

HANOI UNIVERSITY OF MINING AND GEOLOGY  
Faculty of Economics and Business Administration

**7<sup>th</sup> INTERNATIONAL CONFERENCE**

**EMMA+**

**ON ECONOMIC MANAGEMENT  
IN MINERAL ACTIVITIES AND TOPICAL  
ISSUES IN SUSTAINABLE DEVELOPMENT**

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**7<sup>th</sup> INTERNATIONAL CONFERENCE ON ECONOMIC MANAGEMENT IN MINERAL ACTIVITIES  
AND TOPICAL ISSUES IN SUSTAINABLE DEVELOPMENT (EMMA+)**



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## FOREWORD

We are pleased to welcome you to the 7<sup>th</sup> International Conference on Economic Management in Mineral Activities and Topical Issues on Sustainable Development (EMMA+), hosted at the Hanoi University of Mining and Geology on October 23, 2024. The Conference continues to foster dialogue among scientists, researchers, experts, and students dedicated to advancing the field of economic management in mineral activities and sustainable development.

The 7<sup>th</sup> EMMA+ is particularly special as it coincides with the 25<sup>th</sup> Anniversary of the Faculty of Economics and Business Administration. This milestone reflects our commitment to excellent education and research, and we are excited to celebrate this journey with all of you.

This year, the Conference received 70 submissions from Australia, Russia, Romania, China, Indonesia, Thailand, and Vietnam. After a rigorous peer-review process, we are proud to include 51 papers in this proceedings volume, alongside ten qualified articles selected for publication in the Journal of Indonesian Economy and Business and Gadjah Mada International Journal of Business. These works represent the latest advancements, insights, and innovative research in the field.

We would like to extend our heartfelt gratitude to all participants whose contributions and insights enrich our discussions and knowledge base. A special thanks goes to our diligent reviewers, whose expertise and commitment ensure the quality of the papers selected for publication. We would like to acknowledge the significant support from the University of Applied Sciences Georg Agricola Bochum, Germany, and colleagues at the Faculty of Economics and Business Administration. Your dedicated assistance has been crucial to the successful organization of the Conference and the preparation of the proceedings. We also appreciated the financial support from our sponsors, which has greatly facilitated our efforts.

We wish the 7<sup>th</sup> EMMA+ a great success and all participants an enjoyable and fruitful scientific gathering in Hanoi. We look forward to seeing you again at the 8<sup>th</sup> EMMA+ in 2026 at the same location.



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# THE IMPACT OF INFORMATION TECHNOLOGY ON INTERNAL AUDITING IN VIETNAMESE COMMERCIAL BANKS

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**Abstract:** *According to the “3 lines of defense” model, internal audit is a third line of defense responsible for anti-fraud activities in the enterprise risk management system. It identifies gaps in the audit system and applies corrective measures to close those gaps for direct reporting. The productivity of the auditor, as well as the audit functions, can be improved by using automated techniques. In this paper, the approach followed through this research using qualitative research methods to collect, synthesize, and summarize results obtained from previous studies; we will focus on the impact of information technology on internal auditing support banking transactions. The most important questions we will discuss are: (i) Understand the Role of Information Technology in Internal auditing; (ii) Analyze the impacts of information technology (IT) on internal auditing (IA) in Vietnamese commercial banks.*

**Keywords:** *Information technology, Digital transformation, Internal audit, Commercial banks.*

## 1. INTRODUCTION

The Fourth Industrial Revolution (Industry 4.0) has had a strong impact on many fields, especially the finance and banking sectors; Vietnamese commercial banks have been actively integrating advanced technologies such as Artificial Intelligence (AI), Machine Learning (ML), Cloud Computing, Big Data, and the Internet of Things (IoT) into their operations. These technologies are used to evaluate and classify customers, make disbursement decisions, and assist customers more efficiently. Banks can provide faster and more efficient services by simplifying processes and procedures and reducing transaction times. Additionally, the collaboration between commercial banks and Fintech companies has been crucial

in upgrading operational methods and processes and offering advanced products and services. This partnership is helping banks transition to new business models more adaptable to the digital age. The integration of technology allows banks to conduct their business in a more automated and intelligent manner. This enhances their ability to deliver products and services on digital platforms and improves their capability to effectively leverage data for better decision-making and customer service (Bui & Pham, 2022).

