

## Digital Maturity Model for Continuous Improvement

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**Abstract:** The present research work presents the development and implementation of a Digital Maturation Model (MMD) designed and adapted to the Institute of Higher Education, Establishing the degree of Digital Maturity present in the Institute of Higher Education located in Orizaba, through the development and application of a Digital Maturity Model. Outlining strategic planning oriented to the analysis necessary to generate improvement proposals through the use of digital technologies, increasing efficiency and competitiveness, improving the service offered. The present research will take a quantitative methodology through a longitudinal study with the intention of obtaining a before and after, through a quantifiable approach, obtaining the evaluation of the Digital Maturity Index and the detection of areas of opportunity for the proposal of improvements.

**Keywords:** Digital Transformation, Digital Maturation Model, Higher Education, Dynamic Capabilities.

### Introduction

Currently, society demands new changes, based on the adoption of digital transformation, implying an era of digitalization in different sectors of humanity (Mergel et al., 2019; Voss et al., 2022) described that digitalization is the result of the incorporation of digital technology and how its influence within organizations can trigger benefits.

Digital transformation has the ability to improve the strategic position of organizations (Teixeira et al., 2021; Castro, et al., 2022). Contributing to the social, cultural and industrial sphere, promoting trends by instructing new digital skills. Therefore, it is an organizational evolution that takes into account different perspectives seeking a holistic and evolutionary integration. Involving gradual change resulting in deliberate and conscious actions aimed at introducing changes Rodriguez-Abitia & Bribiesca-Correa, (2020) characterized by a fusion of technologies that blurs the borders between the physical, biological or digital.

A clear example was mentioned by Ghobakhloo, & Fathi (2019), stating that there are organizations that still do not understand the importance of adopting TD, raising a problem detected as a frequent challenge that often faces limitations that involve levels of digitalization such as to the resources of each organization. Raising the obligation on the part of organizations to evaluate their digital maturity by determining viable strategies for metamorphosis and continuous improvement Ka et al., (2023).

Therefore, this trend marks the way forward, implying the need for new skills demanded by the labor market and society, giving rise to changes that have the capacity to push Higher Education Institutions to focus on the need to train individuals who have digital competencies (Mushore & Kyobe, 2019) staying updated, facing challenges when developing a digital transformation by implementing new tools seeking to take advantage of the benefits they provide.

Therefore, it is understood that digital transformation has the capacity to empower organizations, emphasizing the need for research to develop a Digital Maturity Model (DMM) to analyze the level of digitalization (Voss et al., 2022) explained. that there are different DMMs for a wide variety of sectors or areas of application. Maintaining that digital maturity is not just a characteristic that every company must comply with (Rafael et al., 2020). In the research by (De Carolis et al., 2017) they highlighted the importance of evaluating a Digital Maturation Index that allows a measurement oriented to processes and dimensions.

Therefore, dynamic capabilities can be linked to the primary objective of TD, which is also based on the business perspective, being defined as a capacity to reconfigure the resources and routines of a company in a way that can be considered appropriate for its purposes. main decision makers Zahra et al., (2006). This implies that regardless of the type of organization, it is essential to have an open mind focused on change since this can generate positive benefits, opening doors for increased competitiveness.

## Background

It is important to recognize that COVID-19 sparked a digital transformation, exploding the interest of academics and professionals, accelerating the adoption of the principles of Industry 4.0 within global economies as expressed by Kargas, et al., (2023), implying a metamorphosis in the social, industrial, economic and educational spheres.

This event created what Crawford, et al., (2020) called the COVID-19 response, implying that HEIs presented an accelerated digital and technological transformation when responding to the pandemic, moving from a face-to-face model to a completely online one, highlighting the existence of Institutions better prepared than others. Implying the need to update educational and administrative processes with the intention of adapting to the confinement environment, creating a global trend for the use of digital resources.

A digital culture is being born, directly associated with Higher Education Institutions, increasing competitiveness, process improvement, viability and growth (Tubis, 2023). Interest in Digital Maturity generates initiatives to increase performance in a digitalized environment, therefore, in the coming years, resources must be invested and practices implemented that understand the potential of emerging technologies (Durek et al., 2018).

Therefore, it is essential to develop and implement a Digital Maturation Model that promotes a strategy with the objective of guiding and measuring the level of digital transformation achieved, capable of increasing the chances of success through the adoption of digital tools (Helmy, et al., 2017). Taking into account the results of the research carried out by (Fernández et al., 2023) where they analyzed 39 Spanish Universities, an area of opportunity for continuous improvement was located.

Noting that 75% of the universities analyzed do not have a digital strategy while 56% achieved isolated initiatives aimed at digital transformation, it was also detected that only 6% achieved their strategic objectives (Fernández et al., 2023). Highlighting the need to delve into this topic, highlighting the relevance for HEIs of adopting digital transformation as a necessity for the future, for organizations that seek to be leaders in their field.

