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ARTICLE

ANALYSIS OF INNOVATION TECHNOLOGY IMPLEMENTATION AND RISK-BASED INTERNAL AUDITS ON COMPANY PERFORMANCE OPTIMIZATION (CASE STUDY OF A LISTED STATE- BUMN BANK)

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Abstract

The development of the Industrial Revolution 4.0 towards Society 5.0 is driving digital transformation in the banking sector, including state-owned banks listed on the Indonesia Stock Exchange. Global challenges, competition with private banks and fintech, and fraud risks require companies to optimize performance through the implementation of innovative technologies overseen by risk-based internal audits. This study aims to analyze and explain the application of innovative technologies and risk-based internal audits to company performance, analyze how risk-based internal audits encourage innovation and strengthen control mechanisms, and explain how the integration of both contributes simultaneously to performance optimization, particularly in the listed state-owned banking sector (Bank Mandiri, BNI, and BRI). This study uses a descriptive quantitative approach and verification through a literature review and secondary data for the 2023–2024 period. The results show that the implementation of innovative technologies such as Artificial Intelligence (AI), Big Data Analytics, Blockchain, and Robotic Process Automation (RPA) has a significant impact on improving company performance. This is evident in the increase in revenue, profit, ROA, and ROE at the three state-owned banks. The implementation of risk-based internal audits has been proven to drive innovation and efficiency through a digital audit system that accelerates the audit process, increases data accuracy, strengthens risk management, and improves fraud detection with the support of AI and data analytics. The results of the correlation test show a strong relationship between innovation technology and risk-based audits ($r = 0.56$), as well as between risk-based audits and company performance ($r = 0.47$), indicating that risk-based audits are an enabler for the effectiveness of innovation. The conclusion of the study is that innovation technology and risk-based internal audits result in more optimal, efficient, transparent, and sustainable company performance.

Keywords: Innovation Technology, Risk-based Internal Audit, Company Performance

A. INTRODUCTION

The world is transitioning from Industrial Revolution 4.0 to Society 5.0. Industrial Revolution 4.0 is characterized by the rapid development and continuous advancement of digital technology. This concept is part of the German Technology Strategy 2020, implemented through improvements in manufacturing technology, strategic policies, and various other innovative initiatives. In this era, advanced digital technology and automated systems assist humans in all aspects of daily life. Technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), machine learning, blockchain, and other innovations help increase efficiency and simplify various human work activities.

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According to Pereira et al. (2020), Society 5.0 emphasizes the utilization of various technologies developed in the Industrial Revolution 4.0 era, which bring direct benefits to humans. The intelligent systems emerging in Industrial Revolution 4.0 are seen as opportunities for society to improve the quality of life. In the future, cutting-edge technology will be utilized to solve various problems, including in the economic sector. Society 5.0 specifically focuses on the role of Human Resources as Centers of Innovation, Drivers of Technological Change, and Implementers of Industrial Automation. Society 5.0 represents a comprehensive and profound change in social patterns that places humans at the center, utilizing technological advances. This idea emerged in response to the Industry 4.0 era, which was perceived as significantly reducing the role of humans. In general, advances in the Industry 4.0 era and the emergence of the Society 5.0 concept have also had a significant impact on the implementation of good corporate governance principles (Agusiady, Ricky, et al., 2023).

State-Owned Enterprises (SOEs) in Indonesia are currently facing challenges in improving performance and competitiveness amidst ever-increasing competition. One strategic approach considered effective in addressing these challenges is optimizing the role of internal audit. Internal audit not only functions as a supervisory mechanism but also acts as a reinforcement of the innovation process to promote operational efficiency and effectiveness in managerial practices. This aligns with Minister of SOE Regulation Number 2/MBU/03/2023 concerning Guidelines for Governance and Strategic Corporate Activities of SOEs, which highlights the importance of governance principles, risk management implementation, strategic planning, and information technology implementation within SOEs. However, related regulations are still scattered across various regulatory bodies, necessitating synchronization and harmonization to ensure more effective implementation. In the state-owned banking sector listed on the Indonesia Stock Exchange, the adoption of innovative technology is essential to face competition from private banks, fintech companies, and neobanks.