With a population of over 98 million people and an average age of 33.3 years, Vietnam presents a highly promising market for digital transformation in the banking sector. The country's high smartphone penetration, with approximately 93.5 million

smartphone subscribers and 73.5% of adults using smartphones, creates an ideal environment for adopting digital banking services (Vietnamese News Agency, 2022).

The European Confederation of Institutes of Internal Auditing (ECIIA) report suggests that by 2027, disruptive technologies like AI could amplify existing risks and introduce new digital risks. Digital transformation tends to change the nature of existing risks and create a new type of risk: digital risk. Therefore, a bank must deploy a strong and secure system to prevent fraud. IA has the function of advising, developing plans, assessing risks, reviewing organizational and cultural accounts, assessing adversarial technology risks through innovative system visions, and preparing intuitive and dynamic reports (Deloitte, 2018).

The article synthesizes the role and impact of IT in IA and focuses on the banking sector. The results of this research will provide a foundation for the relationship between IT and IA in the operations of Vietnamese commercial banks.

## **2. LITERATURE REVIEW**

### **2.1. Internal auditing**

Auditing is a control method that includes a set of procedures that the auditor uses to examine the works and judge the integrity of implementing the rules and instructions. IA is an independent activity that works in various assurance services and advisory activities and is designed to improve and add value to operations in organizations. Internal audit helps the organization achieve its goals. In recent years, IA has undergone changes that have led to expanding its scope

of participation and added value, further affirmed by the Institute's definition of IA.

IA has developed a widely accepted definition: "Internal Audit is an independent, objective consulting and assurance activity designed to add value and improve an organization's operations. It helps organizations accomplish their goals by providing a systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes" (IIA, 2017).

The role of IA in the organization is as an independent observer to ensure the company's operations comply with national legal regulations, business ethics, and company operating regulations. This department is responsible for detecting errors in the enterprise's business operations, acting as a consultant, and oriented to the board of directors and the board of directors on risk control. Besides, by analyzing, checking, and monitoring the operating processes of departments in the business apparatus, they also help business owners improve weaknesses in the management and corporate governance system and provide advice to help the company operate more productively and effectively. IA is one of the consulting activities based on independence and objectivity, aiming to improve organizational operations, add value to the organization (Mocanu and Ciurea, 2019), and provide many services. Organizations need assurance services, consulting for senior management and stakeholders such as investors and government agencies, and helping them properly understand opportunities and tasks (IIA, 2020). With the development of technology, business expansion, and the

development of regulations governing the auditing profession, the role of IA has shifted significantly from its traditional function of preventing fraud and protecting the assets of the auditing profession. Organizations to perform other related functions. To preserve institutions by adding value to them and evaluating their performance and organization (Hazaea et al., 2020).

Furthermore, the role of IA expanded to include consulting, developing plans, assessing risks, reviewing organizational and cultural accounts, and assessing the risks of adversarial technology. This can be done by developing an innovative system vision and preparing visual and dynamic reports (Deloitte, 2018). That is why the American Institute of Internal Auditors has promoted the profession of certified internal auditor, made it professional and advanced, and created systems, rules, guidelines, and regulations - issue international standards (norms) for control, auditing, and internal auditors.

## **2.2. Role of Information Technology in Internal auditing**

Information technology (IT) is a set of tools and processes used to collect, process, and store information. Programming, storage, retrieval, analysis, system monitoring, and data transformation are among the most essential tools in information technology. Information technology also includes communications and automation. Madhar & Almaktoomi (2022): "IT is a set of tools and processes used to collect, process, and store information. Programming, storage, retrieval, analysis, system monitoring, and data conversion are among the most important tools in information technology. Information

technology also includes communications and automation."

