

AI-ENHANCED INTERNAL CONTROLS IN S/4 HANA FICO: A FRAMEWORK FOR AUTOMATED COMPLIANCE

Author Name- Puneet Agrawal
Title - Director - ERP
Affiliation- West Pharmaceutical Services Inc
Location- Exton, Pennsylvania
Email- Puneetagrwal1983@gmail.com

Abstract – This research work explores the application of Artificial Intelligence in SAP S/4 HANA FICO for automating internal control hence compliance risk and financial analysis. To overcome the drawbacks of conventional manual controls and introduce concepts such as machine learning and analytics that improve the real-time control for compliance and anti-fraud, as well as increase operational effectiveness. By using case studies and the evaluation framework adopted in his study, the author proves that AI solutions enhance decision-making; critically address legal concerns; and minimise risks in effective financial management, which offers an effective way at being compliant with the regulations at a proactive level. Global corporate investment in AI has expanded in recent years. AI in SAP S/4HANA was pivotal in creating in-depth data analysis. These insights enable decision-makers to highlight underlying patterns and market trends in data that were not immediately obvious. Therefore, AI-driven recommendations in SAP were major in creating a more user-friendly experience, increasing productivity and efficiency in the workflow.

Index Terms- AI, SAP FICO, IoT, HANA.

I. Introduction

A. Background to the Study

ERP systems have developed much earlier, and SAP's S/4 HANA FICO module is well-

known for its efficient financial as well as controlling function. Businesses also use AI to improve these systems, especially for internal control to facilitate the achievement of their business objectives. They are important in preventing the firm from violating the set legal and business regulations, reducing and controlling risks involving finances and boosting operation efficiency. As the rules and regulations of the international business environment become increasingly complex, the conventional approach of manual check and balance fails to meet the complexity that the compliance function faces today, therefore enabling the integration of AI solutions and automation in compliance functions. This means that using AI jointly with S/4 HANA FICO makes it possible to use real-time monitoring, perform analytic prediction, and identify anomalies. This paper explores how AI can revolutionise internal control within S/4 HANA FICO and automatically conform to regulatory measures.

B. Overview

In further detail, the research focuses on three aspects of applying AI for automating internal controls in S/4 HANA FICO offering a reference model of real-time compliance and risk management. The study then discusses the traditional internal control problems and how AI solutions like; machine learning and natural language processing can help to fix them. The framework suggested for improving compliance checks, fraud detection and regulatory reporting will be

based on integrating AI algorithms with S/4 HANA FICO.

C. Problem Statement

Many companies continue to fight with problems like compliance issues based on limitations of traditional internal controls, including poor recognition of changes in regulatory environments and lack of ability to identify complex fraud. S/4 HANA FICO has strong financial management though internal control can gain from the implementation of AI.

D. Objectives

The main goals of this study are: 1. To identify the limitation of traditional internal controls in the S/4 HANA FICO model and explore areas where AI can provide benefits. 2. To construct effective procedures that would allow the AI technologies integration into S/4 HANA FICO to monitor and control in real time. 3. To evaluate how such related concepts in artificial intelligence as predictive analytics as well as anomaly detection can help mitigate compliance risks and identify fraud. 4. To evaluate the effectiveness of AI-based internal controls in improving regulatory compliance, optimizing operations, and managing financial risk.

E. Scope and Significance

The **scope** of this method presents AI incorporated in internal controls of S/4 HANA FICO, particularly on compliance checks, fraud prevention & detection, and real-time financial analysis. This includes settings, application, and assessment of the use of AI to improve control effectiveness with limited reliance on the human factor. On the other side, the **significance** is that it helps the organisation in saving for possible legal and financial constraints and generating adequate results from financially efficient operations.

II. Literature Review

A. Limitations of traditional internal controls in S/4 HANA FICO

Most of the internal controls implemented in ERP systems like S/4 HANA FICO have prescribed rules that are set in advance to monitor the transactions. Although these controls reflect well in bringing a static environment all controls have a weakness when it comes to responding to dynamic issues such as changes in regulation or elaborate frauds. The author points out that these controls are rigid, and fixed in nature, and cannot support large amounts of financial data hence the inefficiencies [1]. Moreover, manual interventions also involve more risk of the human factor and time delays in detecting and preventing compliance or non-compliance [1]. These gaps can be closed through the application of AI technologies because of the reliability of automated data analysis and monitoring, which eliminate the drawbacks of conventional controls.

