

Literature Review on Digital Maturity Models for Evaluating the Use of Digital Technologies in SMEs

Revisión de literatura sobre los modelos de madurez digital para evaluar el uso de tecnologías digitales en las Pymes

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KEYWORDS

Digital technologies, Digital transformation, Digital maturity, SMEs.

Tecnologías digitales, Transformación digital, Madurez digital, Pymes.

ABSTRACT: The research analyzes the relevance of digital maturity models (DMM) as key tools for assessing and guiding digital transformation in small and medium-sized enterprises (SMEs). In order to achieve this, a narrative literature review is first conducted to identify, analyze, and interpret global knowledge around digital technologies, digital transformation, and digital maturity. Subsequently, a systematic literature review is carried out, identifying and analyzing various DMMs. In order to find and adapt a model that fits the specific needs of SMEs, a characterization of this type of business is conducted using secondary sources. This characterization, focused on SMEs in Colombia, helps establish criteria for evaluating which of the identified models best aligns with the needs of SMEs in their digital transformation process. As a result, it is determined that the most suitable model is the one proposed by Aras & Büyüközkan, highlighting its alignment with the specific requirements of SMEs and the proposed research.

RESUMEN: La investigación analiza la relevancia de los modelos de madurez digital (MMD) como herramientas clave para evaluar y orientar la transformación digital en las pequeñas y medianas empresas (Pymes). Para ello, se realiza primero una revisión narrativa de la literatura, con el objetivo de identificar, analizar e interpretar conocimientos globales en torno a tecnologías digitales, transformación digital y madurez digital. Posteriormente, se lleva a cabo una revisión sistemática de la literatura, en la cual se identifican y analizan diversos MMD. Con el fin de encontrar y adaptar un modelo que se ajuste a las necesidades específicas de las Pymes, se efectúa una caracterización de este tipo de empresas utilizando

fuentes secundarias. Esta caracterización, centrada en las Pymes de Colombia, permite establecer criterios para evaluar qué modelos de los encontrados se ajustan mejor a las necesidades de las Pymes en su proceso de transformación digital. Como resultado, se determina que el modelo más adecuado es el propuesto por los autores Aras & Büyüközkan, destacando su alineación con los requerimientos específicos de las Pymes y de la investigación propuesta.

1. Introduction

In the contemporary era, the dynamics of Industry 4.0 and digital transformation represent disruptive forces in business operations for organizations. In the research [2], the need for companies to develop advanced planning and management capabilities to adapt to the realities of the competitive market is emphasized. In this context of adaptability, authors such as [8] refer to the term "Industry 4.0" to describe the integration of digital technologies in industry, highlighting the primary objective of generating knowledge from data and transforming companies into agile organizations capable of continuously adapting to market dynamics.

In this regard, valuing the relevance and importance of small and medium-sized enterprises (SMEs) in relation to the significant challenges they face in integrating digital technologies without a maturity model (MM) that responds to their distinctive characteristics, there arises a need to investigate and address the existence of various proposals in the scientific literature that allow for the evaluation of digital technology usage in these types of organizations, understood as business engines in many economies around the world.

Now, the existing literature offers a broad overview of digital transformation, exposing theoretical models of digital maturity. Thus, [3] cite Mettler and Rohner (2009), who propose evaluative frameworks for technological adoption, and Lahrmann & Marx (2010), who emphasize the importance of organizational diagnosis in digitalization. Based on these authors, the concern arises regarding the applicability of such models in SMEs.

According to the above, the objective of this research is to identify and evaluate existing maturity models that align with the specific needs and capabilities of SMEs. Therefore, the importance of this study lies in its theoretical contribution to expanding knowledge about models that address the practical need to provide SMEs with an effective tool to assess and manage their digital transformation process, as a relevant issue for their survival and success in a globalized and digital economy.

2. Methodology

For this research, a qualitative exploratory methodology is proposed to address and deeply understand the multiple challenges faced by the business sector in the digital transformation process, specifically in the case of SMEs.

