Journal of Innovation & Knowledge 10 (2025) 100644

Contents lists available at ScienceDirect

Journal of Innovation & Knowledge

journal homepage: www.elsevier.com/locate/jik

A new proposed model to assess the digital organizational readiness to maximize the results of the digital transformation in SMEs

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ARTICLE INFO

JEL classification codes:
O39
M10
M15
M21

Keywords:
Digital transformation
Assessment model
Readiness
Success factors
SMEs

ABSTRACT

Scientific research in digital transformation is expanding in scope, quantity, and relevance, bringing forth diverse perspectives on which factors and specific dimensions—such as organizational structure, culture, and technological readiness—affect the success of digital transformation initiatives. Numerous studies have proposed mechanisms to assess an organization's maturity through digital transformation across various models. Some of these models focus on external influences, others on internal factors, or both. Although these assessments provide valuable insights into a company's transformation state, they often lack consistency, and recent research highlights key gaps. Specifically, many models primarily reflect the views of senior management on the general progress of digital transformation rather than on measurable outcomes. Moreover, these models tend to target large enterprises, overlooking small and medium enterprises (SMEs), which are crucial to economic growth yet face unique challenges, such as limited resources and expertise.

Our study addresses these gaps by concentrating on SMEs and introducing a novel approach to assessing digital transformation readiness—a metric that reflects how prepared an organization is to optimize transformation outcomes. Following design science research methodology, we develop a model that centers on the perspectives of general employees, offering companies an in-depth view of their readiness across 20 dimensions. Each dimension is evaluated through behaviors indicative of the highest level of digital transformation readiness, helping companies identify areas to maximize potential benefits. Our model focuses not on technological quality but on the degree to which behaviors essential for leveraging technology and innovative business models are integrated within the organization.

Introduction

These days, the discussion of the economic development of any industry is linked to the enormous possibilities that technology can contribute or unlock. The role that technology is playing is not only enabling organizations to continuously develop their structures and models but also creating high levels of disruption in existing business models, putting some of the least prepared companies at significant risk (Quinn, Dibb, Simkin, Canhoto, & Analogbei, 2016; Müller, Buliga, & Voigt, 2018; Santoro, Vrontis, Thrassou, & Dezi, 2018). Digital transformation (DT), a phenomenon that has been widely researched over the past decade, is pushing companies beyond their boundaries and stretching the possibilities of their reach, providing them with the ability to develop new business models and new ways to interact with customers. Above all, it is reshaping their overall way of thinking and operating within their domain (Loebbecke & Picot, 2015; Lemon & Verhoef, 2016). This process of continuously seeking improvements and disruption while embracing the endless possibilities of technology and digital models significantly contributes to greater opportunities for companies, especially in supporting faster growth and international reach (Hair, Wetsch, Hull, & Perotti, 2012). Adopting technology is no longer an optional step for organizations. Rather, it represents a fundamental decision, focused on effectively managing and maximizing its potential benefits (Newman, 2017; Ross, 2019).

When we discuss organizations, economic growth, and technology, it is essential to consider the role of small and medium enterprises (SMEs) and their impact on the global economy. SMEs significantly contribute to the gross domestic product (GDP) of various national economies and

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https://doi.org/10.1016/j.jik.2024.100644
Received 12 December 2023; Accepted 9 December 2024
Available online 24 December 2024

have an enormous impact in job creation, accounting for more than 50% of employment in most countries (Muller et al., 2017). Still, even though SMEs have a widely acknowledged impact, they have not been the top priority of the research community over the past decade, particularly in the context of digital transformation. This issue is exacerbated by the continuous struggles these organizations face in adopting newer technologies or models supported by those newer technologies (North & Varvakis, 2016; Giotopoulos, Kontolaimou, Korra, & Tsakanikas, 2017; Andriyanto & Doss, 2020). These struggles are highly driven by the limitations these organizations have in resources and knowledge (Ross, 2019; Machado et al., 2021; Zhu, Ge, & Wang, 2021), putting these companies at significant risk of disruption or general failure (Markides, 2006; Maicher, Radic., Dijik & Große, 2016). In an economy where SMEs account for more than 90% of the companies and employ over 50% of the workforce, it is fundamental that those companies seek newer levels of competitiveness by leveraging what technology has to offer and thus maintain or increase their level of relevance to customers (Nerima & Ralyté, 2021).

Given the significant role of SMEs and the widely confirmed benefits of DT in increasing competitiveness levels, we must find strategies that provide some foundational support for these companies. This support is essential to help them fight back against their limitations, mainly because not everything is a problem. SMEs are widely characterized by their flexibility and agility—two factors that play a critical role when there is a need to change or transform (Williams, Gruber, Sutcliffe, Shepherd, & Zhao, 2017; Barann, Hermann, Cordes, Chasin, & Becker, 2019). Additionally, their leaner and flatter organizational structures can facilitate a faster adoption of new technologies and streamline communication, which may significantly contribute to a positive outcome of DT initiatives (Williams et al., 2017; Barann et al., 2019; Prause, 2019). According to the World Economic Forum (2018), over 80% of chief executive officers (CEOs) indicated that a DT program must be implemented. At the same time, by 2030, more than 70% of economic value creation is expected to be based on digital platforms. However, previous research presents a high rate of more than 70% of DT initiatives that fail to reach the expected value, leading to significant financial losses and, more importantly, negatively impacting companies (Tabrizi, Lam, Gerard, & Irvin, 2019). Therefore, one of the critical aspects of DT is a company's ability to change and transform its processes and overall organization (Legner et al., 2017; Parviainen, Tihinen, Kaariainen, & Teppola, 2017). The reasons organizations fail to achieve the expected DT results vary, with a lack of understanding of new competencies and business models playing an important role (Libert, Beck, & Wind, 2016).

SMEs become even more complex as DT introduces a series of risks, some of which lead to significant failures. As noted by Libert et al. (2016), many organizations fail to deliver on their expected outcomes, contributing to financial loss in transformational projects (Libert et al., 2016; Tabrizi et al., 2019). Much of the research in this area has focused on the development of maturity models. These models are designed to evaluate a company's state in terms of implementation, but they vary greatly depending on the factors or dimensions considered by different authors. One of the limitations of these models is the overfocus on the implementation status rather than on what is preventing companies from maximizing the results of the implementation itself. In response to this limitation, recent research (Kane, Palmer, Phillips, Kiron, & Buckley, 2018; Lokuge, Sedera, Grover, & Dongming, 2019) has highlighted the growing importance of assessing a different dimension of DT: readiness. Readiness is not focused on the actual implementation status but rather on a company's preparedness to take advantage of the implementation (Kane et al., 2018; Lokuge et al., 2019; Gfrerer, Hutter, Füller, & Ströhle, 2021). By assessing it, we take a deeper look at how well a company is prepared to achieve the expected results from its DT. Research on readiness may be a step to identifying solutions that address the challenges arising from three main factors: (1) the combination of SMEs lacking capabilities, (2) the need for SMEs to invest in newer technologies and models deriving from those technologies; and (3) the significant percentage of companies that fail to obtain the expected results. The challenge is that there is currently a substantial gap in models that assess readiness and an even larger gap in models specifically tailored to determine readiness in SMEs (Silva, Mamede, & Santos, 2024). Our research aims to significantly contribute to the scientific community by addressing this challenge.

The research carried out by Silva et al. (2024) provides an extensive literature review of 24 existing models related to maturity and readiness. In this study, the authors conduct a thorough analysis of existing models and, through different methods, identify a significant gap in the overall assessment of SMEs. A key issue in determining the perspective to adopt when conducting these assessments is the predominant focus on management perspectives rather than on the perspective of employees. The selected models need more transparency regarding what is required to maximize the results of a transformation. Instead, they focus on assessing how far along the transformation process is, based on the management perspective or external auditing. This review highlights the importance of considering a different perspective, particularly the need to separate the actual maturity of an implementation from the factors and behaviors that may potentially influence its results. This perspective is especially crucial for SMEs which face known limitations and must prioritize maximizing the return on their investments rather than merely assessing them.

Our research is solely focused on SMEs and aims to identify ways to provide a stronger foundation for these organizations to define a plan and take advantage of their DT. We hypothesize that a readiness assessment, especially one that is firmly focused on the employee's perspective, is a pivotal approach to understanding the factors that may prevent an organization's preparedness for adopting necessary changes, thereby maximizing the value obtained. Our research looks at the readiness approach as a more focused concept that concentrates on behaviors that prevent maximum outcomes when not implemented. This study is guided by the following research questions:

RQ1) How can an assessment model be designed to assess the readiness levels of SMEs for DT?
   a. Can the practical case provide enough valuable insights to help SMEs plan their future with technology?
   b. How can this research help SMEs understand what north star they should pursue to increase their level of readiness?