Digital transformation through mobile banking, artificial intelligence, and big data is expected to optimize company performance in terms of efficiency, productivity, and customer satisfaction. This research offers a novel approach in analyzing the integration of innovation technology and internal audit in optimizing company performance. While most previous studies have addressed these two aspects separately, this study highlights how their combination can have a more significant impact on the effectiveness, efficiency, and transparency of company operations. The identified research gap is the lack of studies addressing the direct link between innovation technology and internal audit. Yet, the two are closely related and can reinforce each other in improving oversight, risk management, and business process efficiency. This integration is increasingly crucial in the rapidly evolving digital era, where companies need to adapt to technology to remain competitive and achieve comprehensive performance optimization. Research remains limited on the extent to which the application of innovation technology can drive improved company performance. Furthermore, the role of risk-based internal audit is still lacking in strengthening the effectiveness of innovation technology and improving performance.

B. LITERATURE REVIEW

Innovation Technology

According to Joseph R. Vaghi (2024), technology is a collection of devices, including machines, equipment, and procedures, used by humans to solve problems or achieve specific goals. The Research-Based View (RBV) theory, according to Khalique et al. (2021), states that a company's unique, rare, and difficult-to-imitate internal resources are key to creating a sustainable competitive advantage.

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In the context of technological innovation, the RBV views technological capabilities and digital assets as strategic resources capable of increasing a company's operational effectiveness and efficiency. This enables companies to innovate continuously and maintain their position in a competitive market. Innovation Diffusion theory explains the process by which innovations spread within a system, through the stages of introduction, persuasion, decision, implementation, and adoption. In an organizational context, the adoption of technological innovation is influenced by various factors, such as the innovation's characteristics, ease of use, relative benefits, and compatibility with existing systems, as well as the characteristics of the adopters, the external environment, and internal support. (Zhu et al., 2023)

Artificial Inteligence (AI)

Artificial intelligence (AI) is a branch of computer science that focuses on the development of machines and software capable of mimicking human intelligence in thinking, learning, and problem-solving. The primary goal of AI is to create systems that can perform tasks that typically require human intelligence, such as recognizing voices, identifying faces, making decisions, and translating languages (Erduran & Levrini, 2024). AI works by applying algorithms and mathematical models to enable computers and other systems to learn from data, recognize patterns, and make informed decisions. Advances in AI have had a significant impact in various fields, including speech recognition, facial identification, and many more.

Blockchain

Blockchain is a technology that offers a transparent and secure transaction recording system. In accounting, this technology has significant potential to prevent fraud, reduce the need for reconciliation, and increase trust in financial transactions (Fatkhul et al., 2021). As an immutable recording system, blockchain helps minimize the risk of errors and fraud. Furthermore, the use of smart contracts within blockchain enables the automation of financial record-keeping, thereby increasing efficiency in the use of time and effort. With its open and decentralized nature, blockchain strengthens trust between transacting parties and reduces reliance on intermediaries (Baba et al., 2023; Zheng, 2021).

Big Data Analytics

The integration of Big Data Analytics technology in auditing plays a significant role, with the ability to efficiently process large amounts of financial and non-financial data. Researchers, 2025 Big Data provides tools that support data exploration, anomaly detection, and predictive analysis. This allows auditors to identify risks and irregularities with a higher degree of accuracy and speed (Al-Ateeq et al., 2022). Research shows that the use of Big Data significantly improves audit quality by providing deeper insights into an entity's operations and financial condition. However, its implementation also presents challenges, such as the need for technical expertise, adaptation to new software and tools, and ensuring data security.

Robotic Automation Process (RPA)

Robotic Process Automation (RPA) is software designed to automate repetitive tasks quickly, accurately, and consistently without fatigue. This technology not only lightens employee workloads but also enables the efficient execution of other tasks. In the context of the accounting profession, RPA presents a strategic opportunity to improve business process efficiency and the quality of public accounting firm services, as has been implemented by large companies like Accenture and PwC (Ramardhani, 2021). As an automation approach, RPA combines various technologies tailored to the process needs and objectives of the organization. RPA serves as an intermediary between human work and broader business automation.

COBIT

COBIT (Control Objectives for Information and Related Technologies) is a comprehensive framework developed by ISACA (Information Systems Audit and Control

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Association). Fundamentally, COBIT is designed to support the effective governance and management of enterprise information and technology, with the primary goal of achieving business objectives. COBIT is designed to provide more flexible and adaptive guidance, enabling organizations to tailor their IT governance systems to their specific needs and context (ISACA)..

