisions. Businesses must test AI systems constantly plus feed mixed training data while ensuring all decision-making algorithms protect ethical standards (Al-Surmi et al., 2020).

When AI systems provide their outputs, users need to determine who is responsible for their results. When an AI system produces bad results, it becomes difficult to assign responsibility between its system logic the programmers who created it and the decision-makers who used it. The organization needs to create firm guidelines about who takes responsibility for AI results while demanding human attention stays present in all choices. Organizations need specific criteria to handle AI systems while making sure AI tools support organizational ethics and values in their automated choices.

8. Conclusion

Organizations utilize AI technology to transform their MCS by making better decisions while making business operations run smoother and adopting faster actions even in dynamic working conditions. Business leaders examine data analytics results and automate tasks to show better performance results throughout their operations. Organizations use AI predictions to detect upcoming events and develop better ways to handle their resources thus planning and controlling their business activities effectively. The setup of AI technology in MCS makes financial control better by speeding up decision-making and giving more precise

results. Managers dedicate their extra time to work with automated systems that automatically track performance and generate reports. They fully focus on making strategic choices only. AI technology lets companies handle all business situations quickly by providing faster and more trustworthy decision solutions. The connection between AI and MCS creates a system that predicts business outcomes better while running tasks faster than ever before. This new system leads businesses to use MCS actively for guiding strategy development.

Improved AI technology will transform industries permanently through its connection to MCS technology. AI systems at MCS will generate better results and speed up team work as the systems help create improved business plans. New AI technology rollouts are assessed to develop performance boosts within MCS operations.

Artificial Intelligence is growing rapidly and emerging digital waves will show us the next steps for MCS application development. The modern machine learning technologies enable MCS to process bigger dataset types and handle them even better than before. When AI systems reach higher levels of strength, they locate patterns promptly and deliver accurate forecasts that work faster toward organizational goals.

MCS combines language understanding and chat technology to its operations. The system's artificial intelligence with Language Processing analyses data containing numerical and textual feedback from employees and market discussions along with customer responses. MCS will better understand its business environment to take swift action towards customer tastes (Khang et al., 2022).

MCS will work with automated systems that make sophisticated decisions automatically. New AI systems will adjust business controls automatically based on set conditions without human supervision as described by Mahdi et al. (2019). The new response times from MCS will make the company respond quickly to market changes.

Managerial Implications:

The research demonstrates that AI systems help business managers become more efficient because they automate basic work functions which then allows more time for crucial strategic planning activities. AI tools integrated into MCS systems enable smooth business procedures and deliver accurate forecasting and present advanced operational analytics for managers. The successful implementation of AI systems requires managers to resolve data quality and privacy issues which preserve the efficiency of AI systems. Organizational leaders need to implement cultural changes to fight against organizational resistance to technological changes when adopting AI systems.

AI's integration into MCS offers significant opportunities for continuous improvement and innovation. More organization data and better AI technology will drive technical systems to enhance their performance with time. The systems will learn from previous choices to improve their ability to forecast results and generate better solutions. Organizations will enhance operations while saving money and get better results when predicting future outcomes. AI systems will help organizations design better ways to evaluate performance and track it. When AI technology grows stronger it will allow MCS tools to measure multiple new

quality indicators across different workplace areas delivering better business insights. More refined performance standards let organizations match their performance expectations better with their long-term business plans (Gill et al., 2022). AI will make MCS deliver better customized services effectively. AI's data processing power allows MCS to meet exact requirements in various organizational components and personnel groups. MCS should show each stakeholder their data that matches their evaluation criteria and shows performance points for goal achievement (Mihardjo et al., 2020)

Theoretical Implications

This study theoretically enhances knowledge about integrating Artificial Intelligence into conventional Management Control Systems. The research develops current concepts through its combination of artificial intelligence with performance management and strategic choice processes. AI enabled strategic goals to merge with operational actions therefore creating a link between strategic management and business operations. Future research has access to new analytic perspectives to study how control systems change because of technological development through this integration.

Limitations and Suggestions for Future Study

The study provides valuable data but the exploration focuses exclusively on current AI systems and their MCS applications within particular business settings. Research needs to examine how the implementation of AI affects workplace organization culture together with staff reactions over extended periods. Research needs to investigate the ability of AI to boost sustainability and corporate social responsibility performance within the framework of MCS. Future research needs to address AI-powered MCS scale potential across distinct industries and organizational sizes together with understanding ethical aspects that emerge from AI-assisted decision-making processes.