Digital technology is a further development of information technology, allowing faster data processing and large capacity transmission at lower cost. This breakthrough development in technology has allowed for comprehensive and comprehensive digital transformation, something that was not possible before. Digital technology can be considered in two aspects: hardware and software construction. Specifically, building application software with multimedia, social networks, e-commerce platforms, online shopping, and payment services; building hardware from mobile devices and automation systems to storing and processing information data, Big Data, Cloud Computing, etc. According to Schwertner (2017), digital transformation is a business change. Changing business models based on technology applications enhances competitive advantage and increases revenue and operational efficiency. According to Lugovsky (2021), for banks, digital transformation is the transition to digital customer services through the Internet environment and a change in culture, organization, and business management activities through the application of modern technologies. So, IT plays a significant role in achieving the effectiveness and efficiency of operations. Information technology helps to provide information in a timely manner and increases the accuracy of information. It also works to improve and facilitate additional information analysis and reduce the risk surrounding control procedures.

Around the world, banks are increasing their technology budgets, and technology costs have increased over the years (Greer

& ctg, 2019). In Vietnam, according to (Nguyen. D. T et al., 2021), spending on technology has a positive impact on the net interest income ratio. Domestic commercial banks have deployed many advanced technologies in banking operations, such as AI, ML, Cloud Computing, Big Data, and IoT, to evaluate, classify customers, and decide on disbursement or help simplify processes and procedures and shorten transaction time. The development of digital technology is gradually changing traditional forms of banking service provision. In addition, commercial banks cooperate with Fintechs to upgrade processes and operations, provide advanced products and services, help banks transform into new business models, and integrate technology in an automated and intelligent direction to help banks conduct business and provide products and services quickly on digital platforms and exploit data effectively (Bui & Pham, 2022). New opportunities always come with new risks, and banks must establish effective risk management methods.

Using technology is one of the important fields of accounting and auditing information system research; technology has gained increasing importance in all fields in recent times (Rajhans & Rajesh 2014). Accordingly, research in this field has evolved over time by developing concepts for studying new factors, which can provide a better explanation for the phenomenon of technology adoption and use. Various studies have indicated that a motive for using information technology is a desire to keep pace with the development. Thus, one of the axes that the study has touched upon is the factors affecting the use of information technology in audit processes; the study

has also identified the theories examining the relationships that affect the behavior of audit technology adoption. It has been noted that various theories can be individual and organized, as well as organizational and explanatory. These theories are as follows: the unified theory of acceptance and use of technology (UTAUT), two proposed models for successful adoption of computer-assisted audit techniques (CAATs), the proposed model for identifying a level of the use of computer-assisted audit techniques (CAATs) and the modified unified theory of acceptance and use of technology (UTAUT2) in addition to Individual -Technology, Organization, and Environment (I-TOE) Framework as well as the unified technology readiness and cultural, technological, organizational and environmental model (UTR-CTOE Model).

In the digital age, internal auditors have new jobs, ensuring the reliability of computer networks and large data processing (Almomani & Alebbini (2021). IA is performed based on risk orientation, and in business activities, IT plays an inseparable role in all operations. Therefore, IT risks are indispensable when assessing a business's operational risks. According to Article 2, the IIA's Global Technology Audit Guide (GTAG) (IIA, 2017) clearly states: "The Chief Internal Auditor (CAE) needs to be able to assess IT governance capabilities and structures in handling Manage data for businesses and improve the efficiency of IT operations. Studies have shown that IT governance will lead to improved business performance as well as better alignment between IT systems and business operations in achieving strategic goals. The use of IT in auditing also needs to be compatible with the bank's digital transformation strategy to

bring high efficiency to the work of internal auditors because, according to Oluoch (2022), when researching 42 commercial banks Commercially in Kenya, the use of IT in internally audit is essential as it improves audit efficiency and effectiveness in organizations. The study also recommends using CAAT applications in internal audit activities to achieve greater efficiency. Omer Ali and Nashat Majeed (2017), this study talks about the role of IT in terms of ways and means of auditing indirectly in the accounting profession and directly in the auditing profession that complements the accounting profession. It also talks about the audit profession as a social profession that serves the community. In addition, the variables and influences that affect the audit profession include (i) IT helps to develop the audit profession and reduce problems; (ii) IT works to reduce the audit expectations gap through methods that help increase the size of audit samples; (iii) IT is working to reduce audit risks through data processing and electronic auditing; (iv) IT reduces the cost of auditing by reducing the size of the audit team.