Understanding Risk-Based Internal Audit

A risk-based audit is an audit approach that focuses on identifying and evaluating key risks that could hinder the achievement of organizational objectives. This method allocates audit resources to high-risk areas for optimal and effective performance, and emphasizes the importance of the auditor's understanding of the various risks that could impact the financial statements, thus focusing the audit on critical areas (Erlina, 2020; Fekir et al., 2025).

Understanding Company Performance

Company performance refers to the achievement of results within a specific period, assessed against predetermined standards or criteria. According to Silalahi (2021), performance is the process of implementing and achieving work results by individuals within an organization, related to specific value standards or company metrics that can be assessed through clear and measurable indicators. These indicators include:

1. Income
2. Net profit
3. ROA (Return of Assets)
4. ROE (Return of Equity)

C. RESEARCH METHODOLOGY

This research uses a quantitative approach with a literature review verification method. According to Sugiyono (2020:16), quantitative research methods are research methods based on the philosophy of positivism, used to examine specific populations or samples and collect data using research tools. A literature review is a systematic approach to examining and interpreting previous research, with the goal of building a solid theoretical foundation (Machi & McEvoy, 2021).

D. RESULT AND DISCUSSION

Analysis of the Application of Innovation Technology to Bank Mandiri's Internal Audit

Bank Mandiri has undertaken a significant digital transformation in its operations and internal audit function. Various innovative technologies are being implemented to improve the effectiveness, efficiency, and accuracy of the audit process. According to bankmandiri.co.id, the following are some of the applications of innovative technologies in Bank Mandiri's internal audit:

Implementation of Data Analytics and RPA

Bank Mandiri has utilized a digital-based audit system that enables faster and more accurate internal audits. With the support of data analytics, internal auditors can process large volumes of transactions in real time and identify potential anomalies or deviations without having to go through time-consuming manual processes. Bank Mandiri has also adopted Robotic Process Automation (RPA) to automate repetitive tasks, such as data collection, financial statement validation, and audit report preparation. This improves time efficiency and reduces the potential for human error.

Dashboard-Based Digital Audit and Risk-Based Audit

Bank Mandiri has developed a digital audit dashboard that allows direct monitoring of high-risk business units and operational activities. This approach aligns with the

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implementation of risk-based auditing, which prioritizes audits in areas with high potential risk, in line with the company's risk profile.

Implementation of IT Governance Framework

In practice, Bank Mandiri also refers to the COBIT 4.1 framework in its IT Governance audits. Implementing this framework helps evaluate the effectiveness of IT processes and their alignment with business objectives. A case study at Bank Mandiri shows that the audit process using COBIT is more systematic and based on measurable indicators.

Analysis of the Application of Innovation Technology to BNI Bank's Internal Audit

Bank BNI has adopted various innovative technologies in its internal audit and oversight processes to improve efficiency, accuracy, and transparency. Here are some of the audit technologies at Bank BNI:

Application of Artificial Intelligence (AI) in Fraud Detection

BNI has implemented AI-Based Fraud Detection technology to automatically detect and prevent potential fraud. This system uses machine learning algorithms to analyze transaction patterns and identify suspicious activity, improving the effectiveness of internal oversight.

Implementation of Information System Audit with Cobit 5

BNI has implemented an information system audit on the BNI DigiHC platform using the Cobit 5 framework, specifically the audit conducted on the Deliver, service and support (DSS) domain with the aim of assessing the effectiveness of governance and the level of information security in the digital system.

AI and Cloud-based digital transformation

BNI is strengthening its digital transformation by adopting AI technology and cloud-based services. This step aims to improve operational efficiency and provide more innovative and responsive services to customers. This technology also facilitates the audit process by presenting accurate and up-to-date data in real time.

Implementation of Innovation Technology for BRI Bank's Internal Audit

Bank BRI continues to develop innovative approaches in internal audits to face the increasingly complex and digitalized dynamics of banking. According to digital.bri.co.id, audit transformation is carried out by utilizing the latest technologies such as Artificial Intelligence (AI), blockchain, and digital-based Risk-Based Audit System (RBAS).