RQ2) Are there any similar patterns across different SMEs that can be used for further research?

RQ3) How do SME leaders and industry experts evaluate and validate the proposed model?

By answering these research questions, we believe our work will not only clarify the distinction between maturity and readiness but also provide an artifact that could introduce important tools for SMEs. This artifact will offer them a level of insight that existing models have not captured, enabling SMEs to be more strategic and precise in the actions needed to drive their DT. Although companies will be better positioned to compete, they will also have more limitations in their capabilities (resources and competencies) when considering a more strategic and focused approach. Through our work, we:

- Propose a more formal definition of readiness as a concept focused on behaviors that ultimately impact the outcomes of a DT. This definition is especially relevant because it addresses the need for standardization across the most appropriate existing models, as identified by Silva et al. (2024). Their analysis of key maturity and readiness models revealed that these concepts are often used interchangeably, leading to a need for a more unified view.
- Propose a set of target readiness behaviors that define an advanced state of readiness to maximize the results of a DT.
- Propose a model called the digital organizational readiness assessment model (DORAM), specifically designed for SMEs, which is

entirely focused on the readiness dimension to maximize the results of DT assessments.
- Validate our model through an evaluation carried out by a targeted group.

What differentiates our model from previous work is its focus on the type of company that involves a dimension that has not yet been deeply explored: readiness as a set of behaviors. Our model, which is entirely focused on SMEs, assesses readiness by considering the employee's perspective and comparing it to the senior management's perspective, providing a more comprehensive understanding. By combining an innovative approach that considers the perceptions of general employees and senior management regarding a set of target behaviors, our model assesses the company across a wide range of categories and subcategories. This innovative approach equips SMEs with an incomparable toolkit to define their future transformation and, equally important, to maximize the results of their digital journey.

This article presents the major outcomes of our work, being structured into seven main chapters:

- Chapter 2 describes the approach undertaken in our work to define the concept of readiness as a set of behaviors that enhance a state of preparedness.
- Chapter 3 outlines the methodology used to deliver the proposed DORAM.
- Chapter 4 describes the proposed model, including its key assumptions and attributes.
- Chapter 5 details the demonstration phase, showing how the model was applied to gain insights across different companies.
- Chapter 6 covers the validation and evaluation process of the proposed model, including the actual results obtained.
- Chapter 7 summarizes the main conclusions and contributions of our work.

Readiness as a set of behaviors

In our research, as presented in Silva et al. (2024), we conducted a detailed analysis of state-of-the-art assessment models in the context of a DT. Our work reviewed 24 models, most of which focused heavily on the maturity aspect of assessments. However, the concepts of maturity and readiness have often been used interchangeably, leading to confusion. These terms have distinct definitions: readiness stands for the state of being ready, as defended by Kane et al. (2018) and Lokuge et al. (2019), whereas maturity is much more focused on the state of implementation, as argued by Leino, Kuusisto, and Paasi (2017). Our analysis of the models reviewed by Silva et al. (2024) revealed that many models combine "state of implementation" and "state of readiness," which supports our view that there is no clearly defined distinction between maturity and readiness in existing approaches.

The concept of readiness is not specific to DT but is often discussed in organizational contexts. Existing research explores various aspects related to or influenced by readiness, such as trust and commitment (Mangundjaya, Bhayangkara, Raya, & Hutapea, 2023), how adaptability affects readiness (Adam, Hanafi, & Yuliani, 2022), and the impact of leadership in the process of organizational commitment (Runa, 2023). Additionally, studies examine the impact of psychological safety on organizational change and its effect on employees' readiness for change (Naumtseva & Stroh, 2021), as well as how some organizational strategies such as strategic workshops can play an essential role in enhancing organizational readiness (Roos & Nilsson, 2020). Finally, Weiner (2009) offered a significant contribution to what can be understood as organizational readiness, defining it "as a shared team property, that is, a shared psychological state in which organizational members feel committed to implementing an organizational change and confident in their collective abilities to do so."

Drawing from the different perspectives on readiness and Weiner's work (Weiner, 2009), which provides a substantial foundation, we can conclude that readiness is more closely related to behaviors than to systems. When we address readiness in DT, we may look at the behavioral dimension that impacts the outcomes. This perspective is a significant contribution to distinguish between the concepts of maturity and readiness.

While reviewing other models, we encountered attempts to address the concept of readiness, such as those by de Carolis, Macchi, Negri, and Terzi (2017) and Machado et al. (2021). However, these models often blur the distinction between readiness and maturity, lacking a clear separation criterion between both concepts. In addition, those cases focus heavily on the readiness level to deploy technology in manufacturing, which ultimately limits their applicability across other industries.

Existing literature often links readiness to behaviors rather than deployment, especially in the context of organizational readiness (Roos & Nilsson, 2020; Naumtseva & Stroh, 2021; Runa, 2023). This work proposes a formal distinction between the traditionally discussed concepts of maturity and readiness. Specifically, readiness is defined as a set of behaviors, which serves as the foundation of our approach.

Table 1 summarizes the proposed distinction between readiness as a set of behaviors and other existing proposals.

Research approach to develop the model

To develop the proposed model, we followed a sequence of steps that ultimately led to the final proposal presented in this publication:

1. Identifying problems and gaps to tackle: As a base of our work, we began by reviewing existing models and identifying gaps in the literature, as outlined by Silva et al. (2024).
2. Model principles: To tackle the listed problems, we have defined a set of principles that we consider mandatory for our model's success.
3. Categories and subcategories: An assessment model requires assessing a list of categories and subcategories. We used the proposal published by Silva et al. (2024) for that purpose.

Table 1
Isolating readiness as a concept defined by a set of behaviors.

Maturity Concept	Existing Readiness Concepts	Proposed Readiness Concept
The concept of maturity is widely used in maturity models, such as those by Klötzer and Pflaum (2017), & Gimpel et al. (2018), Schumacher, Erol, and Sihn (2016), Leino et al. (2017), Berghaus and Back (2016), Kljajić and Pucihar (2021), Sandor et al. (2021), and Tiss and Orellano (2023). In these models, maturity is typically applied to measure the implementation stage, assessing how far an organization has progressed in specific dimensions defined by the models. This approach often relates to how technology is deployed, how the processes are digitized, or if a proper organizational structure is in place.	The concept of readiness is less widely used than maturity. Still, the existing models, like those of de Carolis et al. (2017) or Machado et al. (2021), often equate readiness with a state of maturity to deploy manufacturing or digital technologies. However, readiness needs to be recognized as a distinct measure with specific dimensions and factors. For instance, de Carolis et al. (2017) measures readiness levels through maturity levels, which conflates the two concepts to a certain extent. In these models, readiness is often interpreted as being finished rather than "being ready to adopt change."	This model proposes a distinction between the maturity of an implementation (e.g., DT) and the level of readiness (behaviors) required to maximize the results of that implementation. For example, maturity would assess how far a customer relationship management (CRM) platform has been implemented, whereas readiness would assess whether the necessary behaviors to maximize the CRM are present in the organization and to what extent. This formal separation aims to differentiate between implementing something and optimizing it through the adoption of ideal behaviors.

4. Target behaviors: Recognizing that readiness levels are significantly influenced by a set of behaviors, we reviewed the models published by Silva et al. (2024) and defined the target behaviors for each subcategory.
5. Readiness levels and dimensions: We then designed the readiness levels and dimensions that impact progress, using the defined categories, subcategories, and target behaviors.
6. Assessment process: We developed a process to assess the readiness levels of companies across all subcategories/categories, incorporating perspectives from senior management and general employees.
7. Assessment questionnaire: We designed a questionnaire to support our assessment process.

The overall approach, part of a broader research project on the digital organizational readiness of SMEs, follows design science research (DSR) methodology and the framework provided by Peffers, Tuunanen, Rothenberger, and Chatterjee (2007), as illustrated in Fig. 1.

Silva et al. (2024) research involved an extensive literature review, examining the different models that fit the criteria of assessing maturity or readiness in the context of DT.

In their published work, the authors identified four apparent research gaps:

- *There needs to be a clear focus on readiness assessment models, especially considering the proven scientific knowledge that readiness for change is critical to maximizing change successfully.*
- *More efforts are needed to develop readiness models for small and medium enterprises, given their substantial presence in the number of active companies, workforce size, and contributions to countries' GDP.*
- *There needs to be more focus on considering the difference in perspective between general employees and senior management regarding readiness for change. There is strong evidence that understanding these differences in perspective and tackling the differences play a vital role in successfully implementing change.*
- *No standardized set of factors (dimensions) is used across the research community to define what aspects should be evaluated regarding maturity and readiness in DT.*

The details of the approach are summarized in Table 2.

We designed our research questions to help close the identified research gaps. The relevance of SMEs and their impact on the global

Table 2
Methodological Details.