References:

Alahi, M. E. E., Sukkuea, A., Tina, F. W., Nag, A., Kurdthongmee, W., Suwannarat, K., & Mukhopadhyay, S. C. (2023). Integration of IoT-enabled technologies and artificial intelligence (AI) for smart city scenario: recent advancements and future trends. Sensors, 23(11), 5206. https://doi.org/10.3390/s23115206

Al-Surmi A., Cao G., & Duan Y. (2020). The impact of aligning business, IT, and marketing strategies on firm performance. *Industrial Marketing Management*, 84, 39–49. https://doi.org/10.1016/j.indmarman.2019.04.002

Al-Zgool M. R. H., Shah S. M. M., & Ahmed U. (2020). Impact of energy consumption and economic growth on environmental performance: Implications for green policy practitioners. *International Journal of Energy Economics and Policy*, 10(5), 655–662.

Amar Johri (06 Feb 2025): Impact of artificial intelligence on the performance and quality of accounting information systems and accuracy of financial data reporting, Accounting Forum, DOI: 10.1080/01559982.2025.2451004 To link to this article: https://doi.org/10.1080/01559982.2025.245100

Andreas Sundstr¨om, 2024, AI in management control: Emergent forms, practices, and infrastructures, Stockholm Business School, Stockholm University, Sweden https://doi.org/10.1016/j.cpa.2023.102701

Aguilar, J., Garces-Jimenez, A., R-moreno, M. D., & García, R. (2021). A systematic literature review on the use of artificial intelligence in energy self-management in smart buildings. *Renewable and Sustainable Energy Reviews*, *151*, 111530. https://doi.org/10.1016/j.rser.2021.111530

Aldoseri, A., Al-Khalifa, K. N., & Hamouda, A. M. (2023). Re-thinking data strategy and integration for artificial intelligence: concepts, opportunities, and challenges. *Applied Sciences*, *13*(12), 7082. https://doi.org/10.3390/app13127082

Bharadiya, J. P. (2023). Artificial intelligence in transportation systems a critical review. *American Journal of Computing and Engineering*, *6*(1), 35-45. https://doi.org/10.47672/ajce.1487

Dharmayanti, N., Ismail, T., Hanifah, I. A., & Taqi, M. (2023). Exploring sustainability management control system and eco-innovation matter sustainable financial performance: The role of supply chain management and digital adaptability in indonesian context. *Journal of Open Innovation: Technology, Market, and Complexity*, *9*(3), 100119. https://doi.org/10.1016/j.joitmc.2023.100119

Esenogho, E., Djouani, K., & Kurien, A. M. (2022). Integrating artificial intelligence Internet of Things and 5G for next-generation smartgrid: A survey of trends challenges and prospect. *Ieee Access*, *10*, 4794-4831. https://doi.org/10.1109/ACCESS.2022.3140595

Globocnik D., Rauter R., & Baumgartner R. J. (2020). Synergy or conflict? The relationships among organizational culture, sustainability-related innovation performance, and economic innovation performance. *International Journal of Innovation Management*, 24(01), 2050004. https://doi.org/10.1142/S1363919620500048

Gill, S. S., Xu, M., Ottaviani, C., Patros, P., Bahsoon, R., Shaghaghi, A., ... & Uhlig, S. (2022). AI for next generation computing: Emerging trends and future directions. *Internet of Things*, *19*, 100514. https://doi.org/10.1016/j.iot.2022.100514

Habbal, A., Ali, M. K., & Abuzaraida, M. A. (2024). Artificial Intelligence Trust, risk and security management (AI trism): Frameworks, applications, challenges and future research directions. *Expert Systems with Applications*, *240*, 122442. https://doi.org/10.1016/j.eswa.2023.122442

Hendrawan, H., Bakri, A. A., Fatchuroji, A., & Effendi, R. (2023). Effects of capital, usage of accounting information, financial statements, and characteristics entrepreneurship on f inancial capability and business performance of MSMEs. The ES Accounting And Finance, 1(02), 72–81. https://doi.org/10.58812/esaf.v1i02.64

Ismail A. I., Abdul-Majid A. H., Ameen A., Raza S., & Akindele I. T. (2020a). Using employee creativity to unpack the 'black box' in the high-performance work system (HPWS)-firm performance nexus. *International Journal of Innovation Management*, 24(06), 2050052. https://doi.org/10.1142/S1363919620500528

Ismail A. I., Awawdeh A., Al-Hiyari A., & Isiaka Jimba K. (2020b). Moderating effects of management philosophy on high-performance work practices–firm performance relationship. *Journal of African Business*, 379–393. https://doi.org/10.1080/15228916.2020.1785235

