ISRG Journal of Arts, Humanities and Social Sciences (ISRGJAHSS)

ISRG PUBLISHERS
Abbreviated Key Title: ISRG J Arts Humanit Soc Sci
ISSN: 2583-7672 (Online)
Journal homepage: https://isrgpublishers.com/isrgjahss
Volume – III Issue -III (May-June) 2025
Frequency: Bimonthly

A PROPOSAL OF DIGITAL MATURITY ASSESSMENT FRAMEWORK FOR HIGHER EDUCATION INSTITUTIONS IN VIETNAM

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| **Received:** 27.05.2025 | **Accepted:** 29.05.2025 | **Published:** 02.06.2025

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Abstract

Along with the fourth industrial revolution, Vietnam government has issued many policies to promote the application of information technology in every field and industry of the economy so that Vietnam can wrap every opportunity brought by the fourth industrial revolution; higher education institutions also need necessary preparation to succeed in this process. In this article, the author proposes a digital maturity assessment framework for higher education institutions in Vietnam, based on previous research findings. The proposed framework helps assess the level of digital maturity as well as strengths and weaknesses the university should consider improving to promote digital transformation.

Keywords: *Digital transformation; digital maturity; information technology application; higher education institutions; Vietnam*

1. INTRODUCTION

Along with the invention of the Internet, the rapid development of technology, the use of computer devices and information technology applications has become very popular among every sector of the economy and considered beneficial to organizations and businesses. Digital transformation gradually became an inevitable trend in every industry; higher education institutions (HEIs) are not exceptions. However, digital transformation is a new and complex phenomenon, which needs to be elaborated to implement effectively. This article provides HEIs with theoretical overview on digital transformation, which helps them clearly understand phases and structure of digital transformation; as well as proposes a digital maturity framework, which is detailed, understandable and flexible for HEIs in Vietnam to easily evaluate digital transformation progress, identify strengths and other matters of concern and establish a suitable strategy to promote digital transformation.

2. THEORETICAL OVERVIEW

2.1. The concept of digital transformation

Starting from the urge for profit optimization and competition pressure, businesses have continuously researched and applied new

DOI: 10.5281/zenodo.15572411

technologies. Therefore, digital transformation is a trend that attracts significant attention from the business community and the notion of digital transformation is mainly established and utilized in business context. A number of concepts related to digital transformation are generalized by Lozic (2019) in his article *Core concept of business transformation: from business digitization to business digital transformation*. Lozic (2019) demonstrates that before achieving digital transformation, businesses must go through digitization, which means converting resources in analogy form to digital form, readable by computers, then digitalization, when digital technologies are integrated in business process and then digital optimization, when digitalization starts to add value to the business processes like cost reduction and more efficient use of resources. Finally, businesses are digitally transformed when they are changed holistically, fundamentally in terms of technology, culture, process and management to create values.

O'Leary (2023) says that before digitization and digitalization, businesses should learn about digital technologies and draft some processes that can be digitalized, which means digital initiatives. Therefore, digital optimization according to Lozic (2019) is the result of digitalization.

Figure 1 Digital transformation process (Lozic, 2019 & O'Leary, 2023)

According to Morakanyane et. al (2017) digital transformation is "an evolutionary process that leverages digital capabilities and technologies to enable business models, operational processes and customer experiences to create value". It can be said that digital transformation is a complex process with specific characteristics, drivers and impact on many aspects of organizations; and not limited to the application of digital technology in organization operation. Gong & Ribiere (2021) elaborated this concept by specifying the digital capabilities, technologies as well as drivers and objectives of digital transformation, mentioned by Morakanyane et. al (2017).

Through many approaches, digital transformation is the change process of an entity, enabled by the use digital technology and the strategic leverage of resources and capabilities of the entity, which helps the entity achieve economic and capability driven outcomes, create values for itself and its stakeholders.

Digital transformation impacts are the changes an organization goes through during the transformation process Morakanyane et al (2017). They are categorized into two groups, impacts on customers and impacts on the organization itself. They can be either positive or negative but ultimately, the impact expected by organizations is value creation for themselves and their stakeholders. Digital transformation helps businesses innovate their business model by data analysis, creating business knowledge (Tran, 2024) so that businesses can improve their performance, customer experience, strategic differentiation, competitive advantages, stakeholder relationships and cost reduction and so on.