Therefore, it is necessary that the present work aims to bring this trend closer to Higher Education Institutions, analyzing and restructuring their decision making, changing their organizational culture, as well as the mechanisms for the development of strategies. Highlighting that Digital Maturity is systemic and inter-functional, coming to the foreground to evaluate the level of digitalization of a given organization, industry or national economy as it is considered a distinctive characteristic of highly successful organizations around the world (Ershova & Enkova, 2023).

## Theoretical framework

### 1. Digital Transformation

By implementing digital technologies incorporated into the daily life of society, the concept of Digital Transformation (DT) was born, which emerges as the need to innovate in digital skills through the use of creativity with the aim of improving and supporting traditional methods such as Pérez & Mejía (2018) mentioned changing the paradigm drastically.

Demonstrating that digital transformation represents a profound change in business activities for organizations, modifying processes, competencies and models, mixing technology with society, impacting strategies, along with the way in which they can support improvements (Castro, et al., 2022). Incorporating digital technologies that require a certain time for their implementation, carrying out planning that will guide companies, organizations or institutions

in the digital transformation. Implying that within current and future processes an evolution is necessary for decision making.

Considering that digital transformation represents the reconstruction of technological bases aimed at new areas of opportunity, converting business models, processes, products or services through innovation (Salas, et al., 2020). Resonating that DT seen from a business perspective represents the need for a metamorphosis oriented to user experiences and operations incorporating digital tools Juca et al., (2019). Emphasizing the importance or need for its implementation, becoming a priority to be developed in both the Industrial and Educational fields.

Therefore, digital transformation is an intrinsic and characteristic feature for products and services, implying that it ceased to be a goal and became a basic characteristic for any organization or Higher Education Institute as expressed by Álvarez et al., (2019). Pointing out that DT will lose its importance as a differentiator by becoming a necessary characteristic for any organization.

This leads Higher Education Institutions to highlight the importance of digital services and their implementation (Sych et al., 2021) through the adoption of technologies such as artificial intelligence, Big Data or information systems focused on management, establishing a need to modernize processes by implementing digital devices covering administrative or learning processes.

## 2. What is Digital Maturity?

Digital maturity was born during the massification of emerging technologies (Hanelt, et al., 2020; Lorenzo, 2016), specifying that it is the state or level of present digital transformation of a company, using it to describe the degree of adoption of technological tools of a company. organization. Meaning that it must be a fluid process with the objective of technologically reforming business or cultural models.

Through a continuous digital transformation, providing direction in conjunction with criteria that measure the state and performance of an organization or Institution of any kind. This implies the purpose of positioning itself at an advantageous point as expressed (Matt et al., 2015; Heilig, et al., 2017). Through the digitalization of processes, remembering that said maturity will vary depending on the unique characteristics of each entity.

Mentioned that it is of utmost importance to take into account what is a priority for the implementation of multidimensional models that seek to evaluate the maturity of the digital transformation (Berghaus, & Back, 2016; Wang et al., 2021; Friedrich, DT et al. , 2011) as expressed by the authors when finding a correlation between the level of success and the depth of present in each organization, contributing with models that have different levels of maturity covering organizational preparation and the intensity of technological tools present.

Implying the need to evaluate the preparation of an organization based on facets such as strategy, organization, technological infrastructure and capabilities, where the intensity of the digital transformation refers to the degree of digitalization of operations and organizational management, measuring the strengths of the implementation, allowing essential characteristics to be determined.

### 2.1. Digital Maturity Model (DMM)

During the last 2 decades, several studies were detected that cover maturity models such as the one proposed by De Bruin et al., (2005) where a methodology was found for the main stages of the development of maturity models, in turn visualized an increase in the popularity of MMDs in organizations, formulating different proposals due to the various sectors in which they can be applied.

Stating that the number of models present oriented towards Maturity is large, although when focusing on digitalization, it was noted that there are generic models that share similarities between them, despite having different applications, this generates the need to investigate and identify models that are really beneficial for research, for this reason Table 1 shows MMD used within different areas, highlighting their orientation towards the digitalization of processes.

Table 1. Digital Maturity Models. Source (Buyukozka & Guler, 2020).

