THEORETICAL ISSUES IN DIGITAL TRANSFORMATION AT HANOI METROPOLITAN UNIVERSITY IN THE CONTEXT OF THE 4.0 INDUSTRIAL REVOLUTION

To Hong Duc, & Hoang Thi Mai[1]

[1] Hanoi Metropolitan University, Vietnam

Corresponding Author: To Hong Duc
Corresponding Author Email: thduc@hnmu.edu.vn

ABSTRACT

People have mentioned more about digital transformation in the last few years, especially in the economic, business, and service sectors. In education, it is not until the Covid-19 pandemic breaks out on a global scale that stagnates all socio-economic activities students cannot come to school. Digital transformation is a process whose results can be a completely new educational appearance, with new methods, techniques, tools, and means. This article analyzes some theoretical and practical backgrounds in digital transformation activities nationally and internationally. At the same time, some orientations on the development plan of digital transformation activities at Hanoi Metropolitan University.

Keywords: Digital Transformation, 4.0 Industrial Revolution, Information Technology.

INTRODUCTION

Digital Transformation is the integration of advances in digital technology into the fields of operation of an organization, changing the way it operates, the operating model, bringing new values and creating breakthrough development in the organization (Andriole, S., 2017).

Resolution 52-NQ/TW, dated September 27th, 2019, of the Central Committee on some guidelines and policies to participate in the Fourth Industrial Revolution actively emphasizes the urgent need to accelerate the digital transformation process. The 18th Party Congress also

set the requirements to vigorously promote national digital transformation, digital economic development, and digital society to create breakthroughs in productivity, quality, efficiency, and competitiveness of the economy.

Implementing the above policy, the Prime Minister has made many decisions to implement and promote national digital transformation in recent years. The People's Committee of Hanoi is implementing program No. 07-CTr/TU dated March 17th, 2021, on Promoting the development of science, technology, and innovation in Hanoi from 2021to to 2025.

The People's Committee of Hanoi also issued plan 185/KHTNMT dated August 11th, 2021, to implement program No. 07-CTr/TU and Decision No. 4098/QD-UBND dated September 6th, 2021, approving the digital transformation program of Hanoi to 2025 with orientation to 2030. With a vision for 2030, Hanoi will thrive on digital government, digital economy, and digital society. Accordingly, Hanoi will fundamentally and comprehensively renovate the management and administration of the City government, production and business activities of the enterprise, the people's mode of life and work, and develop a safe, human, and widespread digital environment.

As the only university managed by the City People's Committee, Hanoi Metropolitan University should seize the opportunity to promote the ability to study, train, and apply to meet the requirements and tasks of the city in the new technological revolution. On the other hand, it improves the efficiency in training high-quality human resources, contributing to the development of the digital environment in the education and culture of the capital (Ministry of Industry and Trade, 2017).

Domestic and International Context

The International Context

The world is in the early stages of the Industrial Revolution 4.0, a new technological revolution different from the previous one. Speed increasing as a function of power; In terms of scope and depth, this is the revolution based on the digital process and incorporates many technologies, leading to unprecedented changes in the socio-economic model (Berghaus, S., Back, A., & Kaltenrieder, B. 2017). The systemic impacts include transforming the entire system across countries, enterprises, industries, and society. Like other revolutions, it is necessary to accept the "destruction, sacrifice" of old, backward ones to have new, foundational ones following the laws of development and evolution. To make this revolution a success, not fall behind, if train 4.0, countries must make "Digital Transformation". Digital transformation will change the world, but it doesn't mean there's no control, no interference in the process. Experience of previous technological shifts has shown that the leading countries in applying and developing new technologies will always be the most prosperous and developed (Becker et al., 2009).

Currently, the definition of digital transformation is not standardized. Many organizations and enterprises have their purposes, but from a general perspective: Digital Transformation uses data and digital technologies to change all aspects of socio-economic life in an overall and comprehensive way, reshaping the way we live, work, and relate to each other. It can be said that digital transformation is urgent if it is to develop; on a national scale, digital transformation increasingly affects GDP growth, labor productivity, and employment structure. According to Microsoft and IDG research in Pacific Asia, in 2017, digital products and services contributed 6% of GDP, which is predicted to increase to 25% by 2019 and 60% by 2021; digital

transformation increases labor productivity by 15% by 2017, expected to be 21% by 2020; 85% of jobs in the region will be transformed in the next three years (CEST, 2018).