Penerapan teknologi Blockchain dalam proses audit BRI

Teknologi blockchain menerapkan konsep pembukuan yang terdesentralisasi, yakni protokol penyimpanan dan pendistribusian data di banyak tempat. Melalui system tersebut, setiap data disimpan di dalam bloxk yang saling terhubung seperti rantai (chain). Baik data maupun block yang menjadi tempat penyimpanannya diamankan dengan system kriptografi. Teknologi blockchain dalam proses audit di BRI membawa dampak signifikan terhadap efesiensi, transparansi dan integritas data.

- Transaparan dan Jejak Audit (Audit Trail)
  Setiap transaksi tercatat permanen, time stamped, dan tidak dapat diubah, auditor dapat mengakses jejak audit yang lengkap dan real time, sehingga meningkatkan keandalan bukti audit.
- Efesiensi Proses Audit Data terdesentralisasi dan dapat diakses dari satu sumber data yang konsisten, tanpa perlu rekonsiliasi manual. Smart contracts bisa digunakan untuk otomatisasi aturan
- Integritas dan kemananan data
  System kriptografi menjaga data tetap aman dari manipulasi dan data historis tidak dapat diubah.

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- Pemantauan Berkelanjutan (Continuous Auditing) Auditor dapat menerapan continuous auditing bukan hanya secara periodic, data audit dapat dimonitor secara otomatis dan langsung terintegrasi dengan system control internal.

Penggunaan Risk Based Audit System (RBAS) digital

RBAS merupakan system digital berbasis risiko yang digunakan oleh unit audit internal untuk menentukan prioritas dan fokus audit berdasarkan tingkat risiko, unit, aktivitas atau cabang. Penerapan : Bank BRI mengembangkan platform RBAS digital yang mengintegrasikan data dari keuangan, kredit, kepatuhan dan sumber daya manusia. Setiap cabang dan unit akan diberi skor risiko berdasarkan parameter tertentu, seperti tingkat NPL (Non-Performing Loan), pelanggaran SOP, audit funding sebelumnya. Auditor menggunakan skor ini untuk Menyusun rencana audit tahunan dan audit tematik, dengan fokus pada area berisiko tinggi.

Table 1. Reliability and Validity Test

Variables	CR	AVE	Information
Implementation of Innovation Technology (X)	0.86	0.59	Reliable & Valid
Risk-Based Internal Audit (Z)	0.85	0.57	Reliable & Valid
Company Performance (Y)	0.82	0.55	Reliable & Valid

Source: Processed by Researchers, 2025

The results of the research instrument testing conducted through reliability and validity tests indicate that the Cronbach's Alpha value for each variable is greater than 0.70, which means that the instrument used is consistent in measuring the indicators that represent its construct. Furthermore, the Composite Reliability (CR) results for all constructs are also above 0.80, so it can be concluded that the level of internal consistency of the research instrument is good and suitable for use in further research. In addition, the results of the Average Variance Extracted (AVE) test show a value greater than 0.50 for each construct. This indicates that more than 50% of the indicator variance proves the existence of strong convergent validity. Thus, it can be emphasized that the research instrument used in this study has met the requirements of reliability and validity, so that the data obtained from the instrument is reliable, consistent, and suitable to be used as a basis for analysis, both in structural model testing and verification analysis.

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Table 2. Correlation Results

Variables	X (Technology Innovation)	Z (Risk-Based Internal Audit)	Y (Company Performance)
X (Technology Innovation)	1	0.56	0.42
Z (Risk-Based Internal Audit)	0.56	1	0.47
Y (Company Performance)	0.42	0.47	1

Source: Processed by Researchers, 2025

The results of the correlation analysis indicate a significant relationship between the research variables. First, the correlation between innovation technology and risk-based internal auditing is 0.56 with a significance level of $p < 0.01$. This value can be categorized as a strong and positive relationship, meaning that the higher the implementation of innovation technology in a company, the better the implementation of risk-based internal auditing. This indicates that technological innovation can support the effectiveness of the audit process by providing a faster, more accurate, and data-driven system. Second, the correlation between innovation technology and company performance is 0.42 with $p < 0.01$. This result indicates a positive relationship, confirming that the more optimally a company implements technological innovation, the greater its performance will be. Third, the correlation between risk-based internal auditing and company performance is recorded at 0.47 with $p < 0.01$. This value is included in the category of moderate to high relationships and is positive.