Año	Author	The purpose of the study	Implementation intentions
2017	Carolis et al.	Propose a framework to investigate the digital maturation of companies	Methodology aimed at manufacturing companies and research development to determine their level of digital readiness. Developing a scoring method.
2017	Danjou et al.	Introduce a business model to highlight digitalization and connectivity areas in companies	Creation of a framework for determining maturity levels within digital companies. Implementing a review to detect areas of opportunity.
2017	Grange and Ricoul	Define the stages of maturity for digital companies.	Proposal for a maturity model aimed at providing a research framework for companies in the digital area. Using a systematic review.
2017	Bostrom and Celik	Determine digital factors for business and develop a maturity model	Provide a conceptual framework capable of showing researchers' discoveries within strategies for digital businesses. Carrying out a review.
2017	Hagg and Sandhu	Research articles about digital transformation construction of a framework for digital maturity	Guide for managers with the intention of visualizing in an order the implicit improvements within the levels of digital maturity. Applying an abductive approach and thematic analysis.
2017	Tavakoli and Mohammadi	Define the digital commerce of companies and their digital maturity and analyze the positive effects of digitalization on these companies	Determine for retail companies their level of digital maturity for the distribution process. Through qualitative interviews, questionnaire and theoretical research.
2017	Wibowo and Taufik	Provide a self-assessment tool for companies to measure their level of maturity	Implementation of digital maturity self-assessment as a tool for project construction in Indonesia. Implementing the Delphi method and AHP method.
2018	Gastaldi et al.	Develop a model to measure the level of digital maturity in the health organization	Application of the 2 phases of the ISMETT hospital model. Applying a Benchmarking study.
2018	Mettler and Roberto	Analyze the effects of digital maturity and factors in hospitals	Application of the status quo in Swiss hospitals. Through the implementation of a descriptive exploratory analysis.
2018	Colli et al.	Evaluate the digital maturity of companies through 360 evaluation	Application of an MMD in Danish manufacturing companies. Through a model based on learning problems.

2019	Khanbhai et al.	Evaluate the real-time utilization of system feedback and its digital maturity	Provide a review for patient acceptability for digital maturation technology. Through a review
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In Table 1, you can see the maturity models that were found within the literature review carried out by (Buyukozka & Guler, 2020). Highlighting how different authors took on the task of creating different models for various sectors where their application is viable thanks to the great flexibility of these tools and how their popularity increased starting in 2017, highlighting their flexibility and ease so that the models can be adapted.

Therefore, Digital Maturation Models are tools widely used within organizations with the objective of evaluating the digital capabilities they have, identifying areas of opportunity for continuous improvement. Highlighting that MMD have the capacity to provide a route that supports different purposes seeking to understand their strengths and weaknesses regarding their digital maturity, allowing the development of strategic initiatives that facilitate the technological adoption process that grants higher levels (Aguilar et al., 2019; Weill & Woerner 2017).

Remembering that these tools are intended to evaluate dimensions, highlighting that the number of these may vary depending on the type of organization, collecting information through the use of interviews and surveys, with specific indicators whose purpose is to obtain a diagnosis of the organization, measuring the degree of adoption of digital transformation present in internal and external processes.

**2.2. Digital Maturity Index**

For the correct evaluation of the DMI, it is necessary to take into account dimensions such as: leadership or digital vision, which is responsible for promoting the transformation and the digital capacity that helps achieve technological innovation that aims to improve operational management. and the competitiveness of organizations (Merdin et al., 2023), obtaining new capabilities that are developed with the organization's resources.

This means that the development of these capabilities must be significant and occur in an integrated way along with the dimensions of the organization, highlighting strategy, human capital, culture, structure, management systems, business processes and technology. Remembering that DT is a process conceived from strategic planning, becoming a multidimensional process.

Implying that the evaluation of the Digital Maturation Index is the means by which the level of digital transformation or degree of maturity in the Higher Education Institute will be known, achieved through a series of indicators, allowing an individual and global vision. Without forgetting that there is a perspective to understand organizations, allowing a complete image to be obtained, remembering that DT occurs in a comprehensive way.

Without first forgetting that, although organizations may share the need to transform digitally, the resources and capabilities of each company are different, which creates a disparity because each of them must adapt the Digital Maturation Index to their own needs and characteristics, in order to ensure an analysis that is capable of truly showing the situation of each one.

**3. Impact of Digitalization and Digital Maturity in Higher Education**

Currently, the educational technologies used since the second decade of the 21st century seek to support both the teaching processes and the external and internal processes of Higher Education Institutions by implementing digital tools, developing modern competencies that involve the implementation of technologies, corresponding with the global trend of digital development and its consequent modification of the educational system, experiencing radical changes (Sych et al., 2021).

Highlighting that DT in HEIs has been approached from different perspectives, emphasizing that it has not currently been consolidated within this type of institutions, as expressed (Grab et al., 2019). Which presents digital transformation as an element that seeks to fundamentally change industries or entire organizations, recognizing the need to focus on the technological as well as the social domain to achieve a successful transformation (Bresinsky &



Von Reusner) considering that digital transformation in Higher Education Institutions is a renewal perspective for their business model aligned with technological trends.