Many countries have recognized the importance of digital transformation. They have developed and implemented their national digital transformation strategies/programs in the UK, Australia, Denmark, Estonia, Israel, Mexico, Singapore, Thailand, Uruguay, etc. The content of digital transformation of countries varies, depending on the socio-economic development strategy of each country. However, in general, they are directed to the following principal contents:

- Digital transformation of the economy (digital economy), including 1) Development of digital enterprises; 2) Digital transformation for traditional enterprises (towards digitally integrated products; transformation of business models on digital platforms; change of production processes based on digital data, automation, virtualization) ; 3) Digital finance development; 4) E-commerce development;

- Social, digital transformation (digital society), which focuses on areas such as the application of digital technology to improve service quality reduce social gaps (such as education, health, culture, safety, and social security);

- Digital transformation in some critical sectors for socio-economic development (such as agriculture, tourism, electricity, transportation);

- Digital transformation in government agencies (digital government), aiming to provide convenient public services to the people, increasing the participation of the people in the activities of state agencies (State Administration); enhancing the efficiency of operation and innovation in State Administration; developing open data of State Administration to facilitate socio-economic development. Countries have implemented digital transformation and also identified the foundation elements to ensure, including:

- Development of digital infrastructure (development of new generation mobile networks, fiber optic connections to households and businesses, provision of free wifi in public areas, development of cloud computing, IoT infrastructure, BigData);

   - Development of digital skills workforce;

   - Promote research on new digital technologies;

   - Develop a legal environment to ensure a safe and reliable environment and promote digital transformation.

Nations have implemented the above contents. The countries have set vital goals, tasks, and solutions to implement digital transformation. So far, many countries have made achievements and led the world in digital transformation.

Domestic Context

After more than 30 years of innovation and socio-economic development, Vietnam has achieved enormous achievements. In 2018, with an achieved growth rate of 7.08%, Vietnam's economy had marked the highest growth since 2008. International organizations and friends have valued Vietnam as one of the highest growth groups in Asia and globally. According to the World Bank, the innovation process has helped make Vietnam one of the poorest countries in the world, a middle-income country with an increasingly high position in the international arena.

However, compared to developed countries, Vietnam is still a middle-income country, and the level of competitiveness of the economy is not high. One of the main factors affecting the level of income of people is labor productivity. The labor productivity of Vietnamese people is still

very low, even compared to other countries in the region. According to the General Statistics Office report, the average labor productivity of Vietnamese people is equal to 1/23 Singaporean, 1/6 Malaysian, and 1/3 Thailand. The leading causes of low labor productivity are the low capacity of employees (knowledge, labor skills) and the limited level of application of science and technology in production and business. According to the WEF's human resources index for Southeast Asian countries in 2016, 41% of Vietnam's human resources are low-skilled, and only 10% are high-skilled. According to the report "Future readiness of manufacturing" published by the World Economic Forum (WEF) in January 2018, Vietnam is not in the group of countries ready for the future manufacturing economy. In particular, some indicators are poorly evaluated, such as the "Technology and innovation index" ranked 90/100; the "Human capital" index ranked 70/100. Component indicators such as "Acquisition of technology in enterprises", "The impact of ICT on new services and products", and "Innovation capacity" ranked 78/100, 70/100, and 77/100, respectively (World Economic Forum, 2018).

In addition, Vietnam is also facing the challenge of job losses in the context of AI and robots. Specifically, according to the 4 International Labour Organization, about 70% of jobs in Vietnam are at high risk of being replaced by automation over the next two decades. Vietnam is identified as a high-risk country severely affected by the high proportion of workers working in the garment, agriculture, and retail sectors, which are high-risk sectors to be replaced.

To continue to make breakthrough developments in the new period, narrow the gap with developed countries, moving beyond the middle-income trap, we must create recent efforts, determination, breakthroughs to realize the aspirations of the mighty Vietnam. One of the most basic and foundational solutions is that we have to convert numbers powerfully, leading the region in the 4.0 industrial revolution. According to the research report of Cisco on Vietnam's digital transformation scenario, if Vietnam is not proactive, prepared, and has a low investment in the field of digital transformation, Vietnam will be fell into a backward system in which the digital transformation economy is slow. Labor productivity is stagnant (Nur Haziqah A Malek, 2018).

Some Critical Objectives of the Current Digital Transformation Plan to 2025, Vision 2030
General Objectives
Hanoi Metropolitan University conducts digital transformation based on the Hanoi Digital Transformation Program to 2025 with orientation to 2030, contributing to making Hanoi a Smart, fast, and sustainable city based on digital technology advances. The objectives, tasks, and solutions must be by the Digital Transformation Program of Hanoi to 2025 oriented to 2030 and the Resolution of the XVII Party Congress of the Capital University, term 2020-2025.