2.1. Stage One: Narrative Literature Review

A narrative literature review is conducted with the aim of identifying, analyzing, and interpreting the body of knowledge on the concepts of digital technology, digital transformation, and digital maturity. The objective is to consolidate a clear understanding of the essential definitions and the effects of these technologies in various contexts.

2.2. Stage Two: Systematic Literature Review

Existing Digital Maturity Models (DMMs) are identified through a systematic literature review. To achieve this, a rigorous and structured search protocol is implemented, defining inclusion and exclusion criteria to identify relevant articles for the research.

2.3. Stage Three: Synthesizing the Results of the Systematic Review

The findings from the systematic literature review on DMMs are consolidated and synthesized. This process involves compiling and classifying key information from the selected studies, including authors, dimensions, levels, objectives, needs, size, and type of study for each DMM found in the various scientific documents.

2.4. Stage Four: Analyzing the Results of the Digital Maturity Models Found in the Literature

An in-depth analysis is conducted on the results obtained from the DMMs identified in the literature review. This study focuses on evaluating the main characteristics of each model, identifying both strengths and weaknesses. Additionally, the relevance and applicability of these models in various business contexts are assessed.

2.5. Stage Five: Characterizing SMEs

The research team conducts a study using secondary sources to characterize small and medium-sized enterprises (SMEs) based on information published by Colombian entities. This activity includes collecting data about the characteristics, needs, and opportunities of SMEs in the context of digital transformation.

2.6. Stage Six: Cross-referencing Information in Digital Maturity Models and Characteristics Found in SMEs

The sixth stage involves the research team cross-referencing the information obtained on DMMs with the characterization of SMEs. The objective is to evaluate how these models adapt to the specific needs of SMEs. This cross-referencing allows for identifying and presenting the most suitable and relevant models for this type of company.

2.7. Stage Seven: Defining the Models that Fit the Research for Selection and Prioritization

In the seventh stage, the research team defines and selects from the identified DMMs the one that best fits the specific needs of Colombian SMEs and the research objectives. The process includes a detailed evaluation of each model based on its capacity and contribution to the digital transformation process of small and medium-sized enterprises.

3. Narrative literature review

The research team selected the Web of Science database as the main source, from which a search equation related to the study topic was formulated. This query presented below, establishes the key parameters for selecting the articles to be analyzed:

Search query:

"Digital Technology" (Topic) AND "Digital Transformation" (Topic) AND "Digital Maturity" (Topic)

The following is a summary of three fundamental concepts for the study:

- **Digital Technologies:** This refers to all electronic tools, automated systems, devices, and technological resources that generate, process, or store information [4]. This term is broad and includes both IT and ICT, encompassing any technology that works with digital data and is used in various contexts, from computing and telecommunications to multimedia and industrial automation.
- **Digital Transformation:** According to Westerman (2014), as cited in Karekla et al. (2021), digital transformation is the use of technology to radically improve the performance or reach of organizations [6]. Additionally, it is an essential initiative for companies to adopt new digital technologies to optimize business processes, create new business models, rethink investment measurements, and thus bring about changes in the broader business ecosystem (Ge et al., 2017, as cited in Karekla et al., 2021). [6].
- **Digital Maturity:** This refers to the state of an organization's digital transformation and what the company has achieved so far regarding its transformation efforts [5].