Phase	Description
Problem identification	Problem identification is carried out through a detailed literature review to determine whether the predefined problem is accurate and to ensure it has not already been solved in other published works. In our application of the DSR model by Peffers et al. (2007), we conducted a systematic literature review to identify specific gaps, which were substantiated through a scientific review process, as detailed by Silva et al. (2024).
Objectives	Based on the problem to be solved and the identified gaps, we defined a set of objectives to guide our research. These objectives, presented in this article, formed the basis for developing our model.
Design and development	In line with the identified problems and objectives, we defined the following set of components for our model: - Categories and subcategories are to be assessed by normalizing the existing dimensions proposed by previous models (Silva et al., 2024), as listed in Tables 3 and 4. - Target behaviors were defined by reviewing the models cited in Silva et al. (2024) and extracting the behaviors that fall in the category of "state of being ready to adopt change," as listed in Table 5. - Readiness levels and dimensions were developed by following some of the insights from Bruin, Freeze, Kaulkarni, and Rosemann (2005) and Capability Maturity Model Integration (Goldenson et al., 2004). - The assessment process considers that this model is specifically designed for SMEs. Some assumptions made during the development phase will be evaluated and validated in the DSR's evaluation phase.
Demonstration	The demonstration phase is designed to put our model into practice and gather insights from its execution. In our case, we conducted a demonstration with 12 companies, all of which met the SME criteria and represented various aspects of SMEs. The details are provided in Section 5 of the article.
Evaluation	Following the DSR approach, we thoroughly conducted an evaluation phase to assess the quality of the outcomes produced by the proposed model and, most importantly, to validate the designed model and its key decisions. The details of this validation are provided in Section 6.
Communication	All outcomes from the DSR process will be communicated to the industry. In this case, the results were published in Silva et al. (2024) and in this article.

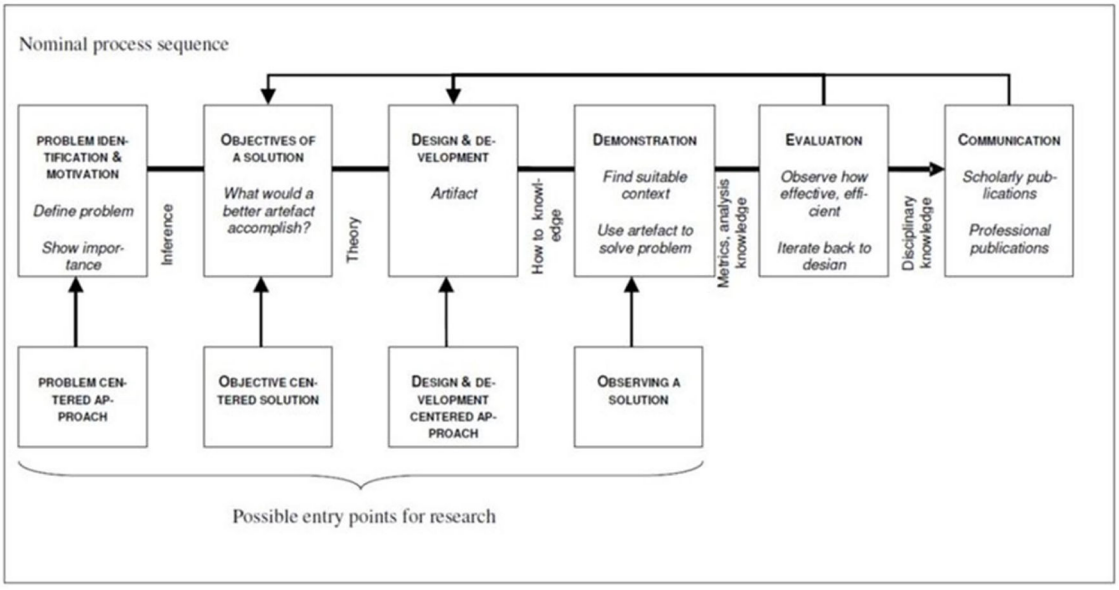

Fig. 1. Instantiation of DSR described by Peffers et al. (2007).

economy, combined with the need to maximize the benefits of DT, makes these research gaps highly relevant. Our work follows DSR to develop a user-friendly model that supports SMEs enterprises assess their readiness for DT, focusing on the employee perspective. We selected DSR because it is a problem-solving approach aimed at enhancing human knowledge, developing innovative artifacts, and solving problems (Peffers et al., 2007). Within the DSR, we selected the model proposed by Peffers (Peffers et al., 2007) because it is a widely consensual design science methodology. The main reason for this selection is its simplicity. Although it emphasizes the theoretical review during the transition from objective to design more than Hevner's approach (Hevner, March, Park, & Ram, 2004), it better suits the current research. This approach is especially suitable because readiness is not a well-defined, tangible asset to investigate in the SME environment. At the same time, it provides a practical and highly problem-oriented, objective-centric, and solution-oriented process, guiding us from problem identification (and relevance) to the design, development, demonstration, and communication of a solution.

Proposed readiness assessment model

In our research, we identified the gaps in DT assessments, and the data revealed that there is little to no investment in readiness assessments, particularly in the context of SMEs. We also concluded that the concept of readiness was widely used in similar meanings of maturity, leading to confusion and misunderstandings. Our work proposes a clear distinction, defining readiness as a concept that specifically focuses on behaviors required to enable organizations to make the best out of digital technologies and business models, ensuring they remain competitive.

To address the lack of resources, knowledge, and tools in SMEs, we developed the DORAM. In this chapter, we will present the different components of the model and how they can be applied to any SME.

Categories and subcategories

After defining the principles, we needed a clear set of factors/dimensions/categories to serve as the basis for our assessment. These elements should comprehensively represent all aspects that influence a company's ability to perform at its best.

In the work carried out by Silva et al. (2024), they publish a formal proposal for the categories and subcategories that should be used to develop new assessment models. Their proposal is based on an extensive literature review and an analysis of existing models. These categories normalize more than 80 categories/dimensions used across most assessment models. Because we refer to that review throughout our research, we adopted these proposed categories as the base for our proposed model. They are listed in Tables 3 and 4.

By establishing these five categories and 20 subcategories, we have set a solid base to deepen our understanding of how an organization should perform at its best to maximize its DT results. However, we still need to define the specific behaviors that companies should target.

Table 3
Readiness categories (adapted from Silva et al., 2024).

Category	Description
Business model	All aspects relate to how the company operates, the products it offers, and how it innovates within those areas.
Market	It focuses on all aspects of the company's market approach, its customers, and its value proposition.
Strategy	It focuses on various aspects of the organization's strategic setting, from strategic planning to change management or technology.
Organization	It focuses on foundational organizational aspects such as a company's structure, people, or culture.
Processes	It focuses on how the company manages its processes and generally governs its working methods.

Table 4
Readiness subcategories (adapted from Silva et al., 2024).

Category	Subcategory	Description
Business model	Business structure	How does the company adapt and understand business models to apply to customers?
	Products and services	How does the company understand product management and digitalization as a core component of it?
	Innovation	How does the company embrace innovation as a mindset and leverage data to achieve better results?
Market	Customers	How does the company manage its relationship with customers?
	Value Proposition	How is the company shaping its value proposition?
	Go to market	How is the company managing its approach to the market?
Strategy	Strategic planning	How does digitalization embed in the overall strategy, and how does the organization allocate the right resources?
	Change management	How does the company manage change and embed change management practices?
	Transformation	How does the company understand transformation as something that must be managed?
	Organizational strategy	How does the company strategize to enable the organization to meet the digital challenge?
	Technology	How does the company embed technology in its day-to-day operations?
Organization	Organizational structure	How clear is the organizational structure?
	People	How is the company developing its talent to meet new demands coming from DT?
	Culture	How is the culture being adapted to new ways of working?
	Collaboration	How does collaboration work across the organization?
	Leadership	How does leadership play an influential role in driving the right behaviors?
	Operations	How are operations adjusting ways of working?
Processes	Process management	How standardized are the business processes?
	Monitoring and control	How well managed are the processes?
	Governance	How is the company looking at governing the different initiatives and processes?

Defining these behaviors is the next step in designing the model.

Target behaviors of each subcategory

To be able to provide an assessment, we need to know what we are measuring, and more than having the categories (and subcategories), we need to define the target. Hence, we have designed a process to obtain the required target behaviors.

Building on the systematic literature review published by Silva et al. (2024), we have reviewed all the models and analyzed all the dimensions and factors used by each model to assess the maturity of the organizations. As noted by Silva et al. (2024), most models must fully distinguish between maturity and readiness. Therefore, we have applied our proposed definition, summarized in Chapter 2, where maturity is viewed as assessing the implementation status by focusing on initiatives aimed at deploying something, whereas readiness is defined as the set of behaviors that indicate a company's preparedness to maximize its DT results.