Ensure that digital transformation brings equity and benefits to all system members; take learners and workers to the heart of the digital transformation program. Combine digital transformation with changing the working style of officials, automating to maximize storage and document search functions, applying automated processes to minimize human manipulation, and improving the efficiency of digital data processing.

The digital transformation process is based on the primary platform, ensuring openness and adaptability to changes in the operating model of the existing system. The digital transformation process is carried out according to the roadmap by the school's plan and updated according to the development of science and technology.

Digital transformation at Hanoi Metropolitan University is implemented synchronously with other units in the city. Some contents are the strengths of the research unit, which may be prioritized to support other teams in technology.

Integrating advances in digital technology into the fields of operation of Hanoi Metropolitan University to modernize human resource training activities of the school in all three aspects:

1) Transformation of some university administration activities;

2) Digital transformation in training and research activities;

3) Development of digital technology resources

4) Becoming the core career unit of the city in researching and implementing the advances of digital technologies in management and building a digital society, with a focus on the field of Education and Training.

Digital Transformation of University Administration Activities

Scope Digital transformation is consistent for most administrative operations in critical areas of the university: 1) Management of Training, Students, Students, and Experiments; 2) Management of Online Courses (LMS), Learning Materials, and Libraries; 3) Management of Scientific Research, Development Cooperation, Magazines; 4) Administrative Management, Digital Documentation, and Accreditation; 5) Management of Labor, Finance, Assets, Dormitories.

Friendliness: Ensure high-speed Internet connection in all areas within the school's jurisdiction. 100% of information services are developed at level 4 according to online public service standards. Minimize administrative procedures and simplify them by automatically validating information from the archive database appropriate delegation of authority to minimize transactions between people and the digital system.

Safety: Assign digital system participation rights to users with different roles, functions, and tasks over time on a centralized database. Securely store digitized databases in 4 layers: application layer, database layer, operating system layer, and network layer. The database is backed up to ensure the safety of the data and the system's continued operation.

Modernity: Transforming the way labor is managed based on KPIs. Apply digital technology advances such as IoT devices and technology in artificial intelligence to exploit information from data storage, labor-management support, and facility management towards building some decision support functions (DSS) for managers.

Target to 2030:

- Strive for 100% of the activities of units in the university from the subject group level upwards to be handled in the computer network environment.
- 80% of the activities of testing, monitoring, and evaluating labor efficiency are carried out in the school's digital environment and information systems.
- Complete the digital transformation in the organizations in the school: Party, Trade Union, Youth Union.
- Synchronize school data with the city's data system, contributing to creating a data platform for the city's digital government, digital economy, and digital society.
- Research and advise the City People's Committee on solutions related to digital transformation in the field of Education and Training.

Digital Transformation in Training and Research Activities

Training Activities:

100% of the university's on- and near-disciplinary information technology training programs are adapted, supplemented with AI, data science, Big Data, Cloud Computing, the Internet of Things (IoT), and virtual reality/augmented reality (VR/AR), blockchain, 3D printing.

Teaching and learning activities are implemented on the platform to support remote teaching and learning in compliance with the Ministry of Education and Training regulations on online teaching.

Develop at least one primary or near-disciplinary master's training program in information technology, meeting the requirements of high-quality human resource training for the Digital Transformation Program of Hanoi City.

The university's on- and near-disciplinary information technology curriculum is complemented with essential knowledge and skills in cutting-edge areas of computer science. Strive for 50% of graduates to be competent in innovative entrepreneurship, creating new jobs.

Every individual can access the online MOOC (Massive Open Online Course), contributing to improving the digital skills of the whole society and improving digital education for the people (Bumann & Peter, 2019).

Research Activities

Research to improve the effectiveness of stem/STEAM education in Hanoi Metropolitan University and implement the research model into general instruction in the capital.

Research and implement a digital system to support teachers to automate assessment activities in most subjects and levels based on the Ministry of Education and Training regulations.

Form a team of experts with in-depth knowledge in the science of Artificial Intelligence, practical experience, and advice on solutions to solve some problems of the city posed in implementing digital transformation.

Development of Digital Technology Resources

Establish a center to develop the university management system to meet the digital transformation requirements of Hanoi Metropolitan University.