B. Integration of AI technologies for real-time monitoring

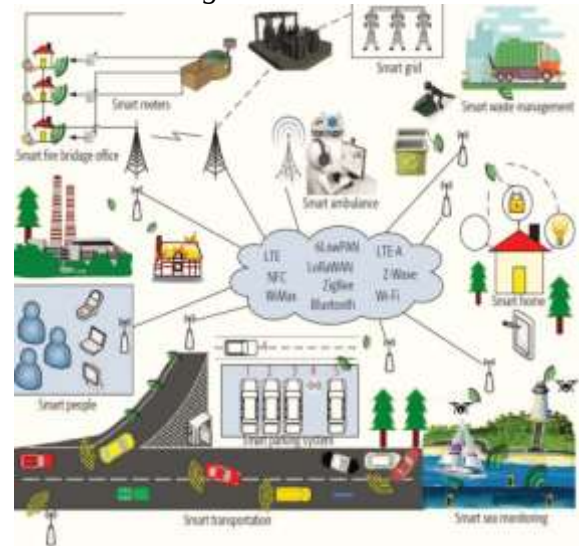


Figure 1: Available communication technologies

[2]

Implementing AI in S/4 HANA FICO requires creating approaches for the effective interaction of AI applications with conventional finance systems. The author states that opines that through Integration of AI such as the use of machine learning into the ERP modules can enable the real-time analytical processing of transactional data without intervention [2]. This integration should entail strong communities to safeguard data preprocessing, model training, and validation to reduce inaccurate outcomes. Further, real-time monitoring essentialities require a robust IT support system, and integrating line functions needs to harmonise AI applications with organisational goals [2]. Automated systems for which it does not only improve financial controls but also better compliance management.

C. The role of predictive analysis and anomaly detection for mitigating risk



Figure 2: System Architecture for Density and Distance-based Anomaly Detection

[3]

Predictive analysis and anomaly detection are very crucial in compliance risk assessment and fraud detection. Risk analytics is the use of historical and live data to create scenarios that enable the organisation to prevent risks from occurring. On the other hand, anomalies

unusual patterns or fluctuations in financial reviews are detected by anomaly detection algorithms that give clues of fraud or regulatory violation [3]. This method shows this in its research on unsupervised learning models in S/4 HANA FICO These can identify concealed structures and alert organisations more quickly to suspicious occurrences. These technologies decrease dependence on the reactive control system and help to apply proactive approaches in managing compliance and financial risks [3].

D. Measuring the effectiveness of AI-integrated internal controls

AI audit can therefore reveal levels of effectiveness of AI internal controls through indicators like; compliance, operations, and risks. The author also believes that the advanced adoption of AI provides minimal formats of audit trails and reporting hence enhancing the extent of compliance with regulation [4]. Additionally, the optimisation of internal controls that use artificial intelligence decreases the time needed for control activities and increases data quality as well as minimises operations' constraints. Research also shows that persistent evaluation of the AI models and making appropriate model changes that fit regulatory and organisational needs are critical [4].

III. Methodology

A. Research Design

The research design of this study adopts an explanatory approach with a secondary data analysis approach for explaining the application of AI-based internal controls in SAP S/4HANA FICO for automating compliance. The approach entails the development of the relevant theories hence a collection of the relevant articles, reports, and case studies to establish the best perception

of current thoughts on the application of AI in financial and controlling modules. Areas related to understanding the role of AI in compliance, mitigation of fraud and prevention of errors [2]. The analysis is done to build an understanding of the research topic and show the best practices and major issues of AI-tuned controls in S/4HANA FICO to perform governance.