Ismail A., Abdul-Majid A. H., Rahman M. A., Jamaluddin N. A., Susantiy A. I., & Setiawati C. I. (2021). Aligning Malaysian SMEs with the megatrends: The roles of HPWPs and employee creativity in enhancing Malaysian SME performance. *Global Business Review*, 22(2), 364–380. https://doi.org/10.1177/0972150918811236

Jardioui M., Garengo P., & El Alami S. (2019). How organizational culture influences performance measurement systems in SMEs. *International Journal of Productivity and Performance Management*. https://doi.org/10.1108/IJPPM-10-2018-0363

Kaouache R., Brewer G. A., & Kaouache D. E. (2020). Existing and preferred organizational culture in public organizations: The case of an electricity power plant in Algeria. *Journal of Transnational Management*, 25(4), 1–18. https://doi.org/10.1080/15475778.2020.1734420

Kasanen, E., Lukka, K., & Siitonen, A. (2023). Insights into AIS and digital audit transformations. Contemporary Accounting Research, 40(1), 1–34. https://doi.org/10.1111/1911-3846.12788

KPMG Taseer Hadi & Co. (2020). *Banking results 2019: Commercial banks operating in Pakistan*. https://assets.kpmg/content/dam/kpmg/pk/pdf/2020/06/Banking%20Results%202019.pdf

Khang, A., Rani, S., & Sivaraman, A. K. (Eds.). (2022). *AI-centric smart city ecosystems: technologies, design and implementation*. CRC Press.

Lazaroiu, G., Androniceanu, A., Grecu, I., Grecu, G., & Neguriță, O. (2022). Artificial intelligence-based decision-making algorithms, Internet of Things sensing networks, and sustainable cyber-physical management systems in big data-driven cognitive manufacturing. *Oeconomia Copernicana*, *13*(4), 1047-1080.

Mahdi O. R., Nassar I. A., & Almsafir M. K. (2019). Knowledge management processes and sustainable competitive advantage: An empirical examination in private universities. *Journal of Business Research*, 94, 320–334. https://doi.org/10.1016/j.jbusres.2018.02.013

Mandala, V., & Vaka, D. K. (2022). REVOLUTIONIZING ASYNCHRONOUSSHIPMENTS: INTEGRATING AI PREDICTIVEANALYTICS IN AUTOMOTIVE SUPPLYCHAINS. *International Journal of Artificial Intelligence & Machine Learning (IJAIML)*, *1*(01), 47-59. https://doi.org/10.17605/OSF.IO/FTXEV

McAdam R., Miller K., & McSorley C. (2019). Towards a contingency theory perspective of quality management in enabling strategic alignment. *International Journal of Production Economics*, 207, 195–209. https://doi.org/10.1016/j.ijpe.2016.07.003

Mia, M. R., & Shuford, J. (2024). Exploring the synergy of artificial intelligence and robotics in industry 4.0 applications. *Journal of Artificial Intelligence General science (JAIGS) ISSN: 3006-4023*, *1*(1). https://doi.org/10.60087/jaigs.v1i1.31

Mihardjo L. W., Jermsittiparsert K., Ahmed U., Chankoson T., & Hussain H. I. (2020). Impact of key HR practices (human capital, training and rewards) on service recovery performance with mediating role of employee commitment of the Takaful industry of the Southeast Asian region. *Education+Training*, 63(1), 1–21. https://doi.org/10.1108/ET-08-2019-0188

Rehman, S. U., Bhatti, A., Kraus, S., & Ferreira, J. J. (2021). The role of environmental management control systems for ecological sustainability and sustainable performance. *Management Decision*, *59*(9), 2217-2237. https://doi.org/10.1108/MD-06-2020-0800

Susanto, Y., & Rambano, D. (2022). The role of HRM factors in improving performance analysis of local government financial reports. Golden Ratio of Human Resource Management, 2(2), 98– 107. https://doi.org/10.52970/grhrm.v2i2.176

Shah, M., & Asad, M. (2018). Effect of motivation on employee retention: Mediating role of perceived organizational support. European Online Journal of Natural and Social Sciences, 7(2), 511-520 https://european-science.com/eojnss/article/view/5280

Singh, R. K., & Kushwaha, B. P. (2022). An assessment of the behavioral intention of generation Z toward the adoption of digital learning applications. IoT and Cloud Computing for Societal Good, 159–180. https://doi.org/10.1007/978-3-030-73885-3_10

Yang, T., Yi, X., Lu, S., Johansson, K. H., & Chai, T. (2021). Intelligent manufacturing for the process industry driven by industrial artificial intelligence. *Engineering*, *7*(9), 1224-1230. https://doi.org/10.1016/j.eng.2021.04.023