

DEVELOPING DIGITAL HUMAN RESOURCES IN VIETNAMESE COMMERCIAL BANKS IN THE CONTEXT OF THE FOURTH INDUSTRIAL REVOLUTION

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Abstract: *In the context of the Fourth Industrial Revolution (Industry 4.0), developing digital human resources is a critical task that enables commercial banks to enhance their competitiveness, ensure safe operations, and achieve sustainable development in the digital environment. In particular, realizing the objectives outlined in Resolution No. 57-NQ/TW and the Banking Sector Digital Transformation Strategy to 2030 makes the development of digital human resources an urgent priority for the banking industry. This article analyzes the current implementation of measures to develop digital human resources in Vietnamese commercial banks over recent years. It identifies key challenges in this process and proposes several recommendations to advance digital human resource development in Vietnamese commercial banks in the coming period.*

Keywords: *digital human resources, developing digital human resources, commercial banks, Fourth Industrial Revolution, digital environment*

I. Introduction

In recent years, under the impact of the Fourth Industrial Revolution, Vietnamese commercial banks have extensively adopted digital technologies such as artificial intelligence (AI), cloud computing, big data, and blockchain across their products, services, and internal operations. This application has enabled banks to innovate, achieve greater personalization, and enhance the customer experience. At the same time, it has transformed the competency requirements of the banking workforce and created an urgent need to develop digital human resources in commercial

banks. To adapt to the digital technology environment, digital human resources must not only possess solid professional expertise but also digital skills. Currently, however, the Vietnamese banking sector, in general, and commercial banks, in particular, face shortages not only of specialists in financial data analytics, cybersecurity, artificial intelligence, and blockchain, but also of personnel who combine deep knowledge of traditional banking operations with strong digital technology capabilities to drive comprehensive digital transformation. A World Bank study (World Bank, 2020) found that only about 20% of the banking

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workforce has sufficient digital skills to meet modern job requirements (Vu, 2025). Therefore, developing digital human resources has become increasingly urgent as the Vietnamese banking sector pursues comprehensive digital transformation toward a digital banking model, aiming to enhance utilities, improve customer experience, and achieve the goal of financial inclusion.

II. Theoretical foundations for developing digital human resources in commercial banks

2.1. The concept of digital human resources in commercial banks

Digital human resources refer to the skilled technical workforce directly involved in developing information technology products and services, telecommunications, and network security to support digital technology operations (Phan, 2024).

Accordingly, digital human resources in commercial banks comprise personnel equipped with specialized expertise, information technology knowledge, data analysis capabilities, rapid adaptability to change, and creative thinking applied to the banking domain.

2.2. Measures for developing digital human resources in commercial banks

- *The Concept.* Developing digital human resources in commercial banks involves measures that increase both the quantity and quality of digital human resources to meet the requirements of digital transformation. Quantitative development aims to create an abundant supply of digital personnel, particularly those responsible for information technology and information security. Qualitative development focuses on enhancing professional qualifications,

operational skills, awareness, attitudes, and occupational competencies of digital human resources.

- *Key measures for developing digital human resources in commercial banks include:*

First, implementing training programs in digital technologies. Banks should select programs tailored to the specific requirements of different departments and positions to equip staff with the necessary knowledge and skills in a timely manner.

Second, recruiting digital personnel. Banks must develop appropriate recruitment policies based on current and future needs to secure the right quantity and quality of candidates.

Third, establishing suitable compensation and incentive policies to attract and retain technology talent. This includes clear career progression pathways, competitive salaries and bonuses, attractive benefits, and a positive, respectful work environment that values talent.

Fourth, building a digital culture. Banks should foster an environment of continuous learning, creativity, and innovation.

2.3. Literature review

In recent years, several domestic studies related to the development of digital human resources, both within and outside the banking sector, have been published, including:

Nguyen (2023) examined the importance of digital human resources in the context of national digital transformation and proposed solutions to develop them to meet Vietnam's current requirements.