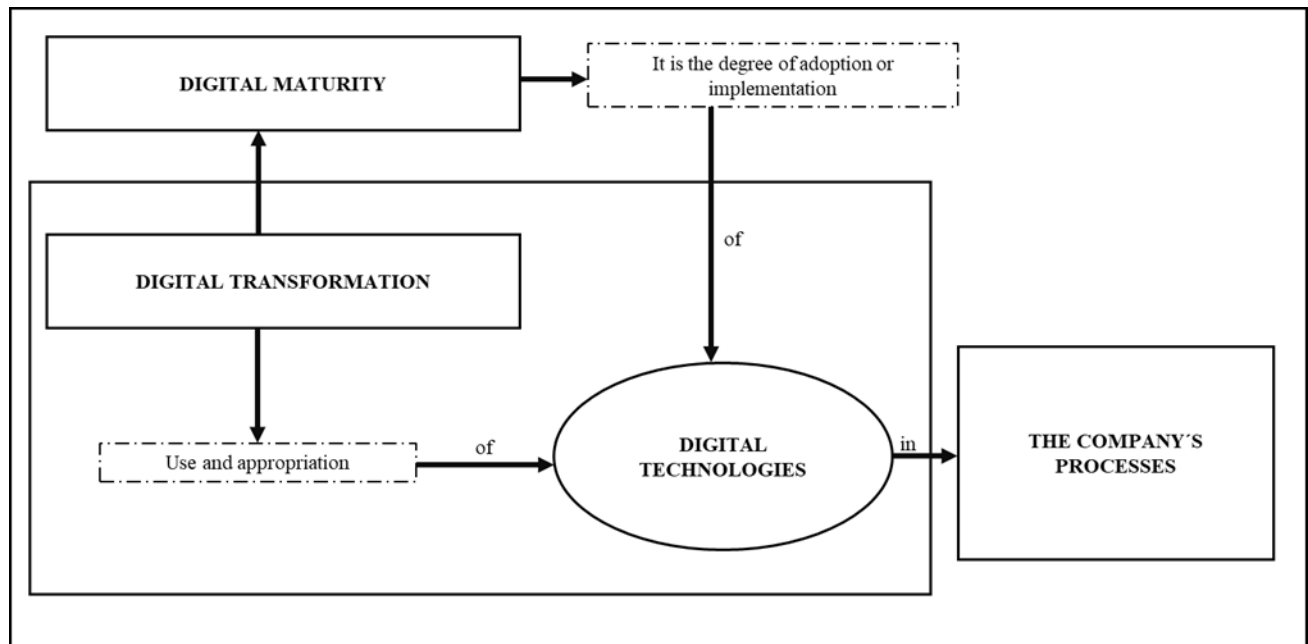


Figure 1. Relationship between the three study terms.

Finally, based on the preliminary analysis of the literature, it can be concluded that the terms digital technologies, digital transformation, and digital maturity integrate complementarily within the technological evolution process of organizations. Digital technologies serve as the technical foundation and necessary resources that enable organizations to initiate and maintain digital transformation.

This transformation involves a deep and strategic shift in processes, business models, and organizational structures, aimed at maximizing the potential of digital technologies. As organizations progress in their digital transformation, they reach different levels of digital maturity, reflecting their ability to adapt, innovate, and remain competitive in a constantly changing digital environment.

Digital maturity, therefore, is the indicator of success and the ultimate goal of effectively integrating digital technologies into digital transformation, demonstrating the organization's preparedness and adaptability to current technological challenges. The integration of these terms, as highlighted in the

review, not only aims to improve organizational performance but also to enhance their competitiveness in the market.

4. Systematic literature review

A search protocol is established in the Web of Science database to build a knowledge base on digital maturity models (DMM). Additionally, the bibliometric software VOSviewer is used to analyze the metadata of the articles found, with special attention to the review of keywords through a co-occurrence map. The analysis reveals a strong relationship between the terms "maturity model," "digital transformation," and "SMEs".

Search query:

(TS=("Digital Maturity Model" or "Maturity Model")) AND TS=("Digital Transformation" OR "SMEs")