2.2. Digital transformation in higher education institutions

Information technology and digital technology applications have been used in HEIs for a long time; however, its impact was felt the most during the Covid-19 pandemic. It only took the University of Oslo, Norway a week to transform traditional education to online education (Bygstad et al, 2022). With 5,000 members of staff and 28,000 students, this was an impressive achievement. The authors say the university started to use digital technology and prepare digital solutions for its operation in 2000, therefore, when the Covid-19 pandemic hit, the university was ready to switch to online mode.

Findings from Duong et al (2021) systematic literature review shows that digital transformation in HEIs has six main focuses of which teaching is the second most prominent. The other focuses are infrastructure, management, research, learning and technology, which is the most prominent focus.

HEIs basic digital tools such as administrative management, admission, assessment and evaluation, human resources or finance management are all very common, so are education solutions like Learning Management System (LMS), Mass Online Open Courses (MOOCs), websites and library system. Nowadays, new technologies like big data, Internet of things, cloud computing and artificial intelligence are mentioned more often day by day. Cyber security also attracts more attention as information is shared and exchanged increasingly on the Internet.

According to Varma & Umesh (2021), big data has led to the development of information management applications, which allow us to store and analyze the management information of HEIs such as students, personnel, facilities, learning materials, research, finance and so on. HEIs, therefore, can provide their stakeholders with comprehensive, visualized and interactive information. Besides, these applications cleanse and analyze data, which helps users make informed decisions more proactively, quickly and precisely.

Nowadays, the concept of digital university or smart university was formulated due to the invention of smart devices, Internet of things, cloud computing and artificial intelligence. In these universities, devices are connected via the Internet, which allows student information to be collected, stored and analyzed, helps them provide students with better education at support services at lower cost. 80% of universities in the UK have been using Internet of things to serve their students, of which 45% have been using this technology to carry out salary disbursement.

Applying digital technology has enabled HEIs to replace their traditional processes with innovative ones, which is the prerequisite for new learning formats such as online learning and blended learning. Online programs and courses allow students to attend classes from their personal computers without being present in physical classrooms. Blended learning was invented at the beginning of the 21st century, when direct teaching was combined with online teaching (Jacob & Jerald, 2003), which allowed HEIs to approach as well as provide access to education to more students. Digital technologies in turn help HEIs collect feedback from students and other stakeholders to enhance their quality of service.

Tang & Nguyen (2020) say that blended learning will lead to significant changes in HEIs and recommend them to (i) invest in upgrading face to face learning space like training lecturers on

DOI: 10.5281/zenodo.15572411

pedagogy and redesign physical classrooms; (ii) assure expected learning outcomes; (iii) develop digital libraries and open learning materials; (iv) utilize digital technologies and mobile devices in teaching; (v) invest in learning analysis applications and integrated planning and advisory services; (vi) prepare lectures and students for skills and psychological matters.

On the one hand, benefits of digital technology are recognized in HEIs; on the other hand, it will become a threat if cyber security is not guaranteed, HEI information system can easily be intruded by people with bad intentions like adjusting learning results, tuition fees, or stealing student personal information. Besides, many HEIs face many difficulties during digital transformation. Conducting a survey targeting UEA universities, Marks et. al (2020) summarized the main difficulties faced by HEIs are lacking holistic vision, inadequate skills of personnel, inconsistent data structure, resistance from staff, other legal and finance problems and so on. In Vietnam, HEIs have the same difficulties while implementing digital transformation; however, Phung (2021) shows that digitizing data and learning materials and quality assurance of online programs are also challenges.