We have yet to identify any clear and well-defined proposals for readiness target behaviors, which is aligned with a lack of research in this area. As a result, we set out to propose these target behaviors, relying heavily on previous research. Instead of inventing new behaviors, we reviewed the models analyzed by Silva et al. (2024) and

followed this process:

1. Assess the different dimensions identified as the end state proposed by each model.
2. Classify each dimension as either "maturity" or "readiness" based on our proposal of what readiness is.
3. Extract all the different readiness dimensions and characteristics from other models.
4. Map all the extractions using our categories and subcategories.
5. Summarize all the findings into a set of target behaviors that define a target state of readiness.

In Table 5, we summarize the different models we reviewed and the core behaviors we defined as a state of higher readiness.

With the target behaviors summarized in Table 5, we have an excellent baseline for designing a model that assesses an organization based on these targets. However, referring to one of the principles of the model that "It must be simple enough for any SME to be able to utilize it," we still lack a format that could be presented to employees and senior management to allow them to give their assessment. Rather than presenting a list of bullets described as "behaviors," we have converted those behaviors into what we call the "behavior north star". These are user-friendly statements that summarize the different target behaviors and can be presented to the other profiles as a target state for the company.

Table 6 summarizes the proposed north stars for each subcategory, consolidating the proposed target behaviors into a more approachable format.

The different north stars summarized in Table 6 will be used to create a user-friendly questionnaire that any employee can use in an SME to assess, based on personal perception, how close the company is to achieving the target state.

Readiness levels and measuring dimensions

One of the required decisions while designing the assessment model is defining its number of levels. We have yet to identify any relevant literature that unanimously defines the appropriate number of levels. Based on the comprehensive review of existing models by Silva et al. (2024), the most common number of levels is four or five levels. Because one of our principles was to maintain simplicity and usability for SMEs, we have opted to identify four levels.

The definition of these levels was highly influenced by the Capability Maturity Model Integration (Goldenson, Gibson, & Ferguson, 2004), which supported our work in defining how the levels should be represented.

Our proposal consists of the following levels (illustrated in Fig. 1):

1. Immature (Red): The company does not demonstrate the key target behaviors and has limited to no actions to address them.
2. Unstructured (Orange): The company sometimes demonstrates critical behaviors and may be evolving toward a more structured level.
3. Structured (Yellow): The company often demonstrates key behaviors and is potentially evolving toward an advanced level.
4. Advanced (Green): The company consistently demonstrates key behaviors, measures them, and continuously improves based on defined actions.

One of the principles of our model is its visual approach. We have applied a color code to each level to facilitate an understanding of the assessment results. In this case, red represents the lowest level, and green represents the highest (as illustrated in Fig. 2).

To compute a readiness level, we had to define which dimensions would contribute to that calculation, assuming that each subcategory's "end state" is determined by the target behaviors and north stars summarized in Tables 5 and 6.

Table 5
Target readiness behaviors based on the literature review.

Subcategory	Target behaviors	Reference models/ literature
Business structure	- Companies can quickly adapt to new business models. - Different business models are well documented and known. - There is a continuous exploration of possible new business models unlocked by digital technologies. - There is an understanding of digital twins as a potential business model.	- Schumacher et al. (2016) - Leino et al. (2017) - Colli et al. (2019) - Sandor et al. (2021)
Products and services	- A well-defined product roadmap and product lifecycle management are in place. - We can see digital-based products and services. - There is investment in the development of data-driven products. - There is visible implementation of a combination of physical and digital products or services.	- Klötzer and Pflaum (2017) - Schumacher et al. (2016) - Leyh, Bley, Schaffer, and Forstenhausler (2016) - Canetta, Barni, and Montini (2018)
Innovation	- Data is seen as an asset. - There is openness to innovation and fail fast. - There is an innovation strategy. - There is openness to adopting digital technologies.	- Klötzer and Pflaum (2017) - Schuh et al. (2020) - Berghaus and Back (2016) - Kljajić and Pucihar (2021) - Sandor et al. (2021)
Customers	- There is a well-defined CRM. - The company embeds customer insights in decision making. - The company aims to understand the types of customers it serves. - Personalized customer relationships are established. - Customer trust is a core value.	- Klötzer and Pflaum (2017) - Gimpel et al. (2018) - Schumacher et al. (2016) - Leino et al. (2017) - Berghaus and Back (2016) - Kljajić and Pucihar (2021) - Sandor et al. (2021) - Tiss and Orellano (2023) - Haryanti, Rakhmawati, and Subriadi (2023)
Value proposition	- There is a well-defined value proposition for the company's customers. - The value proposition is continuously improved based on technology and data usage.	- Gimpel et al. (2018) - Matt, Hess, and Benlian (2015) - Kljajić and Pucihar (2021)
Go to market	- There are clearly defined customer interfaces. - There is continuous monitoring of market demand and competitors. - There is use of new technologies for customer engagement (e.g., social media and mobile devices). - There is a visible optimization and automation of marketing practices.	- Leino et al. (2017) - Berghaus and Back (2016) - Kljajić and Pucihar (2021) - Sandor et al. (2021) - Cunha and Sousa (2021)
Strategic planning	- There is a well-defined and visible digital strategy. - The company has a plan to achieve its mission and objectives. - The company embeds the IT strategy in the business strategy. - Resources are allocated to execute different strategic actions.	- Leino et al. (2017) - Schumacher et al. (2016) - Sandor et al. (2021) - Canetta et al. (2018) - Berghaus and Back (2016) - Gimpel et al. (2018) - Haryanti et al. (2023) - Gökalp and Martinez (2021)

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Table 5 (*continued*)

Subcategory	Target behaviors	Reference models/ literature
Change management	- Defined processes to adopt changes at different levels are present. - A change management mindset is established and well understood. - There is easy adaptability to the different demands for change.	- Schuh et al. (2020) - Kljajić and Pucihar (2021) - Gimpel et al. (2018) - Tiss and Orellano (2023) - Haryanti et al. (2023) - Matt et al. (2015) - Gökalp and Martinez (2021)
Transformation	- Understanding transformation as a critical project is embedded. - Performance management is a crucial component of transformation. - Management support to embrace the transformation is present.	- Berghaus and Back (2016) - Gimpel et al. (2018)
Organizational strategy	- The business is agile and adaptable. - A digital mindset is deployed at all levels. - The company is willing to adapt to newer technologies. - There is a focus on motivational, goal-oriented approaches.	- Nerima and Ralyté (2021) - Leino et al. (2017) - Sandor et al. (2021) - Schuh et al. (2020) - Berghaus and Back (2016) - Gimpel et al. (2018) - Tiss and Orellano (2023) - Haryanti et al. (2023) - de Carolis et al. (2017) - Gökalp and Martinez (2021)
Technology	- There is a reliable IT infrastructure (phones, network, laptops, etc.). - Modern technology is deployed in crucial areas. - Technology is embedded in day-to-day activities. - Digital data are used in critical processes. - Security and privacy policies are clearly defined and used.	- Nerima and Ralyté (2021) - Schumacher et al. (2016) - Colli et al. (2019) - Sandor et al. (2021) - Klötzer and Pflaum (2017) - Leyh et al. (2016) - Canetta et al. (2018) - Schuh et al. (2020) - Berghaus and Back (2016) - Kljajić and Pucihar (2021) - Gimpel et al. (2018) - Tiss and Orellano (2023) - Haryanti et al. (2023) - Cunha and Sousa (2021) - Gökalp and Martinez (2021) - de Carolis et al. (2017)
Organizational structure	- There is a clear organizational structure. - There is visible autonomy in decision making. - The structure is leaner and focused on results.	- Nerima and Ralyté (2021) - Leino et al. (2017) - Sandor et al. (2021) - Schuh et al. (2020) - Berghaus and Back (2016) - Gimpel et al. (2018) - Tiss and Orellano (2023) - Haryanti et al. (2023) - de Carolis et al. (2017) - Gökalp and Martinez (2021)
People	- There are well-defined skills and competencies to succeed in each role. - There is continuous professional development. - Digital competencies are embedded and central to the organization. - Sustainable learning management practices are in place. - The mindset and skills needed to win in a digital environment are present.	- Nerima and Ralyté (2021) - Schumacher et al. (2016) - Colli et al. (2019) - Klötzer and Pflaum (2017) - Canetta et al. (2018) - Schuh et al. (2020) - Kljajić and Pucihar (2021) - Tiss and Orellano (2023) - Haryanti et al. (2023) - Gökalp and Martinez (2021)
Culture	- There is a visible positive attitude toward new technologies. - Knowledge is shared across areas. - The company values technology. - There is a readiness to take risks and embrace change. - A visible culture of adaptability exists.	- Leino et al. (2017) - Schumacher et al. (2016) - Sandor et al. (2021) - Berghaus and Back (2016) - Kljajić and Pucihar (2021) - Tiss and Orellano (2023) - Haryanti et al. (2023) - Matt et al. (2015)
Collaboration	- Cooperation with different partners. - Interdepartmental collaboration. - A teamwork-oriented mindset. - A flexible work environment.	- Schumacher et al. (2016) - Klötzer and Pflaum (2017) - Schuh et al. (2020) - Berghaus and Back (2016) - Haryanti et al. (2023)
Leadership	- Senior Managers are promoters of digital initiatives. - Leadership serves as a role model for transformation. - There is open communication with leadership. - Leadership promotes a risk-taking mindset. - Leaders are willing to make a difference.	- Nerima and Ralyté (2021) - Schumacher et al. (2016) - Klötzer and Pflaum (2017) - Schuh et al. (2020) - Kljajić and Pucihar (2021) - Gimpel et al. (2018)
Operations	- The company has flexible operations (adaptability to newer ways of working). - Automated and decentralized processes are being implemented in operations. - Continuous improvement practices are in place. - Supplier management is well defined. - Financial management and reporting structures are defined.	- Schumacher et al. (2016) - Sandor et al. (2021) - Kljajić and Pucihar (2021) - Gimpel et al. (2018) - Haryanti et al. (2023) - Matt et al. (2015) - Gökalp and Martinez (2021)
Process management	- Clear and standard business processes. - Trust in the defined processes. - Digital-driven processes.	- Nerima and Ralyté (2021) - Leino et al. (2017) - Klötzer and Pflaum (2017) - Canetta et al. (2018) - Schuh et al. (2020) - Berghaus and Back (2016) - Kljajić and Pucihar (2021) - Tiss and Orellano (2023) - Haryanti et al. (2023) - Gökalp and Martinez (2021) - de Carolis et al. (2017)