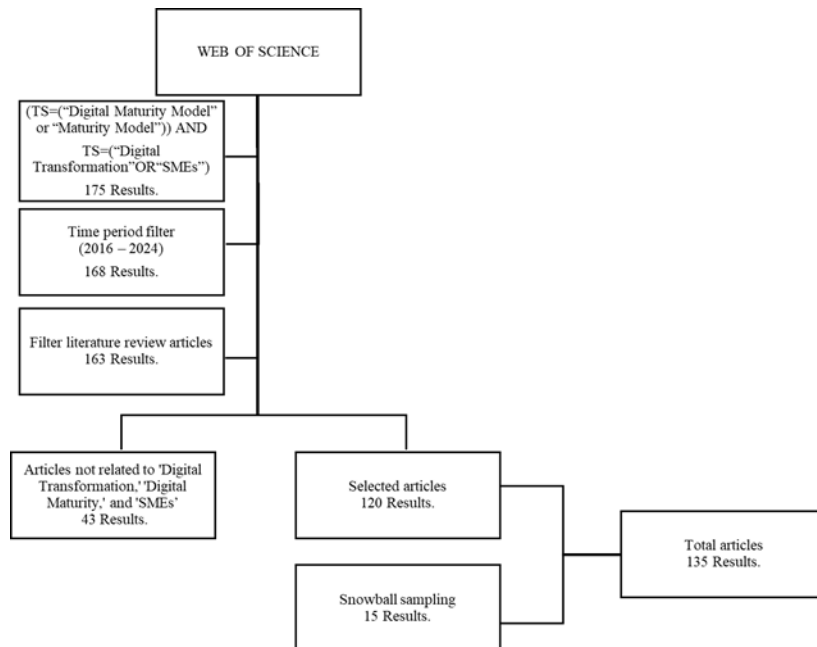


Figure 2. *Prisma flow diagram*

Based on the previously defined search equation, a total of 175 articles are identified. Subsequently, a detailed analysis of the titles, abstracts, and conclusions of these documents is carried out to select the most relevant ones for the research. This process ensures the exclusion of studies that did not provide significant value to the field of study in question.

4.1. Analysis of digital maturity model (DMM)

After establishing a clear understanding of what digital maturity entails, it is essential to analyze the Digital Maturity Models (DMMs) developed to evaluate and guide organizations through their digital transformation process. In the context of this research, DMMs are understood as recognized tools that facilitate the assessment of an organization's current state and provide a framework to identify the necessary activities to reach a more advanced level of organizational development [3]. According to [7], DMMs have three different purposes: descriptive, which allows for diagnosing the current capabilities of the company; prescriptive, which proposes concrete measures to improve maturity; and comparative, which facilitates both internal and external evaluations of the company. Moreover, these models are

effective in identifying strengths and weaknesses across various domains within an organization, offering a clear perspective on critical areas for improvement [3].

4.2. Digital maturity models found in the literature

In the systematic literature review, a total of twenty-one (21) models are identified and analyzed, categorized according to the parameters defined in the methodology, including authors, dimensions, levels, objectives, needs, size, and type of study (see Appendix A). The objective is to gather the necessary information to define the models that best fit the characteristics present in SMEs.

4.3. Synthesis of the digital maturity models found in the literature

In the first phase of the research, an exhaustive reading of each article was carried out to gain a broad understanding of its content. This allowed for an initial filtering process, eliminating those articles that did not contribute significantly, primarily based on their focus. Studies that were centered solely on specific areas were discarded, as their particular characteristics did not provide general information useful for a broad organizational analysis. As a result of the analysis, the phase concluded with a total of thirteen (13) MMDs.

Models	Characteristics									Key dimensions																																			
	Holistic approach	Systematic approach	Multidisciplinary approach	Global approach	Applicability	Flexibility	Descriptive model	Prescriptive model	Comparative model	Strategy	Digital value	Service	Communications	Quality	Operations	Processes	Digital technology and data	Technology	Digital work	Governance	Customers	Product	Employees	Innovation	Tools	Organizational culture	Organizational management	Supply chain	Legal considerations	Business model	Big Data	Change	Information technology	Environment	Transparency	Scalability	Knowledge base	Reusability	Standardization	Cybersecurity	Integrated business	Digital capabilities			
Model "Aras & Büyükoğkan"																																													
Model "Merdin et al."																																													
Model "Sándor & Gubán"																																													
Model ""Senna et al.""																																													
Model "Gökalp & Martínez"																																													
Model "Amaral & Peças"																																													
Model "Depaoli et al."																																													
Model "Ehrensperger et al."																																													
Model "Tortora et al."																																													
Model "Ka et al."																																													
Model "Ávila & Gil"																																													
Model "Macêdo & Dantas"																																													
Model "Bitzer et al."																																													