3. PROPOSAL FOR A DIGITAL MATURITY ASSESSMENT FRAMEWORK FOR HIGHER EDUCATION INSTITUTIONS IN VIETNAM

Up to 2022, out of 100 Vietnamese, 140-150 people have a mobile phone subscription and 78,59 people use the Internet (World Bank data). A high rate of Internet utilization helps Vietnamese students more easily and quickly (Phung, 2021). In the "National Digital Transformation to 2025, vision to 2030", issued on 03rd June 2020, education is of the top 8 priorities. This was emphasized even before the issuance of the program, when the pandemic Covid-19 took place in March 2020. In Vietnam, the application of information and digital technology in HEIs and particularly teaching started in the 2000s, and the term online education was first discussed in 2005; however, it was not very popular and recognized. As mentioned above, digital transformation is a complex process, taking place continuously with the ultimate goal which is creating values for stakeholders. Supported by the government, based on stakeholders' requirements, HEIs in Vietnam soon carried out the first steps of digital transformation.

According to Ochoa-Urrego & Reyes (2021), digital transformation is a multidimensional concept, it goes beyond the application of technology in an organization processes and activities. Therefore, every organization needs to have a detailed plan and strategy to guide the whole process and help ensure the success of digital transformation. A framework to assess the digital maturity level is an essential tool to start and steer digital transformation journey. It provides HEIs with insights of their capabilities and helps them improve resource allocation with proper investment in technology as well as define the expected outcomes for a particular period. However, in Vietnam, for HEIs specifically, there have not been researches about the digital transformation as well as a framework to assess digital maturity.

Marks et. al (2020) proposed a model to assess the digital maturity and readiness in HEIs and applied it in UEA. This model grades the digital maturity in the main processes of HEIs, which were aggregated by Petkovics et. al (2014).

Table 1 Processes in higher education institutions (Petkovics et. al, 2014)

Learning and Teaching Process	**Research Process**
Study program accreditation	Research planning
Teaching process preparation and realization	Research preparation
Teaching process outcomes monitoring	Research conduct
Teaching process assessment	Research outcomes monitoring
Student and teacher mobility realization	Research evaluation
Enabling Process	**Planning and Governance Process**
Student administration services	Organization management services
Library services	Change and business process management
Staff provision and development services	Plan development
Finance and accounting services	Budget and funds planning
Marketing, sales, and distribution services	Performance assessment
Procurement services	

Marks et. al (2020) used 5 criteria, elaborated by the questions in Table 2, these are similar to the most frequently mentioned criteria aggregated by Ochoa-Urrego & Reyes (2021).

Table 2 Description of criteria used to assess HEIs digital maturity level (Marks et. al, 2020)

CRITERIA	**DESCRIPTION**
Digital Transformation Vision, strategy, leadership, and communication	Does the institution have the right vision and strategy for digital, and the leadership, communications and focus required to support this vision?
Digital Transformation Talent, skills, and knowledge	Does the institution have the right talent, skills and knowledge to support its vision, products, and services?
Digital Transformation Processes, controls, and digital technologies	Does the institution have the right processes, controls and digital technologies to support the operations of the organization?
Digital Transformation Technology Infrastructure	Does the institution have the right technologies and infrastructure as well as the ability to develop, manage and deliver?
Digital Transformation Approach to understand and communicate with stakeholders	Does the institution have the right approach to understanding and communicating with its customers to succeed in a digital environment?

DOI: 10.5281/zenodo.15572411

Table 3 Similarities between Marks et. al (2020) model and other models (Ochoa-Urrego & Reyes, 2021)

CRITERIA	DESCRIPTION	SIMILAR CRITERIA IN MARKS ET. AL (2020) MODEL
Strategy	Resources, capacities and action plan to manage the digital transformation process	• Digital Transformation Vision, strategy, leadership, and communication
Business	Active and passive elements, as well as the activities comprised in the digitalized business models	• Digital Transformation Talent, skills, and knowledge • Digital Transformation Processes, controls, and digital technologies
Application	People involved (active elements), the activities and physical elements (passive elements) that are necessary to manage the digital relationship with customers and other participants of the value chain	• Digital Transformation Processes, controls, and digital technologies • Digital Transformation Technology Infrastructure • Digital Transformation Approach to understand and communicate with stakeholders
Technology	Management of the technological platform that supports the business model	• Digital Transformation Technology Infrastructure
Physical	All the technologies supporting the direct processes of transformation and value aggregation	• Digital Transformation Technology Infrastructure

Marks et. al (2020) omit culture as a criterion compared to Deloitte (2019) model. Turcan et. al (2024), on the other hand, consider culture as an important criterion, assessing digital maturity of an organization. According to Kane et. al (2017), digitally mature enterprises share the same characteristics regarding culture, which is higher risk bearing, more willing to try and higher investment in resources; besides, leader social skills are appreciated over technological skills. Gollhardt (2022) says digital culture maturity is used to examine organizations' attitude towards interactions in digital environment and digital solutions. This is seen as the most difficult terminology as it is related to human perception and behavior.