Foster and raise awareness of digital transformation and governance for leaders and all lecturers, officials, and employees. 100% of the school's officials are trained in using the digital platform of the university administration.

30% of IT lecturers receive advanced training in Artificial Intelligence, Big Data, and Blockchain Technology. Organize workshops on technology following the era's trend on AI, IoT, Blockchain, Big Data, etc...

Provide and update skills courses according to social needs. Facilitate the access of all individuals to Massive Open Online Courses (MOOC), contributing to improving the digital skills of the whole society, improving digital education for people (Berghaus et al., 2017)

Solutions to Realize the Goal of Digital Transformation at Hanoi Metropolitan University

Hanoi Metropolitan University identifies essential tasks and solutions for digital transformation on three main pillars: Digital transformation in university administration, Digital transformation in training and research activities, and development of digital technology resources with 03 groups of tasks and solutions, including 1) Development of digital technology infrastructure; 2) Digital transformation in management activities; 3) Training and retraining of human resources.

Development of Digital Technology Infrastructure
- Develop high-quality broadband network infrastructure at all facilities of Hanoi Metropolitan University, ensuring cyber safety and security.
- Develop a free wifi system at all facilities of Hanoi Metropolitan University, supporting officials, employees, and learners to quickly access digital transformation, effectively exploiting the university's digital services.
- Cloud computing technology can be applied to all school units, in which the teams will be provided with computer resources for users. This resource is located at virtual (cloud) servers on the network. Users can access the resources in the cloud simply by connecting to the internet at any time and anywhere.
- Build the digital learning system infrastructure to share in-person and online teaching and learning resources (Bharadwaj et al., 2013).

Digital Transformation of Management Activities
- Promote the propaganda, dissemination, and thoroughness of the Party, the State, the City, and the School on Digital Transformation.
- Linking goals and tasks of digital transformation with resolutions, strategies, action programs, and plans to implement the fields of operation of the school.
- Develop and develop legal bases and regulations on the use, operation, maintenance, and development of digital infrastructure based on the requirements of safety, reliability, and conditions for sharing data based on the digital infrastructure of Hanoi Metropolitan University.
- Build a school administration software system for most administrative activities in the main areas of the university: 1) Training Management, Students, Students, and Experiments; 2) Management of Online Courses (LMS), Learning Materials, and Libraries; 3) Management of Scientific Research, Development Cooperation, Magazines; 4) Administrative Management, Digital Documentation, and Accreditation; 5) Labor, Finance, Property, Dormitory Management. The system ensures that online public services involving learners meet level 4 standards and other online public services at least meet level 3.
- Develop a shared database to facilitate the exploitation of shared resources of subordinate units, study and forecast development trends in higher education activities of the university, and be ready to synchronize with the city's data system. Four layers secure digital databases: application, database, operating system, and network. The database is backed up to ensure the safety of the data and the system's continued operation.
- Develop an automated assessment system to serve the assessment of learners in the training work of the school.
- Strong research group orientation, the university's research teams focus on research using modern digital technologies such as Artificial Intelligence, big data, and virtual reality to develop digital applications.
- Develop mechanisms for cooperation with digital technology experts and enterprises in training and research.
- Enterprises in the university are established, transferring, commercializing scientific and technological research, mainly digital technology products of Hanoi Metropolitan University.

- Develop mechanisms to attract highly qualified experts in Artificial Intelligence technology, big data, virtual reality, and blockchain working at the school.

Training and Retraining of Human Resources

- Develop a code of conduct, create trust in the digital environment, and form a digital culture associated with protecting fundamental ethical values based on the traditional culture of the people of Hanoi and the regulations of the Hanoi Metropolitan University.
- The school will build a team to develop the system to realize autonomy in administration and establish a digital platform for university administration, the digital platform for teaching and learning of the school.
- The school also recruits the expertise for the management team, operating the system through short-term and long-term training courses. Facilitate the participation of system operators in technology workshops on and off the campus.
- Organize the assessment and assessment of digital skills of officials, employees in schools and state organizations, and business units of Hanoi to assess the level of digital transformation and competitiveness in the digital economy of the units.
- Annually, adjusting and supplementing the training programs of the right and close disciplines in information technology content on Artificial Intelligence (AI) technology, data science, big data, cloud computing, Internet of Things (IoT), virtual reality/augmented reality (VR/AR), blockchain, 3D printing with guaranteed volume according to the regulations of the Ministry of Education and Training on program adjustment rates.
- Develop a Master of Information Technology Management training program to meet the requirements of high-quality human resources for digital transformation management for Hanoi Metropolitan University and Hanoi City.
- Build digital equipment infrastructure for the stem/STEAM Education experience center.
- Develop a repository of applied resources on stem/STEAM education to support general education in Hanoi
- Develop a digital system to support competitions in general education in Hanoi.
- Coordinate with the Hanoi Department of Education and Training, Departments of Education and Training, and schools in the city to implement the STEM/STEAM, education model.
- To build and develop the Center for Informatics and Pedagogical Applications, which supports the capital's education in the renovation of teaching methods and contents in digital transformation.
- Send lecturers specializing in information technology to participate in training courses at home and abroad on digital transformation, AI technology, Big Data, Internet of Things (IoT), blockchain technology, etc.
- Organize training courses to update knowledge and skills on information technology for officials and learners of the university.
- Participate in fostering digital transformation capacity for cadres and officials of the city.