Figure 3. List of the 13 identified DMMs

Strengths					Weaknesses					Relevance					Contribution	Implementation Phases					Results Interpretation					Results Interpretation		Data Collection Method		
Comprehensive framework																Literature Review					Level 0					Level 1		Qualitative Method		
Catalyst for transformation																Definition of dimensions					Level 1					Level 2		Quantitative Method		
Transparency																MMD Creation					Level 2					Level 3		Mixed Method		
Reliability																Initial Assessment					Level 3					Level 4		Not applicable		
Personalized approach																Roadmap Development					Level 4					Level 5		Level 1		
Lack of prior models																Pilot Test					Level 5					Level 6		Level 2		
Dependence on implementation																Validation					Not applicable					Level 1		Level 3		
Obsolescence																Implementation					Level 0					Level 2		Level 4		
Sector limitations																Monitoring and Adjustment					Level 1					Level 3		Level 5		
Current context																Level 0					Level 1					Level 4		Qualitative Method		
Operational visibility																Level 1					Level 2					Level 5		Quantitative Method		
Strategic alignment																Level 2					Level 3					Level 6		Mixed Method		
Competitiveness																Level 3					Level 4					Level 0		Not applicable		
New dimensions																Level 4					Level 5					Level 1				
Customer service																Level 5					Level 0					Level 2				
Planning guide																Level 0					Level 1					Level 3				
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In the second phase, the key components of the evaluation were defined, which included: focus, characteristics, strengths, weaknesses, relevance, and implementation phases. Once these components were established, a matrix was created in an Excel document. In the columns of the matrix, the information on these components was placed, while in the rows, the 13 identified models were listed, organized by the authors' names.

[illegible]

Once a matrix with comparable information was available, the analysis of the selected models began. For each model, all relevant information found in the articles was recorded, evaluating whether or not it applied in relation to the established components. A value of 1 was marked when the model met a component, and the box was left blank if it did not. This allowed the results to be summed up at the end, providing a clear view of which models best met the established criteria.

Models	Characteristics									Key dimensions						Strengths							
	Holistic approach	Systematic approach	Multidisciplinary approach	Global approach	Applicability	Flexibility	Descriptive model	Prescriptive model	Comparative model	Strategy and governance	Technology and digital processes	Value and business model	People and organizational culture	Cybersecurity and risks	Supply chain and operations	Scalability and reusability	Transparency	Standardization	Comprehensive framework	Catalyst for transformation	Transparency	Reliability	Personalized approach
Model "Aras & Büyüközkan"	1				1		1	1		1	1	1	1	1					1	1			
Model "Merdin et al."					1	1	1															1	
Model "Sándor & Gubán"	1					1	1	1															1
Model ""Senna et al.""					1			1			1	1								1			1
Model "Gökalp & Martinez"	1				1	1	1	1	1	1	1	1	1							1			
Model "Amaral & Peças"	1						1			1	1	1	1		1				1				
Model "Depaoli et al."	1				1	1	1																1
Model "Ehrensperger et al."							1		1	1				1		1	1	1			1		
Model "Tortora et al."		1					1	1											1				
Model "Ka et al."								1		1	1	1	1										1
Model "Ávila & Gil"				1	1		1		1	1	1	1	1	1									1
Model "Macêdo & Dantas"							1			1	1	1			1					1			
Model "Bitzer et al."			1		1		1	1											1				

Figure 5. Assessment by components of the DMMs

Weaknesses		Relevance		Contribution	Implementation Phases					Results interpretation					Data Collection Method				Scope of model evaluation in the article			
Lack of prior models					Literature Review	Identification of appropriate MMD	Definition of dimensions	MMD Creation	Initial Assessment	Roadmap Development	Pilot Test	Validation	Implementation	Monitoring and Adjustment	Qualitative Method	Quantitative Method	Mixed Method	Not applicable	Model	Model and implementation	Model, implementation, and testing (factor weighting)	Model, implementation, testing, and evaluation
Dependence on implementation	1																					
Obsolescence			1														1					1
Sector limitations																		1				
Current context		1																				
Operational visibility																						
Strategic alignment																						
Competitiveness			1																			
New dimensions																						
Customer service																						
Planning guide																						
Literature Review																						
Identification of appropriate MMD																						
Definition of dimensions																						
MMD Creation																						
Initial Assessment																						
Roadmap Development																						
Pilot Test																						
Validation																						
Implementation																						
Monitoring and Adjustment																						
Level 1																						
Level 2																						
Level 3																						
Level 4																						
Level 5																						
Qualitative Method																						
Quantitative Method																						
Mixed Method																						
Not applicable																						
Model																						
Model and implementation																						
Model, implementation, and testing (factor weighting)																						
Model, implementation, testing, and evaluation																						