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Table 5 (*continued*)

Subcategory	Target behaviors	Reference models/ literature
Monitoring and control	- Automated business processes. - Data-driven decision making. - Processes and controls are in place.	- Schuh et al. (2020) - Kljajić and Pucihar (2021) - Gökalp and Martinez (2021) - de Carolis et al. (2017)
Governance	- There is transparent cost and revenue control. - Project management practices are in place. - Portfolio management practices are in place. - Data governance is embedded within the organization. - Management practices are in place (performance, results, planning, strategy, etc.).	- Nerima and Ralyté (2021) - Schumacher et al. (2016) - Colli et al. (2019) - Haryanti et al. (2023) - Gökalp and Martinez (2021)

Based on the literature (Weiner, 2009; Roos & Nilsson, 2020; Naumtseva & Stroh, 2021; Adam et al., 2022; Runa, 2023), we can identify that behavior tends to be more sustainable when it occurs frequently and is less random. In other words, behaviors that are more frequent and consistent are considered more effective. Therefore, we have selected two key dimensions for our assessment: the frequency of the behavior and how it is managed. We then used these dimensions to break down the different levels (1—10) using the Likert scale (Joshi, Kale, Chandel, & Pal, 2015). As illustrated in Fig. 3, we mapped how each level corresponds to these two dimensions.

As illustrated in Fig. 3, progression can occur vertically or horizontally. Horizontal progression happens when a behavior becomes more frequent, whereas vertical progression indicates that the behavior is better managed (less *accidental)*. The transition between Levels 6 and 7 represents the most considerable step in our model, primarily because the organization would move from an unstructured to a structured readiness level, marking a major milestone in the consistency of target behaviors.

This definition of the levels and dimensions provides a clear path for companies to follow, indicating that the further a company is from Level 10, the more it is lagging in achieving the target behaviors for a specific subcategory (as illustrated in Fig. 4). In our proposal, we consider the assessment in terms of behaviors to be driven at the subcategory level. This approach is necessary because a company may be more ready in one subcategory, such as customers, than another, such as going to market; hence, if we evaluate at a higher level, it could be too generic and less actionable for determining next steps.

The designed approach is fully tailored to provide the company's leadership with a perspective on how far they are from achieving the target behaviors, based on their employees' perceptions. This approach helps them identify the key aspects they will focus on when thinking and planning for improvements needed in the organization.

Readiness assessment process

The process to assess readiness is designed to be straightforward and applicable to SMEs and, hence, must consist of a series of simple steps that can be executed regardless of whether the company has five employees or 300 because both would potentially fall within the SME category.

The proposed model, DORAM, uses a questionnaire as the basis for assessment (more details in the next chapter). This questionnaire allows employees and senior management to assess how they perceive their company regarding the target behaviors (in terms of frequency and management).

We designed a process that consists of five steps:

Table 6
Proposed behavior north star.

Subcategory	Target behaviors	Target north star
Business structure	- Companies can quickly adapt to new business models. - Different business models are well-documented and known. - There is a continuous exploration of potential new business models unlocked by digital technologies. - There is an understanding of digital twins as a possible business model.	The company must adapt to newer business models to fully leverage the technologies it has implemented. At the same time, companies must keep exploring different models to sell their products to existing or new customers.
Products and services	- A well-defined Product Roadmap and Product Life-cycle Management are in place. - Digital-based products and services are evident. - There is investment in the development of data-driven products. - There is a visible implementation of a combination of physical and digital products/services.	The company must adapt to the digital economy and adjust its offerings to focus more on digital-centric and data-driven products and services.
Innovation	- The data is seen as an asset. - There is openness to innovation and failure fast. - There is an Innovation Strategy. - There is openness to digital technologies.	The company must recognize data as one of its critical assets and continuously foster a mindset of innovating new models, ideas, or products, especially with a clear focus on incorporating more digital technologies into those ideas.
Customers	- There is a well-defined CRM. - The company embeds customer insights in decision-making. - The company has a clear understanding of the types of customers it serves. - There is a personalized customer relationship. - "Customer trust" is core.	The company must center its approach on its customers by (a) embedding insights, (b) improving relationship management, (c) personalizing that relationship, and (d) guaranteeing the trust needed to build a long-term relationship.
Value proposition	- There is a well-defined value proposition for the company's customers. - The value proposition is continuously improved through the use of technology and data.	The company must be clear on its value proposition to its customers and how to adjust that proposition based on newer technologies and data.
Go to market	- Clearly defined customer interfaces. - There is a continuous scanning of market demand and competitors. - The company uses newer technologies to engage with customers (social media, mobile). - There is a visible optimization and automation of marketing practices.	The company defines clear customer interfaces and continuously monitors market trends and competitor actions. It leverages new technologies and channels, such as social media, while optimizing and scaling its marketing practices.
Strategic planning	- There is a well-defined and visible digital strategy. - It has a plan to achieve its mission and objectives. - The company embeds the IT strategy into the business strategy. - Resources are allocated to execute the different strategic actions.	The company must define a clear and well-articulated digital strategy with a plan for execution that aligns with its mission and objectives. It must ensure that the IT strategy is a vital component of the overall company strategy and that the necessary resources are allocated to achieve it.

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Table 6 (*continued*)