CONCLUSION

Digital transformation requires telecommunications infrastructure to develop to a certain extent, which is highly relevant to each locality's level of socio-economic development. Therefore, the education sector cannot go alone but must accompany and coordinate with other sectors. It can

be a significant challenge because they are familiar with the operation and operate independently.

Digital transformation in education is expected to help maximize training effectiveness. However, suppose the problem of network infrastructure, equipment, and technological solutions is not met. In that case, the issue of transforming teachers' capacities is not solved; the 'digital 'learning experience for both teachers and learners can become a disaster. There are obvious risks such as possible deviant learning behavior, unregulated educational activity, and loose educational quality. It would be dangerous if we were to' drop' and lose our learners in the vast virtual space.

How digital transformation will relate to the story of educational inequality. It is often thought that the digitalization of education will bring 'digital equity' thanks to access to technology without time and space limitations. However, this can also further deepen inequalities in access to education between regions and students with different socio-economic conditions (SES). Students who do not have access to good telecommunications infrastructure in mountainous or rural areas will be at risk of being left behind in access to high-quality education and primary education as essential resources for learning. Students from disadvantaged families who do not have the minimum equipment or cannot afford the cost of telecommunications services will also be at risk of falling behind. The hearing loss and visual impairment students that interfere with device manipulation and control also have a significant chance of digital inequality due to problems related to inputs (books, documents, languages, equipment) and the educational process (manipulation, control, communication with devices, software, teachers). The application for digitization of materials and learning materials for the target group must use their language system, such as sign language will undoubtedly have many limitations, not prioritized, causing many disadvantages and disadvantages for this group of learners.

Finally, digital transformation facilitates the development of professional learning communities for teachers and education administrators on a wide scale through online forums. There are also many tools to help teachers design materials and build lessons. It is considered an excellent professional career development opportunity for teachers. Still, these technological tools also make it simple and easy to copy and copy records, lesson plans, articles, and even learners' assessments and feedback. The most significant challenge point for digital transformation is how to ensure that learning and teaching, and educational activities are practical.

In education, digital transformation is transforming all needed to implement online education. There is no specific formula for this process, but educational performance assessment frameworks and quality assurance frameworks can be used to guide the transition. The role of leadership, organization, coordination and resource mobilization at the system level will be essential to determining the form of new education. In addition to ensuring adequate education, equal access to education for all learners, including poor and disabled students, so that no one is left behind is a fundamental goal that digital transformation must achieve.

References

Andriole, S. (2017). Five Myths About Digital Transformation. *MIT Sloan Management Review, 58*(3), 20–22. Retrieved from http://mitsmr.com/2ki2h8A

Becker, J., Knackstedt, R., & Pöppelbuss, J. (2009). Developing Maturity Models for IT Management. A Procedure Model and its Application. Retrieved from https://doi.org/10.1007 /s12599-009-0044-5

Berghaus, S., Back, A., & Kaltenrieder, B. (2017). Digital Maturity & Transformation Report 2017. St.Gallen. Retrieved from www.crosswalk.ch/dmcheck

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. (2013). Digital business strategy: toward a next generation of insights. *MIS Quarterly, 37*(2), 471–482. https://doi.org/10.1.1.216.1018

Bumann, J., & Peter, M. (2019). Action fields of digital transformation - a review and comparative analysis of digital transformation maturity models and frameworks.

CEST (2018). Document Forum on Science and Technology with Vietnamese Enterprises in 4.0 industrial revolution, held on May 16th, 2018.

Ministry of Industry and Trade (2017). 4.0 industrial revolution Forum Document, held on April 11th, 2017.