Therefore, IT plays a vital role in auditing, as it improves the analytical review process by studying the most critical standards. The analytical review has developed as a result of the development of IT and the use of electronic evidence, as it works to prevent distortions in financial statements. So, IT significantly impacts the efficiency of IA and improves the control methods in the IA.

### **2.3. The impact of Information Technology on Internal Auditing in bank.**

Some studies have illustrated the impact of IT on the responsibilities and tasks of IA processes, which have changed due to the effects of the emergence of information

technology as well as the transformation of information systems from paper documents into electronic transactions (Abu-Ahmed; 2007, Musa, 2008; Salehi & Husini, 2010; Moorthy et al., 2011; Honselaar, 2012). Internal Auditors use different methods to collect and analyze data, detect fraud, evaluate internal control systems, control e-commerce, and monitor operations (Glover and Romney, 1998 ). Technology features greatly influence technology acceptance in the IA profession by influencing system usage, perceived usefulness, and perceived ease of use (Kim & Nieschwietz, 2009). Most results of previous studies have indicated that the level of computer-assisted audit techniques is still in the early stages; these techniques are mostly limited and simple. In addition, the results have shown that the electronic techniques used mainly by the IA are electronic worksheets, progressing programs and electronic spreadsheets (Janvrin, 2008; Ismail & Abidin, 2009; Adeyemi et al., 2014; Lotto, 2014; Smidt et al., 2014; Pedrosa, 2015; Abou-El-Sood et al., 2015; Omonuk & Oni, 2015; Wu et al., 2016; Cangemi, 2016). On the other hand, the results of some studies have indicated that internal auditors use efficiently advanced computer-assisted audit techniques, and they have illustrated that information technology auditors play a role in achieving the efficiency of the use of IT (Debreceeny et al., 2005; Salehi & Husini, 2010; Honselaar, 2012).

Other researchers have indicated that the role of information technology audit consultants has increased to achieve the efficiency of the use of technology in the audit process within the organization. Thus. The auditors specialized in information technology play an essential role in achieving the efficiency of using

information technology (Salehi & Husini, 2010; Moorthy et al., 2011; Honselaar, 2012; Al-Kasswna, 2023). In addition, the level of the use of audit technology varies among the different economic sectors, and there is a variation in the use of audit technology within the same economic sector. For example, in the Jordanian banking sector field of study, different levels of using audit technology exist within the same sector; some banks expand the use and application of information technology and financial technology; other banks are still in a nascent stage of this technology; other banks are reluctant to expand the use of financial technology (Adeyemi; 2005., al et Debreceeny .et al., 2014; Smidt et al., 2014) due to the difficulty of dealing with data volume. Some researchers believe that automating the audit process is an urgent need because it is challenging to deal with big data volume using traditional audit methods, especially after the electronic operation of data has increased within business organizations' processes, and electronic and digital business has grown. Other researchers have indicated that auditing around the computer method has mostly been terminated because this method is not available in most accounting systems operating the data electronically.

Proper handling of resources, maintenance of records, and effective communication through IT technology are very important to ensure the completeness of the audit process and benefit the auditors (Moorthy et al., 2011). Salehi and Husini (2011) found in their study that IT causes significant changes in internal auditing, increasing IA quality. IT helps auditing by improving the quality of various aspects of IA. The study also found that IT makes

auditors spend less time checking the content and accuracy of office account calculations. Deribe & Regasa (2014) studied 15 Ethiopian Commercial Banks and found that information technology is one of the factors affecting IA. This means that the IA of commercial banks using IT will improve internal audit quality.