Cotinuation figure 5. Assessment by components of the DMMs

Finally, in the fourth phase, those models that did not meet the criteria or did not provide sufficient information on the selected components were eliminated. As a result, seven (7) MMDs were chosen as the most appropriate to advance to the next phases of the research.

Table 1.*The final result of the most suitable DMMs*

MODEL	AUTHOR (S)	YEAR
1	Aras & Büyüközkan	2023
2	Senna et al.	2023
3	Gökalp & Martínez	2021
4	Amaral & Peças	2021
5	Ehrensperger et al.	2023
6	Ávila & Gil	2022
7	Macêdo & Dantas	2021

5. Characterizing SMEs

To understand the current context of small and medium-sized enterprises (SMEs) in Colombia, it is essential to analyze their key characteristics, particularly concerning the use of digital technologies. This analysis allows for the identification of the needs and opportunities that SMEs face in their digital transformation process.

The study of SMEs in Colombia reveals several important characteristics related to their adoption of digital technologies. Firstly, there is a limited adoption of digital technologies, as only a small percentage utilize digital tools, which restricts their ability to optimize processes and compete in digital markets. Additionally, many SMEs lack the necessary infrastructure to carry out digital transformation, placing them in the early stages of adoption.

The lack of technological skills and trained personnel also poses a significant obstacle, hindering the effective implementation of digital solutions. This results in low levels of operational efficiency, as the limited adoption of digital tools stifles organizational optimization. Furthermore, weaknesses in internal processes are identified due to a lack of training and modernization, which impacts their competitiveness. Another relevant aspect is the lack of standardization of processes, as few SMEs have documented and standardized procedures, negatively affecting operational efficiency and quality. There is also low transparency in operations, although some SMEs have begun adopting digital technologies to improve this aspect.

Regarding cybersecurity risk management, a percentage of SMEs have started implementing cybersecurity software or systems, highlighting the importance of evaluating maturity in this area. However, many SMEs face low levels of competitiveness and market positioning, putting them at risk of being displaced by larger companies.

The lack of adaptability and innovation is another limitation, as SMEs must quickly adapt to environmental changes and seize opportunities in emerging markets. Additionally, the high sectoral diversity in which SMEs operate, such as manufacturing, commerce, and services, requires maturity models that can adjust to these particularities.

Moreover, financial constraints and limitations are significant, as many SMEs lack the necessary resources to invest in competitiveness improvements. Lastly, poor strategic management affects their ability to plan and execute effective strategies, limiting their growth and adaptability in a changing environment.

6. Selection and prioritization of models that fit the research

6.1. Definition of evaluation criteria for the DMM

To carry out an effective evaluation of the digital maturity models (DMM) applicable to SMEs, fifteen specific criteria have been defined. These criteria aim to analyze the particular characteristics of SMEs in the context of the DMM and determine which of these models best meets their needs.

The key criteria include:

- **Technology and Organizational Culture:** (1) Evaluates the adoption of digital tools, (2) technological infrastructure, and (3) the training of staff in digital competencies.
- **Productivity and Operational Efficiency:** (4) Considers the impact of digitalization on productivity, (5) efficiency in operational management, and (6) the standardization of processes.
- **Flexibility and Adaptability:** (7) Analyzes the model's capacity to adapt to different levels of digital maturity and (8) manage cybersecurity risks.
- **Competitiveness and Markets:** (9) Examines the positioning of SMEs in the market, (10) their ability to identify opportunities and innovations and (11) their sectoral focus.
- **Structure and Planning:** (12) Addresses structural, operational, and financial weaknesses, as (13) well as long-term planning.
- **Transparency and Support:** (14) Evaluates the promotion of transparency in operations and (15) the availability of guides and support tools.