Phan (2024) clarified the theoretical foundations of digital human resources,

assessed the current status of digital human resources in Vietnamese state agencies, and proposed recommendations to develop digital human resources meeting national digital transformation needs.

T. T. H. Nguyen (2025) focused on clarifying the concepts of digital human resources and the digital economy, identifying opportunities and challenges, and proposing solutions to develop digital human resources in Vietnam's digital transformation process.

Nguyen (2024) analyzed the current quality of human resources in Vietnamese commercial banks and proposed solutions to improve the quality of digital human resources in the finance and banking sector, thereby creating momentum and conditions to promote the digital transformation of the economy in the coming period.

Vu (2025) analyzed the current status of digital competency development in Vietnam's banking sector and proposed solutions to enhance digital skills for human resources.

V. Q. Nguyen (2025) addressed the impact of internal training, work environment, and technological systems on employees' digital competency in Vietnam's banking sector. This article is based on Resource-Based Theory and the Technology Acceptance Model, utilizing survey data from bank employees alongside CFA and SEM analyses. The study indicates that all three factors: work environment, internal training, and technology systems have a positive impact. Among them, the work environment has the strongest influence, followed by training and technology. These findings suggest that banks should prioritize improving the work environment and training programs to enhance their employees' digital capabilities.

The Department of Personnel Organization, State Bank of Vietnam (2026) analyzed the requirements for the breakthrough development of digital human resources in the banking sector in the new era, clarifying strategic steps in institutions, training, and technology mastery to achieve the goals of comprehensive digital transformation and sustainable development.

These studies have primarily described the current status of digital competency and digital human resource development serving national digital transformation in general and the banking sector in particular. They have not yet conducted an in-depth analysis of measures to develop digital human resources in Vietnamese commercial banks, nor have they fully addressed the difficulties and challenges these banks face in this process. These gaps constitute the focus of the present article.

III. Research methodology

The study employs a mixed-methods approach, combining qualitative and descriptive quantitative methods to assess the current situation and propose recommendations for developing digital human resources in Vietnamese commercial banks in the coming period.

The author collected research data from studies published in recent years by agencies, organizations, and individuals both domestically and internationally.

The data were processed through content analysis, synthesis, and comparison to identify development trends, difficulties, and challenges in developing digital human resources in Vietnamese commercial banks. This method helps ensure objectivity and generality while providing implications for subsequent in-depth studies.

IV. Results and discussion

4.1. Basis for assessing and certifying digital capabilities in the banking sector

To ensure the systematic and sustainable development of digital capabilities while realizing the goals of Resolution No. 57-NQ/TW (2024) of the Politburo on breakthroughs in science and technology, innovation, and national digital transformation, as well as the Banking Sector Digital Transformation Strategy to 2030, the State Bank of Vietnam (SBV) has adopted the Basic Digital Knowledge and Skills Framework. This is guided by Decision No. 757/QĐ-BKHCN (April 29, 2025) of the Ministry of Science and Technology, which standardizes the digital competencies of personnel across the system. This initiative not only improves training quality but also lays the foundation for competency-based human resource management, gradually building a workforce that is highly adaptable to digital transformation.

4.2. Implementation of measures to develop digital human resources in Vietnamese commercial banks

4.2.1. Training digital human resources

To enhance digital capabilities for human resources, commercial banks have

in recent years implemented numerous training programs in both face-to-face and online E-learning formats. For example, Vietcombank has developed a Learning Management System (LMS) that automates the registration process and manages staff training pathways. It provides training for staff with innovative, flexible capabilities who can quickly adapt to digital transformation. VietinBank has implemented an E-learning system since 2011 and has deployed flexible training formats, such as virtual classrooms, Remote Expert, and the Workplace technology application, to foster connections between staff and experts. It focuses on training staff on the features of online payment services and encourages customers to use online deposit channels. BIDV trains personnel through various formats, including E-learning, virtual classrooms, in-depth seminars, and simulation games. At the same time, it implements mid-level and senior leadership training programs with courses in South Korea and trainee director training programs. It also develops training programs in scientific research, innovation, and digital transformation to improve labor productivity and human resource quality (Vu, 2025).