Therefore, it is understood that there is a field of opportunity for the development of digital transformation within Higher Education Institutions, generating a need to develop Digital Maturation Models, aimed at a determination that allows positioning the level of maturation of the Institute of Education. Superior, triggering continuous improvement aimed at the adoption of digital technologies to improve the fields of opportunity detected, adding the institute to a global trend, seeking to have a fundamental characteristic for the future, adopting this characteristic as a fundamental competence for success.

### General objective

Establish the degree of Digital Maturity present in the Higher Education Institute located in Orizaba, through the development and application of a Digital Maturity Model. Outlining strategic planning oriented to the analysis necessary to generate improvement proposals through the use of digital technologies, increasing efficiency and competitiveness, improving the service offered.

### Specific objectives

- Analyze and define the necessary capabilities for Digital Maturation.
- Establish and develop the Digital Maturity Model focused on the Higher Education Institution.
- Determine the current state of Digital Maturation present in the Higher Education Institute.
- Make a proposal for improvement based on the results obtained.

### Goals

The main goal of the development of the research is to evaluate the Digital Maturity index of a Higher Education Institution, defining organizational dimensions that promote digital transformation, determining the level of each of them, knowing the current state of Digital Maturity. Considering that digital transformation must be part of the foundations for new opportunities for organizational evolution through innovation.

By carrying out applied research, which revolves around the creation of a Digital Maturation Model Oriented to a Higher Education Institution, which seeks to analyze the entire organization. Creating dimensions that cover all the crucial areas of the organization, collecting quantitative information and analyzing it qualitatively, providing the opportunity to generate a continuous improvement program, through the generation of improvement proposals, for the areas of opportunity detected.

Implying that circumstances are generated that foster high competitiveness on the part of the organization, remembering that Technological Transformation is a need that society itself demands. The integration of new technologies into everyday life is part of everyday life. Likewise, the duty arises on the part of the HEIs to adopt new trends.

### Impact

A Digital Maturity Model generates an indicator called Start which is composed of organizational indicators in defined dimensions generating a weighting that allows each of them to be evaluated obtaining a comparable value oriented towards objectives which are: creating a culture based on quantifiable data, measuring digital transformation, evaluate key indicators, identify strengths and areas for improvement, identify best practices and value the work of the entities that make up the organization.

Therefore, with the arrival of the digital transformation, the implementation of allied instruments was generated that act decisively with the objective of adapting to the demands of a permanently competitive market. Providing challenges for organizations involving a change in existing business models, caused by the technological adoption of emerging tools, integrating a new organizational culture supported by a strategy enhanced by the digitalization of processes.

Demonstrating that digital transformation within the Educational sector can achieve and promote opportunities for the development of strategies that provide institutions with digital inclusion, avoiding being outdated, favoring increased productivity, competitiveness, quality and increased recruitment of new customers by improving educational offerings.

### Methodology

The present research will take a quantitative methodology through a longitudinal study with the intention of obtaining a before and after, through a quantifiable approach which shows the current situation of the Institute of Higher Education through quantifiable data, measuring the effect of DT demonstrating How it affects the organization following an order:

- I. Definition shows it by focusing on a single Higher Education Institute.
- II. Development of a Digital Maturation Model designed specifically for research.
- III. Systematic review of research or projects focused on digital transformation.
- IV. Data collection through interviews and questionnaire surveys.
- V. Analyzing the data descriptively, quantitatively through regression and correlation analysis.
- VI. Processing of data obtained by assigning an identifier, generating a database.
- VII. Identification of areas for improvement and analysis of results.

This research contributes by implementing an analysis focused on improving processes or practices, offering strategies to promote organizational agility and use of technologies, thanks to the information collected from success cases identifying opportunities for improvement.

The findings will guide decision making with the purpose of improving skills, leading to better organizational results along with greater competitiveness within a dynamic environment, verifying the data through cross-information, analyzing study results with the aim of increasing their validity.

Maintaining the confidentiality and privacy of participating individuals within the collection of information by focusing on sensitive data, maintaining confidentiality in internal processes, digital or financial strategies, maintaining impartiality with the intention of maintaining consent, highlighting the voluntary approach to data collection, analyzing and presenting true results, subject to examination or approval in order to avoid any possible type of conflict of interest.

### Conclusion

In conclusion, it is appropriate to mention that dynamic capabilities and digital transformation together represent the ability of a company to integrate, build and reconfigure its competencies, whether internal or external, with the aim of facing changing environments Li, & Liu (2012). By understanding this definition, it is possible to understand how digital transformation plays an important role in the competitiveness of organizations.

Creating a field of opportunity for Higher Education Institutions or companies with the aim of improving and rebuilding their skills, adapting to current trends and demands, without losing sight of the need to maintain competitiveness that allows them to position themselves at a point of advantage compared to its competitors, managing to measure and quantify these improvements.

The research will deliver as benefits the detection of areas of opportunity with the intention of proposing improvement proposals focused on the adoption of digital elements with the ability to grant an advantage over its competitors.

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