Marks et. al (2020) framework does not assess digital culture maturity; although HEIs invest significantly in technology, if their staff members are not willing to be involved in the application process, it may hinder digital transformation. Therefore, to examine the level of digital maturity of HEIs holistically, culture should be put into the framework, answering the question: "Are leaders and staff members of the institution willing to try new digital solutions and ready to take risk?"

Table 4 Marks et. al (2020) digital maturity model

Operation processes	Digital Transformation Vision, strategy, leadership, and communication	Digital Transformation Talent, skills, and knowledge	Digital Transformation Processes, controls, and digital technologies	Digital Transformation Technology Infrastructure	Digital Transformation Approach to understand and communicate with stakeholders	Total
TEACHING AND LEARNING PROCESS (4 processes)						**20**
RESEARCH PROCESS (5 processes)						**25**
SUPPORTING PROCESS (6 processes)						**30**
PLANNING AND GOVERNANCE PROCESS (5 processes)						**25**
Total	**20**	**20**	**20**	**20**	**20**	**100**

Each answer "Yes" is equivalent to 1 point, the maximum points a HEI can achieve is 100, which is then put into 4 categories, which are Desire, Planning and Designing, Delivering and Harvesting. However, the research does not provide a description of each level of digital maturity. Combining Deloitte (2019) and Azizan et. al (2021) model, we can describe and define each level of digital maturity as follows:

Table 5 Proposed description of digital maturity level

CRITERIA	Digital maturity level		
	Early	**Developing**	**Maturing**
	1 point	**2 points**	**3 points**

DOI: 10.5281/zenodo.15572411

Vision, strategy, leadership, and communication	Targeting cost reduction	Targeting at improvement of customer experience and decision making	Targeting at fundamental process transformation
Talent, skills, and knowledge	Lack of digital awareness and skills	Digitally aware	Digital technology proficiency
Processes, controls, and digital technologies	Lack of process control, ad-hoc decision making, partly digital integration, some processes can be done without proper technological support	Processes are structured effectively, digitally integrated to visualize areas to be improved and ensure quality.	Use digital technology and transform processes. Benefit partially from digital transformation (information is reliable and exchanged quickly etc) continue to improve internal coordination and decision making.
Technology Infrastructure	Lack of investment	Moderate investment	Sufficient investment
Approach to understand and communicate with stakeholders	Minimal	Gaining more attention	Becoming focus of digital transformation
Culture	Risk resistance	Risk acceptance and enabling innovation and cooperation	Risk bearing and promoting innovation and cooperation

Based on Table 5, the maximum points a HEI can get is 360, HEIs which gain up to 120 points are at early stage of digital transformation, HEIs which gain 121-240 points are at developing stage of digital transformation and HEIs which gain 241-360 points are at maturing stage of digital transformation. However, the defined range for each stage may change when HEIs adjust the model by adding other processes.

4. CONCLUSION

Digital transformation is an inevitable trend in every industry and education is not an exception, especially after Covid-19 pandemic happened. The rapid change of technology and the economy in general may go beyond HEIs ability to adapt themselves, hence, they must invest in innovative technology and processes to maintain their competitive advantages. The proposed framework for digital maturity assessment allows us to measure the digital maturity level of HEIs holistically, identifying strengths and areas to be improved in specific activities and criterion. The model provides a detailed description of each maturity level, which helps HEIs examine their digital transformation situation easily, regularly to monitor the progress of digital transformation. HEIs can also add more maturity categories into the model to have a more detailed assessment, applicable to HEIs current practice.

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DOI: 10.5281/zenodo.15572411