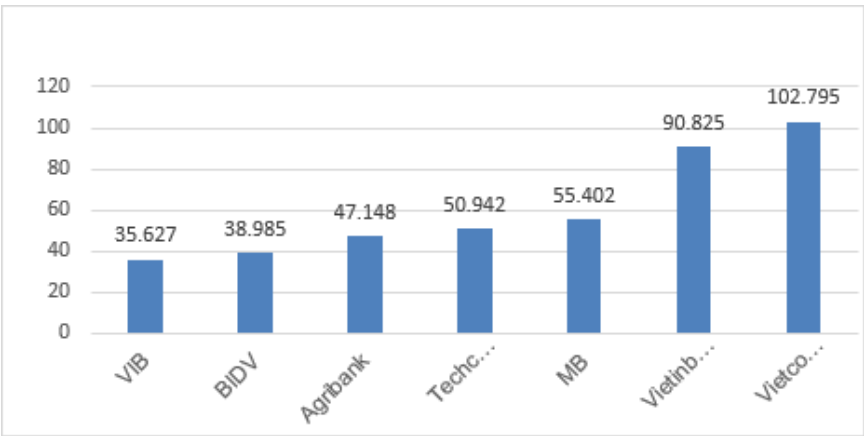


Figure 1. Total number of digital transformation training and development sessions at selected commercial banks, from 2022 to 02/2026

(Source: Department of Personnel Organization, State Bank of Vietnam, 2026)

In 2025, through the “Digital Mass Education” movement and the digital knowledge and skills training and popularization program led by the State Bank of Vietnam, commercial banks deployed digital skills training on a system-wide scale, with many exceeding their set targets by more than 100%. Many large commercial banks allocate 8-10% of their total personnel to information technology and digital transformation. The online learning platform “Digital Mass Education” attracted more than 4,200 learner enrollments in courses on digital safety and AI applications and integrated 142 high-quality electronic learning materials from various units in the sector. Notably, a core force of 336 “Digital Ambassadors” and 2,296 “Digital Nuclei” was formed at various units and has played a role in spreading digital skills and supporting on-site technology implementation (Department of Personnel Organization, State Bank of Vietnam, 2026).

A highlight of digital human resource training at commercial banks in recent times is that technology training is closely linked to practical management and business problems. The main technology areas included in training are AI and automation. Among these, generative AI (GenAI) models, virtual assistants, and chatbots have been deployed by many banks to provide 24/7 customer care and support internal staff in information retrieval and business processing. AI, combined with Robotic Process Automation (RPA) and Optical Character Recognition (OCR) technology, is used to extract financial reports, process credit dossiers, and check trade finance documents, helping to increase processing speed and significantly reduce manual errors (Department of Personnel Organization, State Bank of Vietnam, 2026).

However, because digital human resource training activities at commercial banks have only been implemented relatively recently, there are not yet long-term, synchronized digital human resource training programs, nor have specialized international training cooperation programs been deployed. This issue causes digital human resource training at commercial banks to remain slow.

4.2.2. Recruiting digital human resources

In addition to training activities aimed at enhancing digital capabilities, recruitment at commercial banks not only emphasizes trained professional expertise, soft skills, foreign language certificates, and professional certificates required for each job position to develop sustainable human resources, but also requires candidates to possess a certain basic level of information technology skills to support the use of software and computers in work processes, operations, and customer support. For example, HDBank has strengthened recruitment of personnel with strengths in core technologies such as AI, Big Data, and Blockchain, along with skills for working in the context of digital transformation and strong foreign-language proficiency, meeting professional requirements in the finance and banking sector. Techcombank aims to recruit Vietnamese talents currently working at leading global fintech hubs such as Singapore, the United Kingdom, and the United States. In 2024, Techcombank recruited 4,800 staff, of whom approximately 1,000 worked in information technology, digital transformation, and related departments. MBBank has also prioritized recruiting personnel with digital technology competencies to support the bank’s