B. Data Collection

In case of collecting qualitative data, secondary research in the form of refereed academic journals, cases, papers, white papers, and standard industry reports highlighting the usage of AI in SAP S/4HANA FICO further curtain be carried out. Some of the sources of information used include research articles, and professional opinions from giants in the field like SAP, Deloitte and PwC among others. To ensure that information is focused only on the relevant themes, items such as compliance automation, risk management and internal controls will be extracted from the tweets [8]. In the case of quantitative examinations of internal controls by utilizing AI in S/4 HANA FICO, quantitative analysis includes the use of various figures of financial transactions, number and percentage of compliance, and risk ratings. Graphs and other statistical instruments were used to compare the effectiveness of AI-based controls with the applications of conventional controls [8]. The sources of data are hardcopy documents, financial records, system logs and reports and compliance reports to compare improvements in efficiency gains, reduced risk, and better compliance.

C. Case Studies/Examples

Case Study 1: Fujitsu's Migration of SAP S/4HANA Finance

The information and communication technology company, **Fujitsu** adopted SAP

S/4HANA Finance to improve its financial management activities. This migration was to ensure that data flowed in the right way throughout the process in a very efficient manner [5]. But the likes of standardised process models, and obsolete user interfaces were faced. To meet these concerns Fujitsu modified the interfaces of various applications and offered extensive training to its employees to better the outlook that is seen by users and make the working process more efficient.

Case Study 2: Integration of AI with SAP S/4HANA at Deutsche Bank.

AI solutions by **Deutsche Bank** combined working with SAP S/4HANA and affected its financial data managing and risky assessment. This integration allowed the bank to automate the more complicated parametric allocations that include depreciation and tax configurations [7]. Further, the implementation of Artificial Intelligence and the use of predictive analytics led to the improvement of decisions made in advance, insight into possible trends observed in the financial market, as well as possible risks that can be paid attention to by Deutsche Bank [7]. The application of AI for the SAP S/4HANA showed new possibilities for the optimisation of bank processes and enhanced the competitive position in the financial market.

Case Study 3: SAP Business Suite Implementation by Accenture

SAP S/4HANA has received wide application across **Accenture's** company business lines not forgetting the corporate functions such as analytics and cloud services [6]. The integration has enhanced internal communication and business decision-making processes as well as establishing strategic, organisational and operational coherence and quality. SAP solutions have

helped Accenture to manage its processes effectively hence improving its capacity to deliver its services to clients [6].

These case studies show indeed how the combination of SAP S/4HANA FICO and AI can revolutionise the process, creating higher compliance levels, more efficiency and better decisions.

D. Evaluation Metrics

In assessing the effectiveness of AI-integrated internal controls in SAP S/4 HANA FICO the following metrics have apply under each with an independent focus. Metrics like **Automation efficiency** are evaluated through the following decrease in errors, processing time, and automation to manual operation ratio [9]. Measuring **compliance accuracy** involves counting the number of compliance issues observed, reducing penalties, and auditing by AI to confirm adherence to regulatory standards. **Cost-effectiveness** pays attention to the possible savings in terms of fines for non-compliance and other operating costs channeled towards implementing AI innovations [10]. **Risk mitigation** is measured by the efficiency of distinguishing financial fraud and other practices with the percentage of fraud detected, accuracy in identifying the anomalies, and time taken to manage the risks. **Scalability** is assessed based on the effectiveness of the AI systems as Operation [11]. Lastly, **user adoption** examines the extent of users' acceptance and usage of AI-controlled systems, their training course completion, satisfaction rate, and comments on critical organisational aspects concerning the systems. Each of the above metrics gives an evaluation of how AI has influenced internal controls in S/4 HANA FICO [12].

IV. Results

A. Data Presentation

SAP FICO applies AI to develop data inputs, complicated financial analysis, reconciliation, and data forecasting. Artificial intelligence in NPL, ML, and predictive analytics generates contemporary initiatives to highlight oddity, and risk anticipation, and streamline compliance systems [2]. AI alters internal controls in S/4 HANA FICO by identifying anomalies, automation in the system, 24/7 monitoring, and predictive compliance.