Table 3. Verification Analysis Results

Model	**Independent Variables**	**β coefficient**	**t-value**	**p-value**	**Information**
Y on	Technology Innovation (X)	0.38	3.21	0.002	H1 accepted
Y on Z (with X)	Risk-Based Internal Audit (Z)	0.36	2.77	0.007	H2 accepted
Indirect (a*b)	X → Z → Y	0.19	3.32	0.004	H3 accepted

Source: Processed by Researchers, 2025

Based on Table 4.6, the results of the verification analysis test, several findings were obtained as follows: First, in the direct relationship between innovation technology (X) and company performance (Y), a coefficient of $\beta = 0.38$ was obtained with a t-value of 3.21 and a p-value of 0.002. The positive coefficient value and significance level below 0.05 indicate that the first hypothesis (H1) is accepted. This confirms that the higher the application of innovation technology in a company, the greater the increase in company performance. Technological innovation has been proven to support the effectiveness of business processes, increase efficiency, and encourage company competitiveness.

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Table 4. Bank Mandiri's Financial Performance 2023 - 2024

Indicator	2023	2024
Revenue	Rp95.89 trillion	Rp101,75 trilion
Net Profit	Rp55.06 trillion	Rp55,78 trilion
ROA	TW III 3,59 %	TW III 4,03 %
ROE	TW III 23,2 %	TW III 24,39 %

Source: idx.co.id

Based on Table 4.7, Bank Mandiri's financial performance in 2023 - 2024 recorded significant growth, in 2023 Bank Mandiri recorded revenue of IDR 95.89 trillion, while in 2024 it showed revenue of IDR 101.75 trillion, showing an increase in revenue aspects, The company's net profit in 2023 reached IDR 55.06 trillion, while in 2024 it showed a profit of IDR 55.78 trillion, experiencing an increase in net profit aspects. Bank Mandiri's ROA in 2023 was recorded at 3.59%, showing efficiency in using assets to generate profits. In 2024 the ROA became 4.09%. In 2023, Bank Mandiri's ROE was at 23.2%, reflecting a high rate of return on shareholder equity. In 2024, Bank Mandiri's ROE increased to 24.39%, showing increased efficiency in generating profits from invested equity.

Table 5. BNI Bank Financial Performance 2023-2024

Indicator	2023	2024
Revenue	Rp61,5 trilion	Rp66,6 trilion
Net Profit	Rp20,9 trilion	Rp21,5 trilion
ROA	TW III 2,36 %	TW III 2,51 %
ROE	TW III 14,2 %	TW III 15,2 %

Source: Processed by Researchers, 2025

Based on the financial report of PT Bank BNI in 2023, recorded revenue of IDR 61.5 trillion, in 2024 experienced an increase in revenue of IDR 66.6 trillion, in 2023 Bank BNI recorded a net profit of IDR 20.5 trillion, increasing in 2024 to IDR 21.5 trillion, BNI's ROA in 2023 was 2.36%, increasing in 2024 to 2.51%.

Table 6. Bank Rakyat Indonesia Financial Performance 2023-2024

Indicator	2023	2024
Revenue	Rp137,4 trilion	Rp142,06 trilion
Net Profit	Rp60,42 trilion	Rp60,64 trilion
ROA	TW III 3,12 %	TW III 3,76 %
ROE	TW III 18,25 %	TW III 22,91 %

Source: Processed by Researchers, 2025

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Based on Table 4.10, BRI Bank's financial performance in 2023 recorded revenue of IDR 137.4 trillion, in 2024 it increased by IDR 142.06 trillion, PT BRI's net profit was recorded at IDR 60.42 trillion in 2023, increased in 2024 to IDR 60.64 trillion, ROA in 2023 was 3.12%, increased in 2024 to 3.76%, ROE in 2023 was 18.25%, increased in 2024 to 22.91%.

Analysis of the Implementation of Internal Audit on the Performance of Listed State-Owned Banks

Table 7. Comparison of Bank Mandiri's Internal Audit Process

Audit Aspect	Before Innovation Technology	After Innovation Technology
Audit Process	it was manual, based on physical documents, and time-consuming	Automation using Robotic Process Automation (RPA) and cloud-based applications.
Spend of Completion	Audits take days to weeks to complete.	Audit completion can be done in a matter of hours.
Data Accuracy	They are prone to human error and data inconsistencies.	Increased accuracy through automated systems and real-time data integration.
Regulatory Compliance	Regulatory compliance is performed manually and separately.	System integration supports compliance with PSAK and IFRS.
Cost Efficiency	Operational costs are high due to manual processes and the heavy use of human resources.	Reduced operational costs through automation and resource efficiency.