According to Oluoch (2022), in a study of 42 commercial banks in Kenya, the use of IT in internal auditing is important because it improves the performance and efficiency of audits in organizations. The study found that the use of IT in commercial banks has increased integrity, reduced cases of fraud during audits, helped in making strategic decisions that reduced fraud in banks, and reduced the cost and time of performing internal audit processes. The findings also showed that the audit process is efficient, transparent, and accurate through the use of blockchain, cybersecurity, big data, and data analytics technology. The study also shows that the cost of purchasing, deploying, and updating CAAT applications is quite high, so many units are still considering it. However, the author recommends using CAAT applications in internal audit activities to achieve higher efficiency. Banks in Oman, especially the National Bank of Oman, provide customer services using information technology. Banking services based on information technology help banks increase customer satisfaction because of high quality and ensure the safety of banking transactions. The research results show that information technology positively affects IA and customers' views on banking transactions.

The banks are also reconsidering the competencies, agendas, and management. In addition, the Board and its committees

need to re-evaluate the quality of internal controls and internal auditing discussions. Working to determine if the board of directors committees can reach senior management and obtain correct information in many areas, such as the impact of new technologies, potential risks, risk limits, etc. They conduct annual evaluations of the internal control, compliance, and internal audit functions of the Board of Directors. The Board of Directors guides Board committees to obtain external evaluations of the compliance and internal audit functions. This review is in internal audit and compliance areas such as status, capacity, technology, policy, training, and communications. The development of IT in banks and especially its application in IA can improve the effectiveness of audit work. During the audit, internal auditors can examine data sets more quickly, look for patterns, and discover new relationships between data points that are currently overlooked, which can provide ways to explore them further (IIA, 2017). In Vietnam, in a study of joint stock enterprises in Hanoi, Tran & Nguyen, (2023) also stated that information technology helps internal auditors shorten work time and complete their work more effectively and accurately. The study will further analyze the impact of IT on internal auditing in Vietnamese joint stock commercial banks in the next section.

### **3. RESULTS AND DISCUSSION**

#### **3.1. The level of information technology use of Vietnamese joint stock commercial banks.**

The banking sector, one of Vietnam's most important economic sectors, has witnessed significant growth in IT use and applications, particularly in financial

technology. So, IT-based banking services help banks increase customer satisfaction, as they are of high quality and ensure the safety of banking transactions. It has become an indispensable factor in all organization's and enterprises' business activities and development strategies. Especially in the banking and finance sector, IT systems are increasingly integrated into all business activities, operations, management, and administration, becoming the core element of financial institutions. Consequently, the use of IT shall be accompanied by the development of internal control and audit procedures.

In the enterprise risk management system based on the "3 layers of defense" model, experts recommend that a modern corporate governance model be applied according to international practices. The IA and risk management department belong to 2 different layers of defense, with internal auditing belonging to the 3rd layer of defense with activities to ensure independent inspection and audit of the 1st layer of defense (business departments) and 2nd (risk management), reporting directly to the Board of Directors on the effectiveness of risk management and control activities. Vietnam has made a significant step forward in building the banking corporate governance structure when Circular No.13/2018 of the State Bank of Vietnam, issued on May 18, 2018, and Circular No.40/2018 of the State Bank of Vietnam, issued on December 28, 2018, and focuses on the requirement to build for yourself a model of 3 lines of defense in the organization of commercial banks, to control and prevent risks in the process of conducting business activities. The position

of IA is placed in the third line of defense, which shows that the role of IA in the management activities of commercial banks and foreign bank branches has been focused on. On January 22, 2019, the Government issued Decree No. 05/2019, which regulates internal auditing and came into effect on April 1, 2019, with the main content regulating methods of implementing IA: “risk-oriented” audit method, prioritizing focusing resources to audit units, departments, and processes that are assessed to have high levels of risk. The contents of this Decree are aimed at international practices on IA, enhancing information transparency, efficiency and effectiveness in corporate governance. Decree No.05/2019, issued by the Government on internal auditing, does not define this activity. However, the birth of Decree is an opportunity for businesses to realize the importance of implementing IA in their organizations: “IA is an indispensable

part and plays an extremely important role.” in the management activities of organizations and businesses today. As the business environment becomes increasingly complex and global, there is an increased need to raise governance awareness and stakeholder expectations. The challenges for the IA industry become more difficult.”.