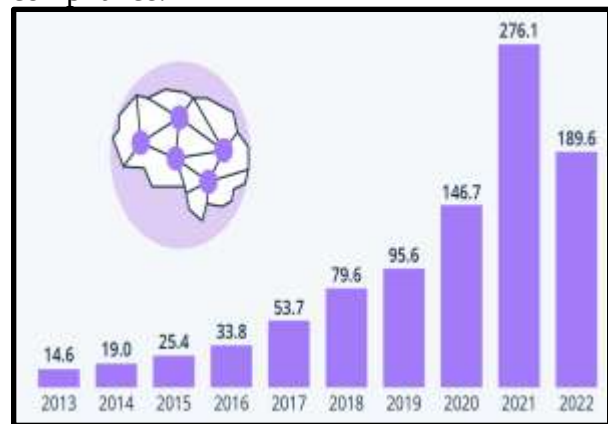


Figure 3: Companies Investing in AI [13]

The above graph highlights the total international corporate investment made in AI. Investment rose in 2021 to \$276.1 billion however, a downgrade was identified in 2022 [13]. Thus, international corporate investment in AI has increased effectively in recent years with \$934.2 billion investment made between 2013 to 2022 [13].

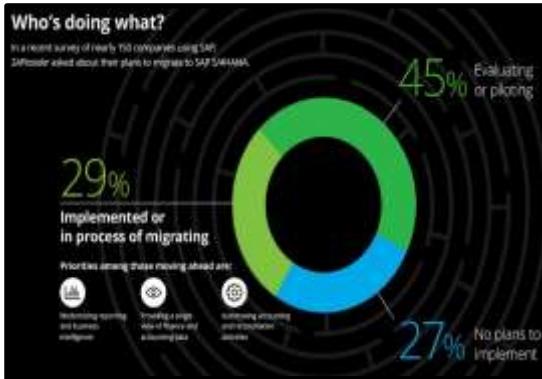


Figure 4: SAP HANA Application
[14]

The above graph shows insights into the SAP HANA Application, where 29% of companies have applied it in the process of migration, 45% are evaluating it and 27% of companies have no plans to implement it [14]. However, there are market threats such as complexity in the integration process, challenges with Data Migration and Integration, and Change Management Resistance [15]. AI and ML, Emphasis on Industry-Specific Solutions, and Extension of Ecosystem and Partnerships have been identified as market trends of this adaptation.

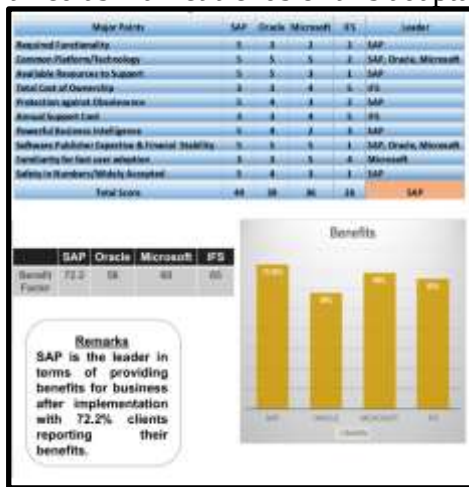


Figure 5: Factors and Benefits of Implementing SAP
[16]

Figure 4 shows 10 major elements attached to the implementation of SAP including,

required functionality, common platform, total cost of ownership, and others. This also highlighted the leading position of SAP with around 72% of customers reporting their facilities [16]. The international ERP software market is anticipated to enlarge by 8.4% CAGR between 2020 to 2026 increasing from \$38.84 billion in 2020 to \$63.42 billion in 2026 [15]. Demand forecasting integrates AI to interpret past sales information and market trends to anticipate further product recruitment, which is major to managing manufacturing planning and inventory.

B. Findings

AI in SAP S/4HANA is pivotal to developing accuracy and productivity rates in process management or PM around frameworks, such as SCM, procurement, and finance. AI in these domains thrives beyond seamless automation, to streamlining and improving the whole workforce. Figure 3 shows the investment rate made by companies in AI. According to Stanford University analysis, entire mergers and acquisitions, private investments, and public offerings were worth around \$934.2 billion from 2013 to 2022 [13]. Investment in AI increased most in 2021 with \$276.1 billion investment [13]. This tracks investment records of 8 million global public and private sectors. Figure 4 has highlighted the deployment options of SAP S/4HANA where 29% of companies applied it in its system of migration [14]. Lastly, SAP has become the leader in creating facilities for companies after the application with around 72% of customers reporting positive feedback [16].