Subcategory	Target behaviors	Target north star
Change management	- Defined processes to adopt changes at different levels are present. - A change management mindset is established and well understood. - There is an easy adaptability to the different demands for change.	The company must manage change according to its complexity, implement the necessary processes for adoption, and ensure that a change management mindset is present at all levels to effectively adapt to that change.
Transformation	- Understanding transformation as a critical project is embedded. - Performance management is a crucial component of transformation. - Management support to embrace the transformation is present.	The company must treat transformation as a project that requires management, guaranteeing that adequate management support and performance management are critical components.
Organizational strategy	- The business is agile and adaptable. - A digital mindset is deployed at all levels. - The company is willing to adapt to newer technologies. - There is a focus on motivational, goals-centric approaches.	The company must be agile and flexible, adapting to external and internal changes. It should foster a robust digital mindset, adopt new technologies, and create a goal-oriented, motivational culture.
Technology	- There is a reliable IT infrastructure (phones, network, laptops, etc.). - Modern technology is deployed in crucial areas. - Technology is embedded in the day-to-day activities. - Digital data is used in critical processes. - Security and privacy policies are clearly defined and used.	The company must guarantee a reliable IT infrastructure, invest in new technologies and data for its key processes, and ensure technology is embedded in everyday activity, with a strong focus on cybersecurity and data privacy.
Organizational structure	- There is a clear organizational structure. - There is visible autonomy in decision-making. - The structure is leaner and focused on results.	The company must have a clearly defined organizational structure that is transparent to all employees. It should create an environment where employees are empowered to achieve results through a lean, results-oriented structure.
People	- There are well-defined skills and competencies to succeed in each role. - There is continuous professional development. - Digital competencies are embedded and central to the organization. - Sustainable learning management practices are in place. - The mindset and skills needed to win in a digital environment are present.	The company must clearly define what skills and competencies are needed to succeed in any role, promote the continuous development of its talent, guarantee that digital competencies are core to the organization through sustainable learning practices, and build the mindset and skills needed to win in a digital environment.
Culture	- There is a visible positive attitude toward new technologies. - Knowledge is shared across areas. - The company values technology. - There is a readiness to take risks and embrace change. - A visible culture of adaptability exists.	The company must foster a positive attitude toward newer technologies, value the role of technology, promote knowledge sharing across teams and partners, and develop an environment that embraces adaptability and is ready to take risks.
Collaboration	- Cooperation with different partners. - Interdepartmental collaboration. - A teamwork-oriented mindset. - A flexible work environment.	The company must guarantee a healthy environment that promotes knowledge sharing among peers, cooperation with partners, collaboration between departments, and team spirit and flexibility.
Leadership	- Senior managers are promoters of digital initiatives. - Leadership serves as a role model for transformation. - There is open communication with leadership. - Leadership promotes a risk-taking mindset. - Leaders are willing to make a difference.	The company must guarantee that senior managers lead the example in promoting digital technologies and mindsets. They must be role models in the transformation process, promote open communication, advocate risk-taking attitudes, and be committed to making a difference.
Operations	- The company has flexible operations (adaptability to newer ways of working). - Automated and decentralized processes are being implemented in operations. - Continuous improvement practices are in place. - Supplier management is well-defined. - Financial management and reporting structures are defined.	The company must make its operations flexible to adapt to external volatility. Ideally, they should be highly automated and decentralized, with continuous improvement practices in place. The company should also manage its suppliers effectively, with strict reporting on finance and overall management.
Process management	- Clear and standard business processes. - Trust in the defined processes. - Digital Driven Processes.	The company must implement transparent and fully standardized business processes that are entirely digitally enabled and trustworthy for all employees.
Monitoring and control	- Automated business processes. - Data-Driven decision making. - Processes and controls are in place.	The company must automate its business processes to enable efficient, transparent, data-driven decision making and establish the necessary processes and controls for correct business monitoring.
Governance	- There is a transparent cost and revenue control. - Project management practices are in place. - Portfolio management practices are in place. - Data governance is embedded within the organization. - Management practices are in place (performance, results, planning, strategy, etc.).	The company must deploy efficient project and portfolio management practices, establishing transparent cost and revenue control practices, all connected through standardized and documented management practices around performance, results, planning, or strategy. It must also guarantee consistent data governance across the organization.

I. **Meeting with senior management:** Before any execution, a 30- to 45-minute meeting with the senior management team will explain how the model works and what is being assessed. During this session, senior management should agree to distribute a questionnaire to all their employees via corporate email, and to complete the questionnaire themselves.

II. **Questionnaire distribution:** A questionnaire with the 20 north stars is sent to all employees and senior management (illustrated in Fig. 5). This procedure allows us to collect the perspectives from both employees and senior management.

III. **Compute and calculate readiness at the subcategory level:** After collecting the responses from all the employees and senior

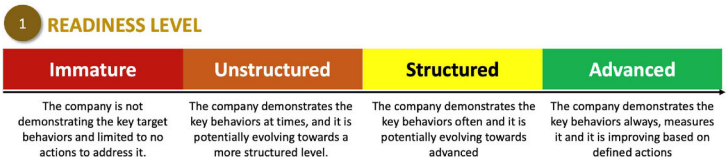


Fig. 2. DORAM readiness level color scale.

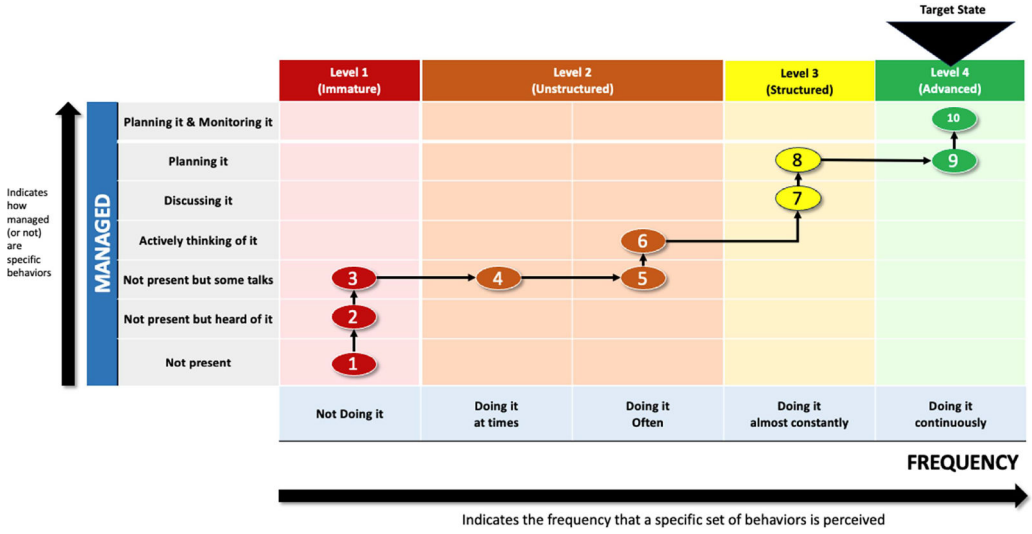


Fig. 3. DORAM readiness assessment dimensions.

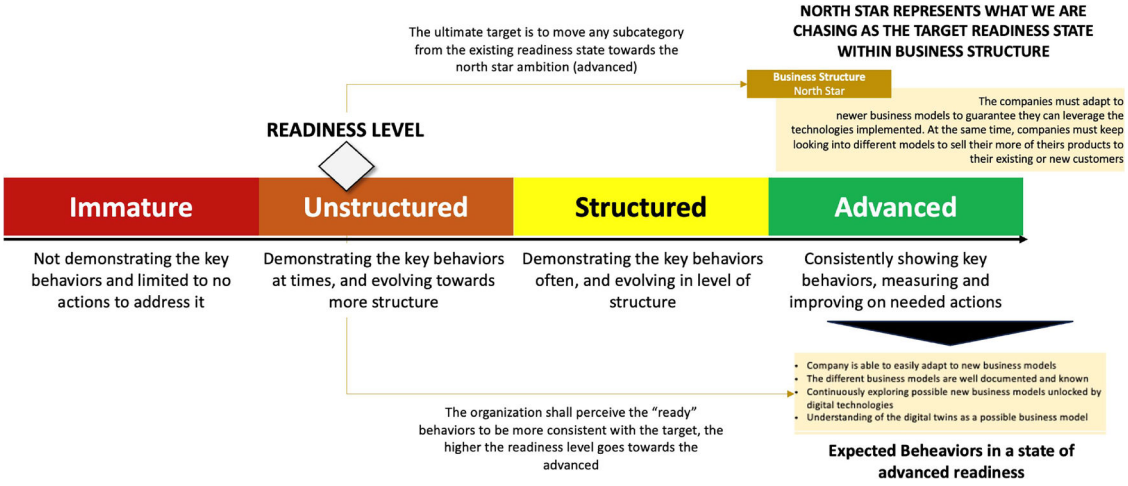


Fig. 4. How do the levels align with the north star and target behaviors?.

management, we calculate the following four measurement indicators:

a. Average rating at subcategory level for employees: This provides an overall rating based on employee responses.
b. Average rating at subcategory level for senior management: This provides an overall rating based on the senior managers' responses. From this, we can calculate the Perception Gap.

Perception Gap (Pg) = **IF** (Employee Rate > Senior Management Rate) **THEN** (Employee Rate > Senior Management Rate) **ELSE** (Senior Management Rate - Employee Rate).

As referenced in the literature (and illustrated in Fig. 6), differences in perspective between employees and senior management create a more significant risk of change adoption and require more efforts in baselining a common understanding as a preliminary step toward changing behaviors (Voß & Pawlowski, 2019; Gfrerer et al., 2021; Trenerry et al., 2021)

a. Median rating at subcategory level for employees: We can calculate the readiness level when removing the outliers, providing an excellent benchmark compared to the estimated average rating.
b. Net Promoter Score (NPS): The NPS provides a clear view of the difference between employees who could be considered detractors (a rating of 6 or less) and those who can be regarded as promoters (a rating of 9 or 10). The approach is illustrated in Fig. 7.