Vietnamese commercial banks have prioritized the synchronous development of IT within their operations; however, the level of investment and implementation varies among different banks. In the Readiness Index ranking for the development and application of information and communication technology (ICT Index) among banks in Vietnam (Table 2), joint stock commercial banks consistently occupy leading positions. The ongoing advancements in technological activities within these banks will significantly impact the scope of work and the application of technology in internal auditing processes.

**Table 2. 10 banks with the highest ICT-Index in 2022**

Bank	Technical infrastructure index	Human resources Index	Internal application index	Online Banking Services Index	ICT Index	Rating
Nam A Bank	0.8561	0.3095	0.8628	0.9501	<b>0.7446</b>	1
Techcombank	0.5847	1.0000	0.6434	0.6424	<b>0.7176</b>	2
TP Bank	0.7978	0.5242	0.6380	0.8985	<b>0.7146</b>	3
BIDV	0.6226	0.1857	0.9878	1.0000	<b>0.6990</b>	4
Sacombank	0.7337	0.4934	0.8394	0.7058	<b>0.6956</b>	5
VP Bank	0.6079	0.2780	1.0000	0.8389	<b>0.6812</b>	6
MB Bank	0.4888	0.8307	0.7450	0.6027	<b>0.6668</b>	7
Vietinbank	0.6161	0.0592	0.9474	0.9661	<b>0.6472</b>	8
Vietcombank	0.6135	0.1290	0.8481	0.8481	<b>0.6168</b>	9
HDBank	0.5809	0.4886	0.6663	0.7085	<b>0.6111</b>	10

*(Source: Vietnam ICT Index 2022)*

**3.2. The impact of the use of Information Technology on internal auditing of Vietnamese joint stock commercial banks.**

Some studies related to this issue have also shown the significant impacts of IT on IA at commercial banks, and this will be the motivation for joint stock commercial banks to pay more attention to information technology issues in internal auditing. The impact of IT on IA at Vietnamese commercial banks is that the application of technology in auditing activities not only requires the application of technology to perform audits but also requires the integration of this technology with the bank's risk management and business operations software to support IA to extract data, collect audit evidence or conduct remote internal auditing whenever needed. When interviewing many experts in commercial banks and auditing companies (Nguyen et al., 2021) some comments were made: The data storage and file management systems are not complete and synchronized to be able to manage and control remotely; Many banks still lack tools and software to support auditing while automatic transactions at banks account for the majority, which is one of the significant difficulties for internal auditors, especially in conducting risk-oriented IA.

*Firstly, IT promotes capacity building of IA of Vietnamese joint stock commercial banks*

According to Mr. Tien Thanh, Senior Manager of IT Risk Management Consulting Services, PwC Vietnam, "For the Internal Audit (IA), the Bank's last line of defense, independently assessing IT risks and conducting audits and checks in high-risk areas is an important component that needs to be performed regularly. However, the specialized nature and specific skills

required to conduct IT audits are placing demands on the Bank's IT IA, such as standardizing processes, improving the quantity and quality of human resources, thereby effectively applying IT applications to IT IA activities." According to Ms. Nguyen Phi Lan, Deputy General Director and head of the Risk Management Department at PwC Vietnam, "Regarding technology application, the Internal Audit Information Technology department needs to be invested in and trained to use automated tools and techniques (ATTs) effectively. Automated tools and techniques in auditing are processes that support auditing through automated methods and procedures, helping to supplement or replace manual or repetitive tasks."