comprehensive digitization process. In 2024, MBBank had a technology personnel and expert workforce of up to 1,200 people, accounting for more than 10% of the bank's total staff (Nguyen, 2024). Vietcombank implements policies to attract, recruit, and appoint experienced foreign experts to key leadership positions in Information Technology and Digital Transformation. It recruits highly qualified information technology and digitalization staff to manage and operate modern technology systems (Vu, 2025).

In 2025, many banks intensively sought artificial intelligence experts, machine learning engineers, cloud computing architects, and data analysts. In 2026, recruitment in the banking sector is expected to become more selective, reducing mass hiring and prioritizing technology, data, and AI personnel to meet credit growth and digital transformation needs. However, current recruitment faces significant difficulties due to a shortage of human resources with deep expertise in information technology, particularly in data, AI, and cybersecurity, where supply is very scarce. In addition, the quality of training at universities still lags considerably behind actual demand, making competition for digital talent increasingly intense. Furthermore, banks find it difficult to recruit high-quality digital personnel due to a lack of talent-attraction policies and regulatory constraints on salaries and income.

4.2.3. Enhancing compensation to retain talent

Major joint-stock commercial banks such as Techcombank, VPBank, MB, and Vietcombank have offered competitive salaries, performance bonuses, and benefits including international health insurance and overseas training programs.

Smaller banks, with less financial leverage, focus on stable work environments and internal promotion opportunities. In 2025, many banks increased salary funds, raising average employee income by 15-23% to retain high-performing staff (Khanh An, 2026). However, brain drain to fintech and Big Tech companies continues.

4.2.4. Building a digital culture

Commercial banks have systematized innovation activities through internal idea management platforms linked to the National Innovation Portal. In 2025, credit institutions submitted 1,438 initiatives, many of which leveraged AI and large language models to improve operational efficiency, information retrieval, data transparency, and accuracy. This reflects the broad dissemination of an innovation mindset across the sector. Banks are also developing Data Lakehouse architectures, advanced analytics tools, and self-service reporting to promote data-driven decision-making. Participation in major domestic and international science, technology, and digital transformation exhibitions facilitates partnerships and technology matching. Efforts to build networks of fintech, AI, and cybersecurity experts, alongside data standardization and digitization of research materials, are laying the groundwork for a vibrant technology and innovation ecosystem in the banking sector (Organization and Personnel Department, SBV, 2026).

4.3. Difficulties and challenges in developing digital human resources in Vietnamese commercial banks

Currently, personnel with formal qualifications and scientific and technological capabilities in commercial banks represent only a small proportion of the workforce and are concentrated in specific functions at head offices.

A significant portion of staff still lacks the digital competencies required for digital transformation. Key challenges include:

Severe shortage of specialized technology talent, particularly in AI, Big Data, Blockchain, data analytics, and digital risk management.

Mismatch between the quality of university training and industry requirements, stemming from weak linkages between academia and banks, resulting in graduates lacking practical experience and essential digital skills.

Limited proactive adaptation among some traditional staff, who struggle to integrate digital competencies into daily operations.

Intensifying competition for digital talent, exacerbated by less competitive compensation packages compared to fintech and technology firms, and overall supply shortages.

High costs and time demands associated with training large numbers of employees in digital skills.

V. Recommendations and conclusion

5.1. Recommendations

- For the State Bank of Vietnam

Refine mechanisms and policies on salaries and incentives to grant commercial banks greater autonomy in setting competitive compensation packages aligned with their financial capacity, enabling them to attract top digital talent.