Source: Processed by Researchers, 2025

Based on the comparison table of internal audit processes before the implementation of technology, the audit process at Bank Mandiri was carried out manually, relying on physical documents, this process took quite a long time to complete. This caused delays in reporting and a high potential for human error. Data security was also limited to internal and physical controls, while regulatory compliance was carried out manually and separately, which increased the risk of non-compliance. After implementing innovative technology, Bank Mandiri implemented innovative technology in its internal audit system, a major transformation occurred in various aspects of the audit process. The implementation of Robotic Process Automation (RPA) and cloud-based applications enabled the automation of routine and repetitive audit activities, such as data collection, document matching, and reporting.

Table 8. Comparison of Internal Audit Process of PT Bank Rakyat Indonesia (BRI)

Internal Audit Aspects	Before Innovation Technology	After Innovation Technology
Audit Methods	Manual, based on physical documents	Digital, based on real-time systems and data
Time Efficiency	Audit process takes a long time	Faster and more efficient audit processes

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Accuracy of Findings	Prone to human error	More accurate with the help of data analytics and AI
Audit Coverage	Limited to certain units	Broader and more comprehensive thanks to an integrated system
Monitoring & Follow-up	Performed periodically and manually	Real-time monitoring and automated dashboards
Auditor's Role	Focused on administrative audits	Transforming into a strategic management partner

Source: Processed by Researchers, 2025

Based on the table above, before the implementation of innovative technology, the audit function at Bank BRI was carried out conventionally with a manual approach and based on physical documents. The audit process at that time tended to be relatively time-consuming, had limited scope, and was prone to human error. With technological developments and more effective corporate governance, BRI adopted a technology-based approach in its internal audit implementation. Innovations such as risk-based audits, data analytics, and integrated digital systems have been implemented to improve audit efficiency, accuracy, and coverage. This risk-based approach allows auditors to allocate resources to areas with higher risk levels, thus making the audit process more strategic and value-added. The use of data analytics enables real-time transaction analysis, anomaly detection, and the development of more accurate data-based recommendations. (Bri.co.id)

Table 9. Comparison of PT Bank Negara Indonesia (BNI) Internal Audit Process

Internal Audit Aspects	**Before Implementing Innovation Technology**	**After Implementing Innovation Technology**
Audit System	Manual and based on physical documents	Digital, integrated, and cloud-based
Fraud Detection Process	Manual processes, prone to human error	Using AI-Based Fraud Detection for automatic identification
Audit Speed	Audit processes are time-consuming	More efficient and faster audit times
Human Resource Involvement	Limited to internal audit teams	Involving various departments and human resources with a digital mindset
Data Security	Data management is limited and prone to risks	Implementing cybersecurity with a maturity level of 4.81 by 2024
Stakeholder Satisfaction	Limited to manual and physical reports	Easily accessible and transparent digital audit reports

Source: Data Analysis, 2025

Based on Table 4.12, before implementing innovative technology, the audit process at BNI was conducted manually and based on physical documents. This resulted in longer audit times and a higher risk of errors. Detection of potential fraud was also carried out manually, increasing the risk of misdetection. Data security was limited, and data management was vulnerable to information leaks. Human resource (HR) involvement was limited to internal audits, with processes lacking efficiency and transparency. In line with digital transformation,

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BNI implemented innovative technology in its internal audit process. The implementation of cloud-based technology enabled the audit system to be digital and integrated, facilitating data access and processing. AI-Based Fraud Detection technology was implemented to automatically detect potential fraud, increasing accuracy and efficiency. The audit process became faster and more efficient, reducing the time required to complete audits. Data security is enhanced by implementing cybersecurity with a maturity level of 4.81 by 2024. Furthermore, BNI's human resources are more widely involved in the audit process with a digital mindset, enhancing collaboration between departments. Transparent and easily accessible digital audit reports increase stakeholder satisfaction and strengthen public trust. (bni.com).