Dang (2022) pointed out that commercial banks need to raise awareness of all bank staff in general and internal auditors in particular, making them understand the importance of the digital revolution to the banking industry. Encourage internal auditors to study and improve their professional qualifications and scientific and technological skills to adapt to new requirements. In addition, the quantity and quality of IT audit personnel are of concern for banks. According to Circular No.13/2018 requirements of the State Bank of Vietnam - Regulations on the internal control system of commercial banks and foreign bank branches, most Vietnamese banks have at least one IT internal auditing specialist. However, the number of IT auditors should align with the Bank's scale and operations in the context of increasing IT risks. Banks must focus on the role and responsibilities of IT auditors, the size and structure of the IT internal auditing department, and the knowledge and skills of the IT auditors. Along with that, building an IT internal auditing team needs to have

a suitable roadmap for finding, training, and maintaining resources in the context of a market shortage of this human resource.

*Secondly, IT helps ensure independence and objectivity for IA of Vietnamese joint stock commercial banks*

Circular No.13/2018 of the State Bank of Vietnam has provided more specific and detailed regulations on the level of independence and objectivity of internal auditing in banks and is consistent with international practices. Internal auditing ensures that it is the third line of independent protection in the internal control system, performing the internal auditing function as Basel prescribes. The objectivity of internal auditing is reflected in the internal auditing report. It must be carefully analyzed and based on collected data and information, or internal auditors must be honest and have the right and obligation to report to competent authorities on issues related to objectivity in performing internal auditing. Applying information technology by joint stock commercial banks will help internal auditors perform tasks automatically, achieving objective analysis and increasing work efficiency. In the study of Doan & Le (2023), it is suggested that in the near future, Vietnamese commercial banks can apply intelligent contracts on the Blockchain platform to implement control points in operations and risk management. For internal auditing, auditors in remote monitoring can set up smart contracts to detect credit risk warning thresholds such as indicators of overdue debt, bad debt, problematic credit loans, etc. In operational risk management, key risk indicators (KRIs) will be continuously updated, highly authentic, and traceable, such as money transfer transactions, customer identification, fraud, etc.

*Thirdly, IT improves the performance of IA of Vietnamese joint stock commercial banks*

Lai et al. (2023) identified factors affecting the effectiveness of internal auditing in enterprises in the digital transformation period. The study showed that the application of IT is one of the two factors that have the most significant impact on the effectiveness of internal auditing. The study shows that applying IT helps improve the effectiveness of internal auditing. Internal auditing using technology will help shorten the time and reduce costs.

With the strong development of information technology today, banks are providing more and more digital services, which will increase the workload of internal auditing. Hence, the synchronization of information technology is an urgent requirement.

In accordance with Circular No.13/2018 of the State Bank of Vietnam, most Vietnamese banks have at least one staff member specializing in IT internal auditing. IT audit collects and evaluates evidence to determine that an IT system has been designed to maintain data integrity, protect assets, enable the organization's objectives to be achieved effectively, and use resources optimally. The overall aim of an IT audit is to evaluate the IT system of the audited organization to determine the timeliness, accuracy, completeness, and reliability of information output, as well as ensure the confidentiality, integrity, availability, and reliability of data, as well as compliance with legal requirements and relevant regulations. Nguyen & Doan (2021) conducted a case study at two banks: the Vietnam Joint Stock Commercial Bank for Investment and Development (BIDV) and the Military Commercial Joint Stock Bank (MB) in IT audit activities. Assessing IT audit activities, it can be seen that commercial

banks have achieved some initial results specifically: IT audit activities have received close attention from the Board of Directors, and units in the entire system; The audit system and process have been built and increasingly improved; The IT audit team has been formed and increasingly improved in terms of capacity and qualifications; IT audit has contributed to improving the quality of risk management and the quality of operations at the bank. Besides the advantages, there are still difficulties and shortcomings, such as The audit scope is too broad, making it difficult to determine the focus and may miss risks. Banks are often confused when choosing methods and tools to assess risks. The IT field frequently changes in technology and system architecture, causing auditing activities to change constantly, causing pressure on time and effort, and reducing management efficiency. The IT audit human resources are still lacking and weak.

That assessment is similar to Nguyen's research results. Nguyen et al., (2021) currently the level of technology application in internal auditing activities of Vietnamese commercial banks is still low. Internal auditing lacks application tools and information technology systems to support effective internal auditing activities. Internal auditing is not currently equipped with application software to help manage audits to be performed consistently and ensure quality, nor is there a monitoring system to warn of early signs of abnormalities in some high-risk departments of the bank. Auditing activities still need to be performed entirely manually, without applying modern technologies, partly because the bank's information technology system cannot meet the requirements if the activities are digitized, and partly because applying advanced technologies encounters problems with investment capital.