C. Case Study Outcomes

Case Study	Company	Key Outcome
Migration of SAP	Fujitsu	SAP Japan and Fujitsu

S/4HANA Finance		Limited announced that Fujitsu has proactively finished design efforts in the management of full-scale integration of “SAP S/4HANA® Manufacturing solution” for production of operations and engineering [17]
Integration of AI with SAP S/4HANA at Deutsche Bank	Deutsche Bank	Deutsche Bank has initiated AI linked with SAP S/4HANA and impacted its risky assessment and financial data management. Integration of AI for the SAP S/4HANA highlighted new scopes to optimising banking procedures and improved competitiveness

		ss in the financial landscape [18].
SAP Business Suite Implementation	Accenture	SAP S/4HANA integration has improved business decision-making, internal communication, and operational, and organisational quality. SAP mitigations have guided Accenture to manage its processes leading to performance enhancement in service delivery [6].

Table 2: Case Study Outcomes*D. Comparative Analysis*

Aspects of literature review	Focus	Key Findings	Challenges highlighted	Proposed solutions
[1]	Focuses on the application of	Commonly SAP system	The speed and format	The success of the

	SAP S/4 HANA module FICO in the Accounting and Finance division with the help of “Delone and Mclean Information System Success Model.”	m did not have networking issues and this helped companies to run their business process effectively [1].	t of responses were some negative views from the user [1].	SAP system with the S4/HANA version at Perm Jasa Tirta 1 Malang added with the Delone and Mclean model was declared effective [1].
[2]	Focuses on creating a “comprehensive overview of the current state and future direction	IoT and AI have positive implications for the urban environment and	Urbanisation struggles to provide a convenient, sustainable, and secure lifestyle	IoT as mitigations [2].

	ns of smart city development.”	the wellness of inhabitants [2].	le because of the lack of necessary smart technologies [2].	
[3]	Focuses on 2 core methodologies: “a density and distance-based architecture” and “a model-based architecture.”	Trade-offs need to be considered when choosing the appropriate anomaly detection and predictive modeling contexts [3].	Creating an effective AI-based system for predictive analytics and anomaly detection is a major threat [3].	A considerable architectural design with proper algorithms is imposed [3].
[4]	Focuses on the transformative role of (AI) in improving	AI is pivotal in forming the future of the	Lacks in audit accuracy and time management	AI-driven technologies created

	ng the effectiveness of international internal audit functions.	internal auditing process on a large-scale [4].	gement [4].	facilities for data analysis and risk mitigation [4].
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Table 3: Elaboration of Literature sources

V. Discussion

A. Interpretation of Results

Predictive and analytics instruments in SAP S/4HANA develop data management and create foresight in the operations of companies, demonstrating a sector-wide transformation to more data-based operational planning and informed decision-making. Internal controls applied in ERP systems such as S/4 HANA FICO have prescribed norms that were created in advance to track transactions. Traditional mitigations include more risk of delays and risk of the human factor and decreasing non-compliance [1]. On the other hand, SAP S/4HANA has been connected with AI-based analytics which signifies its potential [14]. Thus, AI in SAP S/4HANA has significantly developed accuracy and efficiency rates in process management around several domains including, supply chain management, procurement, finance, and others. The application of AI in SAP S/4HANA with user interface specifically in SAP Fio marks a major improvement in the user communication with the ERP methods.

B. Practical Implications

Automating workflows for activities such as approval processes as well as mollification

decreases the chances of manual flaws and develops operational capabilities. Additionally, real-time observation of variation specifies a seamless resignation of uncertainties, improving fraudulence mitigation. Real-time dashboards and ongoing data monitoring processes smoothen authoritative reporting and preparation of regular audits, decreasing further charges and time. FICO is a module that is major in managing accounting and financial processes [19]. However, effective implementation of its need's major employee training, strong data quality, and smooth application of data with pre-existing mechanisms.

C. Challenges and Limitations

The present work had its boundaries. The researcher has applied secondary qualitative and quantitative data collection and analysis methods and this draws a major limitation with the involvement of descriptive and bias in information. Additionally, a few case study instances such as Fujitsu, Deutsche Bank, and Accenture restricted the generality and wider aspects of the research outcomes [6].