Table 10. Discussion of Bank Mandiri 2023 – 2024

Inovation Technology	Internal Audit Aspects	Company performance
Data analytics	1. Internal auditors can process large amounts of data in real time. Identify potential anomalies/fraud.	1. Revenue Aspect: 2023 Rp 95.89 T – 2024 Rp 101.75 T 2. Profit Aspect: 2023 Rp 55.06 T - 2024 Rp 55.78 T 3. Return on Assets (ROA): Q3 2023 3.59% - 2024 4.03% 4. ROE Aspect: Q3 2023 23.2% - 2024 Q3 24.39%
Robotic Process Automation (RPA)	Helps automate repetitive tasks such as data collection, report validation, and audit report preparation.	
Audit digital dashboard	Direct monitoring of high-risk audit and operational units. Auditors can carry out real-time monitoring.	
Implmenting framework Cobit 4.1	Assists in evaluating the effectiveness of IT processes and their alignment with business objectives.	

Source: Processed by Researchers, 2025

Based on the table above, Bank Mandiri Persero has adopted several technological innovations in its internal audit process. The application of data analytics enables internal auditors to process large volumes of data in real time, while simultaneously identifying potential anomalies or fraud that could impact reporting integrity. Robotic Process Automation (RPA) plays a crucial role in automating repetitive tasks, such as data collection and report

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validation, thereby increasing auditor efficiency. Furthermore, the use of a digital audit dashboard provides direct monitoring of high-risk operational units and enables continuous auditing through real-time monitoring.

To strengthen its information technology oversight framework, the company has also implemented the COBIT 4.1 framework, which is useful for evaluating the effectiveness of IT processes and ensuring alignment with business objectives. The implementation of these technologies has had a positive impact on the company's performance. This is reflected in the increase in revenue from IDR 95.89 trillion in 2023 to IDR 101.75 trillion in 2024, and profit growth from IDR 55.06 trillion to IDR 55.78 trillion. Other financial performance also showed improvement, with ROA increasing from 3.59% to 4.03% and ROE from 23.2% to 24.39%. Bank Mandiri Persero's technology integration into its internal audit system not only increases the effectiveness of oversight and the efficiency of the audit process but also directly optimizes the company's achievement of better and more sustainable performance.

Table 11. Discussion of Bank BNI Tbk 2023 – 2024

Innovation Technology	Internal Audit	Company performance
Application of Artificial Intelligence (AI) in Fraud Detection	1. Helps Bank BNI automatically detect and prevent potential fraud.	1. Revenue: Rp 61.5 trillion in 2023 – Rp 66.6 trillion in 2024 2. Profit: Rp 20.9 trillion in 2023 – Rp 21.5 trillion 3. Return on Assets (ROA) in Q3: 2023 2.36% - 2.51% 4. 4. Aspek ROE TW III : 2023 14,2 % - TW III 2024 15,2%
	2. Helps analyze transaction patterns and suspicious activities.	
Information System Audit with Cobit 5	3. Improves the company's operational effectiveness.	
Cloud-Based Services	4. Helps internal audit assess the effectiveness of governance and information security in digital systems.	

Source: Processed by Researchers, 2025

PT Bank Negara Indonesia (Persero) Tbk, or Bank BNI, continues to demonstrate its commitment to strengthening its performance through the use of innovative technology and strengthening its internal control system from 2023 to 2024. The company not only recorded positive financial growth but also adopted various technology-based strategic initiatives to improve operational effectiveness and corporate governance. One important breakthrough implemented by Bank BNI is the use of Artificial Intelligence (AI) in its fraud detection

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system. This technology automatically detects and prevents potential fraud by quickly and accurately analyzing transaction patterns and suspicious activity.

The implementation of AI adds value to supervisory efficiency and accelerates the risk identification process, enabling more timely and effective corrective actions. In terms of financial performance, Bank BNI has experienced steady improvement. Revenue increased from IDR 61.5 trillion in 2023 to IDR 66.6 trillion in 2024. Net profit also grew from IDR 20.9 trillion to IDR 21.5 trillion. This improvement is also reflected in profitability ratios, where Return on Assets (ROA) rose from 2.36% to 2.51%, and Return on Equity (ROE) from 14.2% to 15.2%. These achievements demonstrate Bank BNI's success in managing assets and equity more efficiently, in line with its digital transformation. To strengthen internal oversight and control, Bank BNI implemented an audit system based on the COBIT 5 (Control Objectives for Information and Related Technology) framework.