*Fourthly, IT improves the quality of IA of Vietnamese joint stock commercial banks*

The role of IA must meet the increasing expectations of the Board of Directors and the Board of Supervisors of the bank to help the bank cope with risks, seize opportunities in compliance with legal regulations, and provide adequate information to support the decision-making process of the Board of Directors. The role of IA needs to change in quality and quantity, from being just an "auditor" with the role of ensuring independent assessment to make proposals and recommendations to becoming a "trusted advisor" with the role of consulting and creating value through enhancing the value of IA activities, focusing on achieving compliance goals, efficiency and economy for banking activities (Nguyen et al., 2021). Therefore, banks can meet international standards on IA and keep up with the roadmap for Basel II implementation in Vietnam. With the practical benefits that digital transformation brings to the internal auditing industry in banking, such as optimizing work efficiency, creating a better working environment, and storing data securely, the banking industry needs a strategy to develop internal auditing human resources. A good IA team not only helps banks detect risks in a timely manner but also provides honest and objective information and confirms the correctness, compliance with the law, effectiveness, and efficiency in mechanisms, policies, business processes, and banking operations, thereby helping to make appropriate and effective management and operation decisions. A strategy with a long-term vision and a systematic human resource development roadmap is a prerequisite for successfully implementing effective human resources work in line with the industry's general goals and orientations. Researchers also suggest some modern technologies applied in internal auditing: Computer-assisted audit technique (CAAT);

Data analysis; Robotics Process Automation (RPA); Big data, artificial intelligence (AI), Blockchain, Robotics Process Automation... Automated tools and techniques allow IT auditors to increase personal productivity as well as the productivity of the audit team, improve the quality of audit results and fraud investigations, support design testing procedures or operational testing at checkpoints that do not have clear audit trails, or have large datasets and sample sizes.

#### 4. LIMITATIONS

This current study was limited to the following: Understand the role of IT in IA and studies on the impact towards the benefits of IT on IA in Vietnam Joint Stock Commercial Banks from Circular No.13/2018 of the State Bank of Vietnam issued. However, the use of IT in IA operations is considered to be somewhat acceptable. It is. It is different from the progress in its use in providing banking services. In the future, studies can conduct quantitative research to clarify the comments made in this study, such as Measuring the extent to which information technology is used in auditing processes (planning, implementing control tests and basic tests, preparing the audit report, and implementing analytical procedures and detailed tests); or Factors affecting the level of use of information technology tools in auditing processes according to different organizational characteristics (the degree of automation of information systems, according to different auditing methods, according to the different method of data operation, the presence of internal auditors specialized in technology).

#### 5. CONCLUSIONS

The study has shown that information technology impacts auditing in Vietnamese

joint stock commercial banks, especially in the current digital transformation period. To effectively implement the digital transformation strategy, joint stock commercial banks need the attention, support, and investment of state management agencies, especially the Government and the State Bank. Perfecting the legal framework related to the operation and development of the digital transformation strategy of the banking industry. The legal corridor must ensure an entire ecosystem (State management agency - bank - customer - related third party). Commercial banks must actively change their business model towards multi-channel integration and financial technology innovation, aiming to build a comprehensive ecosystem for banks to apply modern business models, shorten operational processes, and streamline personnel. Thereby helping banks save costs, increase convenience in banking operations, and move towards innovation in customer experience. New technologies such as AI, continuous auditing, Blockchain, Robotics Process Automation, etc., should be studied and applied in banks to increase analytical capacity, risk warning, and bring higher efficiency to internal auditing activities. Investing in technology in this area of activity may increase initial costs for banks but will bring overall benefits in the long term. Building an IT internal auditing team also needs a suitable roadmap for finding, training, and maintaining resources in conditions where the market is lacking in this human resource.

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