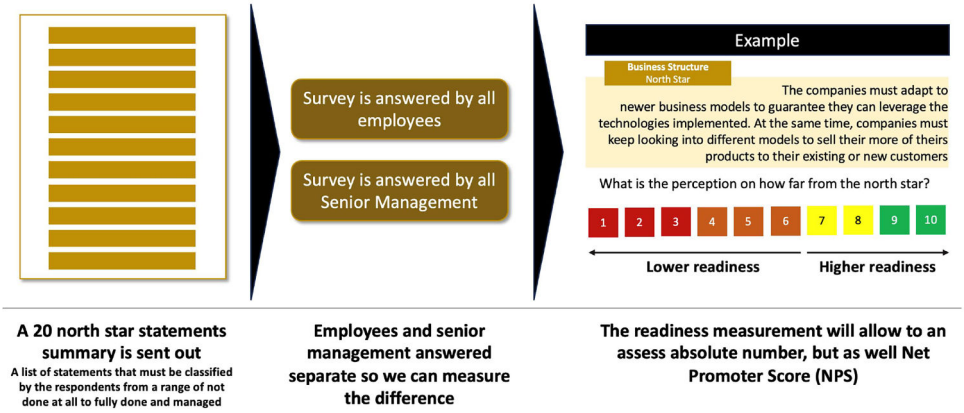


Fig. 5. Readiness assessment process.

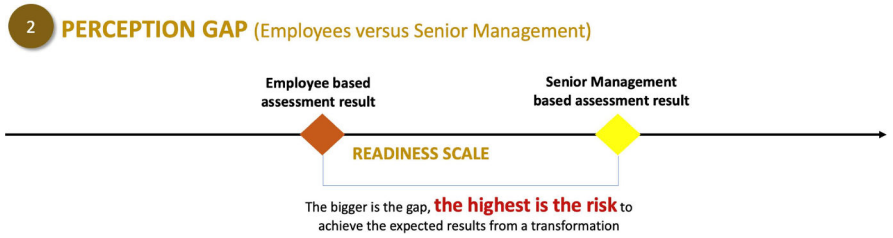


Fig. 6. Perception gap and its risk.

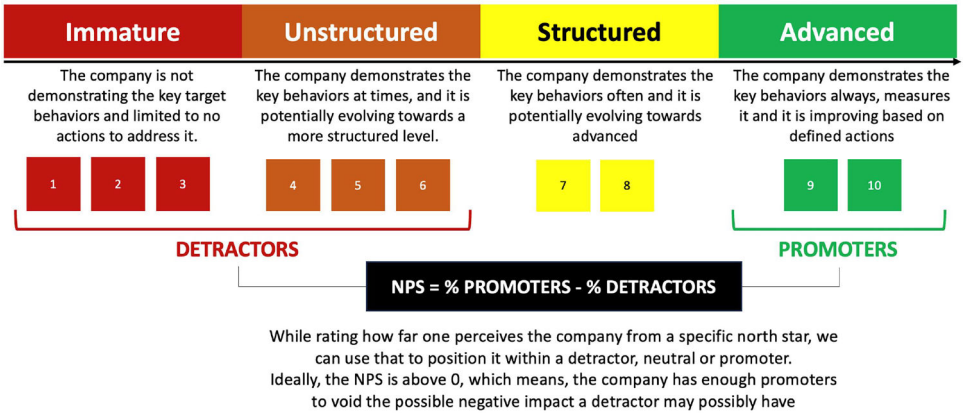


Fig. 7. Calculate the NPS at the subcategory level.

%1. **Presentation of the results to senior management:** Based on the four different measurements, provide a comprehensive report to senior management explaining the highest and lowest subcategories, the most significant perception gaps, and the overall distribution of responses.
%1. **Assessment of the results:** After the results are presented, senior management should complete a questionnaire that asks for their evaluation.

Through these four steps, we designed an approach that suits any organization. It allows them to assess the readiness levels of employees versus senior management and, simultaneously, helps understand the distribution of detractors versus promoters in the different subcategories. The NPS approach is necessary because it addresses behaviors and perceptions. Increasing the number of promoters is an excellent step to improve readiness and, more importantly, gain greater buy-in for the organization's transformation.

Questionnaire and approach

As illustrated in Fig. 8, we have designed an approach that supports the overall assessment, based on 20 questions focused on the north stars.

One of the critical decisions in this process was determining the type of rating we would ask employees to provide. To make this decision, we reviewed our initial model principles and set some critical considerations for our decisions related to the approach (summarized in Table 7).

Taking full consideration of the defined north stars (see Table 6), the designed principles aligned with four of the model principles, and the two measurement dimensions (see Fig. 3), we developed an approach that engages employees (and senior management) using common language rather than numeric ratings. We recognized that the general population may relate more strongly to answers connected to their daily activities rather than to subjective numerical ratings.

Therefore, as illustrated in Fig. 8, we created a series of statements, termed as "assessment levels," that provide the employees with a word-

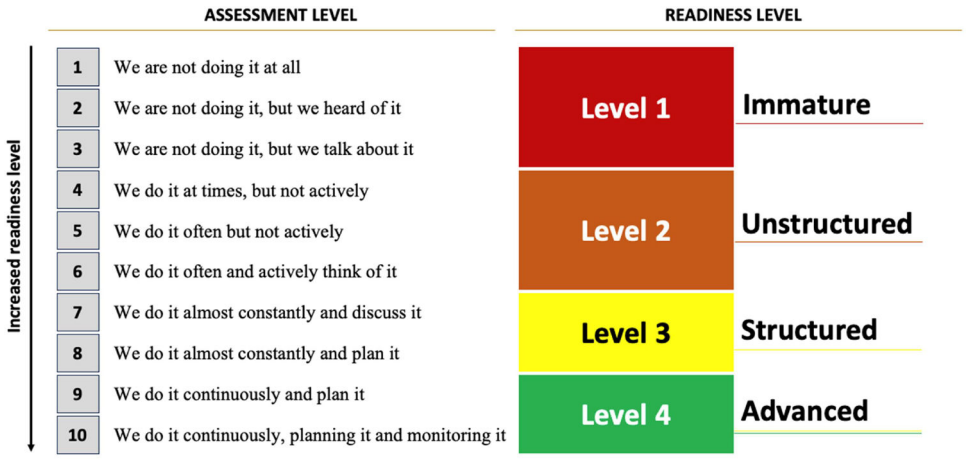


Fig. 8. Assessment levels mapped to readiness levels.

Table 7
Considerations for design principles.

Theme	Objective	Design principle consideration
Granular	It must precisely measure the different factors, breaking them down to the smallest level dimension.	The designed questions should cover at least 20 subcategories and allow conclusions to be drawn at this level of granularity.
Behavioral	It must assess and focus on the behaviors related to maximizing the DT.	The questionnaire must focus on the identified target behaviors and north stars.
Employee centered	It must be centered on the employee's perspective while also considering the differences from the senior management perspective.	The questionnaire must be completed by any employee with a corporate email address within the organization.
Quick	It must be executed quickly and without disrupting the organization's employees.	Considering the organization's lack of resources, completing the questionnaire should take little time.

based answer in a language familiar to the employees' daily activities.

The 10 statements are divided into two categories: Frequency and Managed. Each statement covers the two measurement dimensions we defined and provides an exact positioning within the chart illustrated in Fig. 3. These 10 statements allow employees to rate each question using simple, everyday language. The second part of the questionnaire involves questions that employees (and senior management) need to rate, based on the proposed north stars (see Table 5).

We summarize our questionnaire approach in three simple steps:

1. Each question corresponds to one of the 20 north stars.
2. Employees and senior management are asked how they perceive that "vision" within their organization.
3. Each employee and manager select one of the 10 statements to describe their perception of that north star within their organization.

As part of the questionnaire, we provide a clear introduction that explains the meaning of each of the 10 statements (summarized in Table 8) so that employees can resolve any questions.

Each statement (see Table 8) grows in frequency and level of planning, providing natural guidance on which level employees should choose when they rate the 20 north stars. We aim to obtain an almost immediate response (meeting the "quick" objective) that accurately describes their perception of a specific statement in the context of their work at the company.

Table 8
Assessment level explanation.

Level	Objective	The explanation given in the questionnaire
1	We are not doing it at all	It is not something I can identify in the company.
2	We are not doing it, but we have heard of it	It is not something I can identify in the company, but it is something I hear about at times.
3	We are not doing it, but we talk about it	It is not something I can identify within the company, but it is a topic where I feel actively involved in discussing it.
4	We do it at times but not actively	I can identify some of it at times, but not in a way that seems structured or planned.
5	We do it often but not actively	I can often identify it in the company, but I feel it is a lot more random than planned.
6	We do it often and actively think about it	I can often identify it in the company, and I feel it is being discussed more actively.
7	We do it almost constantly and discuss it	I can almost always identify it in the company, and I feel it is being actively discussed.
8	We do it almost constantly and plan it	I can almost always identify it in the company, and I feel it is being actively discussed and planned.
9	We do it continuously and plan it	I can always identify it in the company, and I feel it is being actively discussed and planned.
10	We do it continuously, planning it and monitoring it	I can always locate it in the company, and I think it is being actively discussed, planned, monitored, and assessed.