With these criteria, each of the seven DMMs is evaluated by cross-referencing information to identify which model meets the most criteria and is most suitable for SMEs. The evaluation is conducted by assigning a value of "1" to the models that meet each criterion, and a color-coding system is used to facilitate the identification of the evaluated components (see Appendix B).

Models	Approach		Characteristics		Key dimensions								
	Holistic approach	Global approach	Applicability	Flexibility	Strategy and governance	Technology and digital processes	Value and business model	People and organizational culture	Cybersecurity and risks	Supply chain and operations	Scalability and reusability	Transparency	Standardization
Model "Aras & Büyüközkan"	1		1		1	1	1	1	1				
Model "Senna et al."			1			1		1					
Model "Gökalp & Martínez"	1		1	1	1	1	1	1					
Model "Amaral & Peças"	1				1	1	1	1		1			
Model "Ehrensperger et al."					1				1		1	1	1
Model "Ávila & Gil"		1	1		1	1	1	1	1				
Model "Macêdo & Dantas"					1	1	1			1			

Figure 6. Evaluation matrix of the final DMMs

Relevance				Contribution		Interpretation of results				
Current context	Operational visibility	Strategic alignment	Competitiveness	New dimensions	Planning guide	Level 1	Level 2	Level 3	Level 4	Level 5
1		1		1	1	1	1	1	1	1
1						1	1	1	1	1
	1	1			1	1	1	1	1	1
		1			1	1	1	1	1	1
		1	1		1	1	1	1	1	1
1			1		1	1	1	1	1	1
1		1			1	1	1	1	1	1

Continuation Figure 6. *Evaluation matrix of the final DMMs*

6.2. Final evaluation and selection of the definitive model

In the final stage of the research, a horizontal sum is made of the criteria met by each model. Based on these totals, it is determined that the model by Aras & Büyüközkan [1] is the most suitable for SMEs, as it received a high score in the matrix, meeting the largest number of defined criteria, thus proving to be the most appropriate for the needs identified for Colombian SMEs.

Models	Approach		Characteristics		Key dimensions								
	Holistic approach	Global approach	Applicability	Flexibility	Strategy and governance	Technology and digital processes	Value and business model	People and organizational culture	Cybersecurity and risks	Supply chain and operations	Scalability and reusability	Transparency	Standardization
Model "Aras & Büyüközkan"	1		1		1	1	1	1	1				
Model "Senna et al."			1			1		1					
Model "Gökalp & Martínez"	1		1	1	1	1	1	1					
Model "Amaral & Peças"	1				1	1	1	1		1			
Model "Ehrensperger et al."					1				1		1	1	1
Model "Ávila & Gil"		1	1		1	1	1	1	1				
Model "Macêdo & Dantas"					1	1	1			1			

Figure 7. *Evaluation and selection of the DMM*

Relevance				Contribution		Interpretation of results					Best model
Current context	Operational visibility	Strategic alignment	Competitiveness	New dimensions	Planning guide	Level 1	Level 2	Level 3	Level 4	Level 5	
1		1		1	1	1	1	1	1	1	11
1						1	1	1	1	1	5
	1	1			1	1	1	1	1	1	10
		1			1	1	1	1	1	1	8
		1	1		1	1	1	1	1	1	8
1			1		1	1	1	1	1	1	10
1		1			1	1	1	1	1	1	7

Continuation Figure 7. *Evaluation and selection of the DMM*

6.3. Description of the definitive model

The Digital Maturity Model (DMM) by Aras & Büyüközkan is a comprehensive tool designed to evaluate and optimize digital transformation in organizations across various sectors. It is based on six key dimensions:

- I. **Digital Strategy:** The ability to create value through strategic objectives.
- II. **Digital Value:** The impact of digitalization on products and value processes.
- III. **Digital Processes:** The degree of implementation of transformation in business processes.
- IV. **Digital Technology and Data:** The sustainability of technological solutions.
- V. **Digital Work:** Changes in work patterns and required skills.
- VI. **Digital Governance:** Effective management of digital transformation.