D. Recommendations

Organisations and exerts willing to integrate AI in S/4 HANA FICO will impose **data governance** to specify the reliability and quality of financial information for AI frameworks. However, the governance of digitalisation cannot depend effectively on data-centric economic frameworks [20]. **Daily maintenance and upgradation** will be proactive by the algorithms of AI to comply with emerging financial policies. Additionally, the application of an **ongoing monitoring system** to approach AI-improved controls for large sectors and SMEs. Lastly, **employee training** and awareness of AI in S/4 HANA FICO specify its usage and adaptation rate.

VI. Conclusion and Future work

AI-based internal controls in the SAP S/4 HANA FICO model have highlighted a developmental development in compliance and financial data management. By cultivating and incorporating AI instruments, companies automate their daily activities, improve the detection of anomalies and specify compliance prediction, developing overall performance and minimising threats. Additionally, further deployment and research concentrate on applying advancements in AI such as, Explicable AI (XAI) to develop trustworthiness and clarity in business-informed decision-making processes.

VII Reference List

- [1] Rarantika, L.C. and Firmanto, Y., 2024. THE MANIFESTATION OF DELONE AND MCLEAN MODEL IN EVALUATING THE IMPLEMENTATION OF ERP SAP TO FINANCIAL STATEMENTS. *International Journal of Research on Finance & Business*, 2(1), pp.85-101.
- [2] Alahi, M.E.E., Sukkuea, A., Tina, F.W., Nag, A., Kurdthongmee, W., Suwannarat, K. and 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), p.5206.
- [3] Agrawal, S., 2022. Enhancing payment security through AI-Driven anomaly detection and predictive analytics. *International Journal of Sustainable Infrastructure for Cities and Societies*, 7(2), pp.1-14.
- [4] Ghafar, I., Perwitasari, W. and Kurnia, R., 2024. The Role of Artificial Intelligence in Enhancing Global Internal Audit Efficiency: An Analysis. *Asian Journal of Logistics Management*, 3(2), pp.64-89.
- [5] Chintale, P.: *DevOps Design Pattern: Implementing DevOps Best Practices for Secure and Reliable CI/CD Pipeline* (English Edition). BPB Publications, 2023.
- [6] Rane, N.L., Choudhary, S.P. and Rane, J., 2024. Artificial Intelligence-driven corporate finance: enhancing efficiency and decision-making through machine learning, natural Language Processing, and robotic process automation in corporate governance and sustainability. *Studies in Economics and Business Relations*, 5(2), pp.1-22.
- [7] Dharmasiri, P., Phang, S.Y., Prasad, A. and Webster, J., 2022. Consequences of ethical and audit violations: Evidence from the PCAOB settled disciplinary orders. *Journal of Business Ethics*, pp.1-25.
- [8] Bello, O.A. and Olufemi, K., 2024. Artificial intelligence in fraud prevention: Exploring techniques and applications challenges and opportunities. *Computer Science & IT Research Journal*, 5(6), pp.1505-1520.
- [9] Lewis, J.R. and Sauro, J., 2021. Usability and user experience: Design and evaluation. *Handbook of human factors and ergonomics*, pp.972-1015.
- [10] Kunchala, M.R., 2024. SAP ECC to S4 HANA Changes in Finance Best Practices: Business Users-PART 1. *Available at SSRN 4807972*.
- [11] Vaka, D.K., 2023. Empowering Food and Beverage Businesses with S/4HANA: Addressing Challenges Effectively. *J Artif Intell Mach Learn & Data Sci*, 1(2), pp.376-381.
- [12] "Design and Implementation of an AI-powered e-commerce shipping Recommendation System", *int. J. Eng. Res. Sci. Tech.*, vol. 19, no. 4, pp. 32–41, Nov. 2023, doi: [10.62643/](https://doi.org/10.62643/).

[13] INNOVATIONS IN AZURE MICROSERVICES FOR DEVELOPING SCALABLE”, *int. J. Eng. Res. Sci. Tech.*, vol. 17, no. 2, pp. 76–85, May 2021, doi: [10.62643/](https://doi.org/10.62643/)

[14] Purtova, N. and van Maanen, G., 2024. Data as an economic good, data as a commons, and data governance. *Law, Innovation and Technology*, 16(1), pp.1-42.