Develop and standardize a sector-wide digital competency framework based on job positions and titles, aligned with international best practices and the modernization requirements of the banking industry. Establish long-term, systematic digital training programs that meet international standards.

- For Commercial Banks

Strengthen training to enhance digital competencies. Deliver specialized programs in digital skills, AI, data analytics, and cybersecurity, closely linked to current banking operations and tailored to specific roles. Develop clear training roadmaps aligned with evolving competency requirements.

Adopt scientific recruitment policies to attract high-quality digital talent. Ensure processes are transparent, democratic, objective, and fair.

Attract and retain technology talent by creating a positive, supportive work environment that promotes collaboration, respect, fairness, performance-based evaluation, and career advancement. Implement competitive, specialized compensation structures for high-quality IT personnel and flexible, professional digital workplaces.

Drive cultural and mindset transformation. Raise awareness of digital transformation from leadership to frontline staff, foster innovative thinking, and build a culture of proactive learning and rapid technological adaptation.

Enhance collaboration with universities and technology firms. Partner with academic institutions and tech companies to co-design finance and banking curricula. Commission targeted training programs, support student internships, and facilitate knowledge exchange with international financial organizations to ensure graduates are job-ready.

Refine internal policies. Review and update human resource policies with a focus on digital competency assessment and technology-enabled performance management to address skill gaps and support comprehensive digital transformation.

Promote innovation and creativity. Strengthen linkages between research and application, integrate digital initiatives into operations, optimize processes, improve productivity, and build a competent, elite workforce capable of meeting new development demands.

5.2. Conclusion

In the context of the ongoing and accelerating Industrial Revolution 4.0, digital transformation has become an inevitable trend and a key driver of the development of Vietnamese commercial banks. This process not only requires banks to invest in technological infrastructure and innovate their business models, but also creates an urgent need to develop digital human resources, as this is the decisive factor in determining banks' competitiveness and adaptability in the digital environment.

The research shows that although Vietnamese commercial banks have initially focused on training and improving digital capabilities for their workforce as well as attracting high-quality human resources, there are still many limitations, including a shortage of technologically skilled personnel, uneven digital skills among employees, ineffective policies for training and talent retention, and a persistent gap between practical requirements and the current quality of human resources. These limitations require banks to develop a comprehensive strategy for digital human resource development that is closely aligned with their digital transformation strategy and sustainable development orientation.

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PHÁT TRIỂN NGUỒN NHÂN LỰC SỐ Ở CÁC NGÂN HÀNG THƯƠNG MẠI VIỆT NAM TRONG BỐI CẢNH CUỘC CÁCH MẠNG CÔNG NGHIỆP 4.0

Lương Văn Hải¹

Tóm tắt: Trong bối cảnh cuộc Cách mạng công nghiệp (CMCN) 4.0, phát triển nguồn nhân lực số luôn là nhiệm vụ rất quan trọng giúp các ngân hàng nâng cao năng lực cạnh tranh, bảo đảm hoạt động an toàn và phát triển bền vững trong môi trường số. Đặc biệt, để hiện thực hóa các mục tiêu của Nghị quyết số 57-NQ/TW và Chiến lược chuyển đổi số ngành Ngân hàng đến năm 2030, việc phát triển nguồn nhân lực số đang trở nên cấp thiết đối với ngành ngân hàng. Bài viết tập trung vào phân tích thực trạng triển khai các biện pháp phát triển nguồn nhân lực số ở các ngân hàng thương mại Việt Nam thời gian qua, từ đó chỉ ra những khó khăn, thách thức trong việc phát triển nguồn nhân lực số ở các ngân hàng thương mại, đề xuất một số khuyến nghị nhằm phát triển nguồn nhân lực số ở các ngân hàng thương mại Việt Nam trong thời gian tới.

Từ khóa: nguồn nhân lực số, phát triển nguồn nhân lực số, ngân hàng thương mại, cách mạng công nghiệp 4.0, môi trường số

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