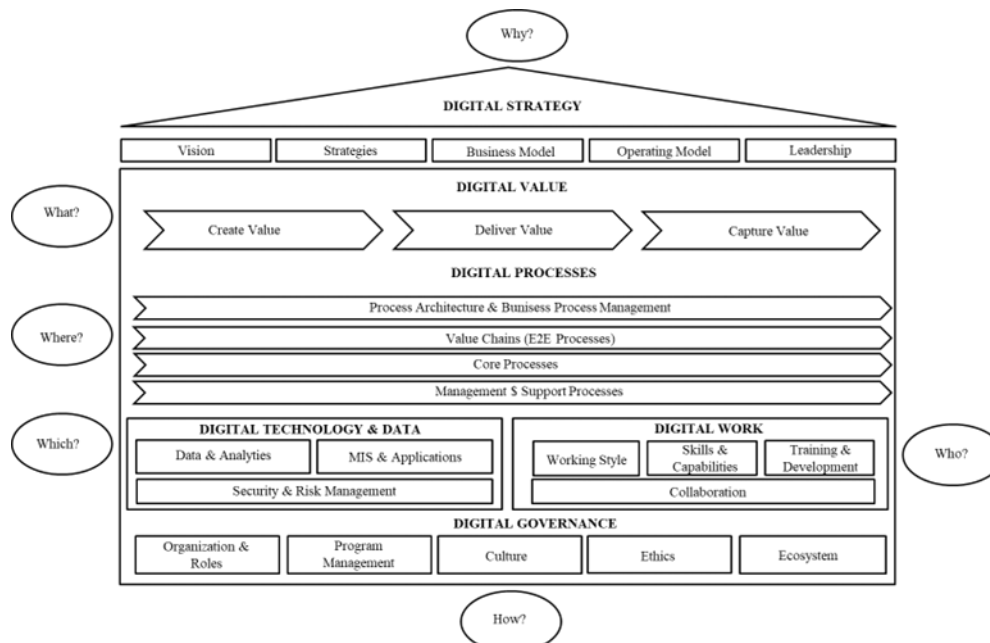


Figure 8. *DMM proposed by Aras & Büyüközkan*

The model is based on six questions that guide the evaluation of digital maturity and organizational transformation:

- Where is digital transformation headed?
- What value does it bring?
- In which processes should it be applied to?
- What technology supports it?
- Who implements digital transformation?

How is it sustained in the long term? Implementation begins with an assessment of the organization's current state, followed by the development of roadmaps aligned with digital objectives. It also categorizes maturity into five levels: intention, beginner, adaptation, executing, and transforming. In summary, the DMM helps maximize the value of technological investments and aligns digital transformation with organizational strategies.

7. Conclusions

The analysis highlights the importance of digital maturity models (DMM) as essential tools to guide the digital transformation process in SMEs. These models allow the assessment of the current state of digitalization, identification of gaps, and definition of concrete actions to advance digital maturity. However, Colombian SMEs face significant challenges, such as inadequate technological infrastructure, a shortage of skilled personnel, and financial constraints, which limit their adoption of digital technologies and competitiveness in global markets.

Among the models analyzed, the one by Aras & Büyüközkan stands out for its alignment with the specific needs and capacities of Colombian SMEs. This model offers a comprehensive approach that encompasses both strategy and operations, facilitating the creation of roadmaps for progressive digitalization. Its implementation will not only enhance operational efficiency and risk management but also strengthen organizational culture and improve adaptability to an ever-changing environment.

For future research, it is expected that this model will be implemented and evaluated across different economic sectors to test its effectiveness and adaptability, as well as to explore ways to mitigate the challenges faced by SMEs in the Colombian context.

8. Declaration of competing interest

(X) We declare that we have no significant competing interests including financial or non-financial, professional, or personal interests interfering with the full and objective presentation of the work described in this manuscript.

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11. Author contributions

The authors contributed equally to this work, with G. A. and J. R. jointly responsible for collecting data, conducting the analysis, and writing the paper.

12. Data availability statement

The data associated with this article are available at the following link: [Appendix](#)

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