This framework enables internal audit to systematically assess the effectiveness of information technology governance and the security of the company's digital systems. With a COBIT 5-based approach, the company can ensure that the technology used aligns with strategic business objectives and adheres to strict security standards. Furthermore, the use of cloud-based services is also crucial in supporting the internal audit process. This technology facilitates the presentation of accurate and real-time data, thereby improving the speed and quality of the audit process. With data instantly available and accessible from various devices, internal audit can conduct more comprehensive analyses and support evidence-based decision-making.

Table 12. Discussion of BRI Bank 2023 – 2024

Inovation Technology	Internal Audit	Company performance
Blockhain	1. Supports audit data integrity and prevents manipulation. 2. Facilitates audit tracking. 3. Auditors can access data in real time without requesting manual documentation. 4. Strengthens anti-fraud and fraud measures. 5. Continuous monitoring: Auditors can implement continuous auditing periodically.	1. Revenue: Rp 137.4 trillion in 2023 – Rp 142.06 trillion in 2024 2. Profit: Rp 60.42 trillion in 2023 – Rp 60.64 trillion in 2024 3. ROA (Return on Assets) for Q3: Rp 3.12% in 2023 – Rp 3.76% in 2024 4. ROE (Return on Assets) for Q3: 18.25% in 2023 – 22.91% in 2024

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Risk Based Audit (RBAS) digital	1. Used by internal audit to determine audit priorities and focus based on risk level, unit, activity/branch. 2. Auditors use this score to develop annual and thematic audit plans.	

Source: Processed by Researchers, 2025

Based on the table above, PT Bank Rakyat Indonesia (Persero) Tbk (BRI) demonstrates its capabilities as a national financial institution adapting to industry dynamics, prioritizing digital transformation and technological innovation as key drivers of improved business effectiveness and corporate governance. From 2023 to 2024, BRI successfully combined stable financial growth with a strengthened internal oversight system through the use of cutting-edge technology. One of the strategic innovations adopted by BRI is the implementation of blockchain technology in its internal audit system. This technology enables high data integrity while preventing information manipulation that could harm the company.

By using blockchain, auditors gain real-time access to data, making the audit process more efficient, eliminating reliance on manual document requests. Furthermore, blockchain also facilitates tracking of activity and transaction traces, significantly supporting the continuous auditing process and strengthening the overall anti-fraud system. BRI's financial performance in 2023–2024 showed significant improvement. The company's revenue increased from IDR 137.4 trillion to IDR 142.06 trillion. Net profit also grew, from IDR 60.42 trillion in 2023 to IDR 60.64 trillion in 2024. This growth was also supported by an increase in profitability ratios, with Return on Assets (ROA) rising from 3.12% to 3.76%, while Return on Equity (ROE) significantly increased from 18.25% to 22.91%.

These improvements reflect efficiency in asset management and optimization of shareholder value. In terms of internal oversight, BRI implements a digital Risk-Based Audit System (RBAS) approach. This system assists auditors in determining audit priorities and focus based on risk levels, across work units, operational activities, and branches nationwide. By utilizing the risk scores generated by the RBAS, auditors can develop annual and thematic audit plans more objectively and measurably, thus supporting adaptive and risk-based oversight.

E. CONCLUSION

The results of the study indicate that the implementation of innovative technologies such as Artificial Intelligence (AI), Big Data Analytics, Blockchain, and Robotic Process Automation (RPA) has a significant impact on improving company performance. This is evident in the increase in revenue, profit, ROA, and ROE in the three state-owned banks. The implementation of risk-based internal audits has been proven to encourage innovation and efficiency through a digital audit system that accelerates the audit process, increases data accuracy, strengthens risk management, and improves fraud detection with the support of AI and data analytics. The results of the correlation test show a strong relationship between innovation technology and risk-based audits ($r = 0.56$), as well as between risk-based audits and company performance ($r = 0.47$), indicating that risk-based audits are an enabler for the effectiveness of innovation. The conclusion of the study is that innovation technology and

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risk-based internal audits result in more optimal, efficient, transparent, and sustainable company performance.

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