Artifacts produced as outputs of the assessment

The last component of our assessment is the "assessment report," which should be comprehensive and visually intuitive. It aims to provide companies with the right level of insights into which areas may need more active development or where significant perception gaps exist, potentially raising higher risk levels.

We have designed a report that consists of four blocks:

1. General overview: Provides a general overview of participation and average calculations at the category level.
2. Management cockpit: A one-pager that presents the calculations of the four indicators at the subcategory level: employee-based readiness calculation, management-based readiness calculation level, perception gap, and net promoter score.
3. Heatmap: Displays the total distribution of responses, with color coding applied (from red to green) to show senior management how their employees' perceptions are distributed across the different statements.

4. Health check: A double-click focused view of the highest-rated and lowest-rated areas, as well as the most significant perception gaps.

Demonstration of the model through practical cases

The initial step in our demonstration and exploratory study was selecting the companies we wanted to include in our research. Our objective was not to conduct a nationwide survey but instead to apply the DORAM in enough companies to demonstrate its applicability. At the same time, we aimed to conduct it across a diverse group of companies, varying in industry and size, to create a solid baseline for extracting insights that could later be used for larger-scale studies or for developing further hypothesis-driven research in SMEs.

To make this selection, we identified a set of criteria to determine whether an organization could be included. These criteria are summarized in Table 9.

Using the criteria in Table 9, we invited several organizations that met these requirements. Invitations were sent through different channels, including email, LinkedIn, and direct contact. They outlined our study's target and highlighted the potential benefits for companies that participate in the assessment.

Based on these criteria, we then designed a process for each selected company to follow:

1. We sent an official written invitation, asking if they would be interested in participating in our study. We informed them that, by accepting, they would consent to the anonymous use of their data and agree to be fully engaged in the process.
2. Upon acceptance, we scheduled a 30- to 45-minute introductory video call that was structured as follows:
   a. Introduction of the model and an overview of what to expect (and what not to expect)
   b. Q&A session
   c. An outline of the next steps
3. If management remained interested, we agreed to share two links to two identical online questionnaires: one for all employees and one for senior management.
4. Senior management used their internal processes to send out an internal communication inviting all employees with corporate email to access and complete the employee questionnaire as part of the assessment for their readiness level. Each company allowed at least one week for responses and sent a reminder in the middle of this period.
5. At the end of the response period, the report was generated and the following actions were taken:
   a. A video call was organized to walk the senior management through the results.
   b. A pre-read package was sent in advance containing three documents: (1) An explanation of the model and how to interpret the results; (2) The report detailing the actual results of the assessment; (3) A compilation of open-ended comments given by employees during the survey to three general questions "What are you most proud of?", "What are you least proud of?", and "What support do you think is needed?".
6. A video call session was held to present the results to senior management and to address any questions they had.
7. A results evaluation questionnaire was sent out post-video call, and senior management provided their evaluation.

The presented process was executed with all participating companies, and the results are presented later. The final list of companies is summarized in Table 10.

The list summarized in Table 10 presents 12 companies selected across five industries: advisory services, retail, logistics, manufacturing, and healthcare. At least two companies, ranging from 10 to 300 employees, were chosen from each industry.

Once the final list of 12 companies was determined, the study was divided into four phases, as illustrated in Fig. 9.

Each of the four phases has a clear target and defined scope, aiming to standardize the model's execution.

A) Introduction: The DORAM is based on many different aspects and requires some commitment from the organization to achieve its objectives. During the introduction phase, a meeting is held with the company's senior management. During that meeting, a comprehensive description of the model and the expectations for the execution phase are given. Expectations are set, and the commitment is once more re-affirmed.

B) Execution: During the execution phase, the companies handle the process without external support. The DORAM questionnaire is distributed to all the companies and their senior management. Each company chooses how to share the questionnaire, but it is crucial that it reaches all employees with corporate email access.

C) Collection: The results are processed when all the employees and senior management respond to the questionnaire. They are interpreted in two different contexts: (1) In a single company focus report that looks at the company-specific data and (2) an overall study with the 12 companies, extracting the relevant insights.

Table 9
Selection criteria for demonstration and exploratory study.

Dimension	Description	Reasoning
SME	The company must be categorized as an SME according to the national regulatory criteria.	Our research is entirely focused on SMEs.
Size	The company must have between 10 and 300 employees.	The company must be large enough to provide meaningful data but not so large that managing the study becomes overly complex.
Structure	The company must have a clearly defined management team.	One of our model's dimensions is assessing the gap between employees and senior management.
Commitment	The company's leadership must be fully committed to running the whole process.	The model requires some level of commitment from management to collect the data and review the assessment.
Diversity	The selected companies must be allowed to test in different industries.	By running in different industries, we can better compare the data.

Table 10
Companies selected for the demonstration and exploratory study.

Id	Company label	# Employees	Industry	Remarks
1	Company A	200	Advisory Services	
2	Company B	100	Advisory Services	Operating through a franchising model
3	Company C	80	Healthcare	
4	Company D	80	Healthcare	
5	Company E	40	Advisory Services	
6	Company F	10	Manufacturing	
7	Company G	50	Retail	
8	Company H	40	Retail	
9	Company I	25	Manufacturing	
10	Company J	20	Logistics	
11	Company K	40	Logistics	
12	Company L	50	Logistics	

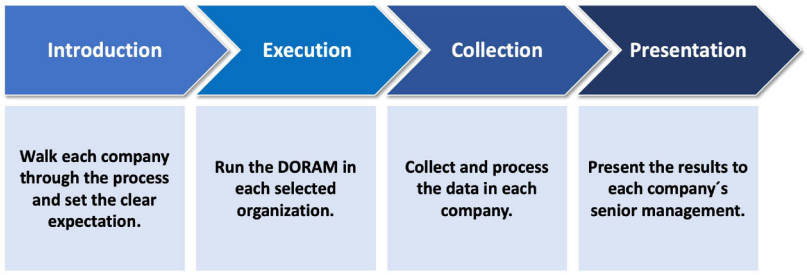


Fig. 9. Process followed to execute the exploratory study.

D) Presentation: As soon as the report is completed, a meeting is organized with each company's senior management to present the results. The focus is on the artifacts of the four primary produced models. During this session, there will be an open dialog so the results can be understood within the company's context, and valuable information for developing future action plans will be provided.

Our research involved a comprehensive demonstration of the model, successfully executing it across the 12 selected companies (see Table 10). The participation rates were notably high across all companies, as summarized in Table 11.

With 100% of the companies achieving more than 70% of employee participation, surpassing our 60% threshold, we have a good view of each company.

Results

Fig. 10 summarizes each company's assessment in each subcategory based on their employee rate.

Fig. 10 shows a different set of levels across the companies. For example, company B scores significantly higher than the remaining companies, and company H and F have the lowest scores.

Additionally, Customers is consistently the highest-ranked subcategory across the different companies, with Value Proposition also showing a similar trend. This pattern indicates that SMEs are externally focused but exhibit varying readiness levels when looking at the more internal subcategories. Process Management, Monitoring and Control, and Governance consistently show lower rates/scores. However, similar patterns can also be seen in some subcategories, such as Change Management or Transformation.

Fig. 11 presents the same assessment from the senior management perspective.

Although not the case in all categories, senior management's view tends to be greener and yellower than the view presented by the employees.

This conclusion is supported by Fig. 12.

Fig. 12 shows the perception gaps calculated by comparing the senior management and employee rates. We identify any perception gap above 1 point as red, representing a specific level difference. Only two companies, 17%, are completely aligned across all subcategories. In contrast, 50% of the companies show a perception gap greater than 1 point in at least 40% of the subcategories.

The results in Fig. 12 also support the idea that Customers and Value Propositions are the primary focus for SMEs. In this case, Strategic Planning, Monitoring, and Control also reflect an aligned perception. The difference between the two groups is that Customers and Value Propositions align more at a higher rate, while the latter aligns more at a lower rate.

In total, nine subcategories have a perception gap greater than 1 point in at least 40% of the companies. Notably, Innovation, Transformation, Operations, and Governance represent a perception gap in 50% of the companies, making this gap particularly significant.

One of the other indicators we extract from DORAM is the NPS, and the results of this are summarized in Fig. 13.

The general results indicate that the NPS is negative across almost all companies (75%).

Companies B and L are exceptions because they show consistently positive NPS across all the subcategories. Interestingly, they also show that NPS is closely connected to readiness levels because companies B and L also show the highest readiness levels. This pattern is observed in Company G, which shows marginally positive or medium-high NPS in almost all subcategories.

Standard deviation

In Fig. 14, we summarize the standard deviation for each company in each subcategory and calculate the minimum and maximum values for at least one subcategory. Overall, the standard deviation varies between 1.1 and 3.1 in different subcategories. We also observe that the standard deviations for Innovation, Change Management, Collaboration, Leadership, and Operations are minimal and nearly uniform across all companies. Conversely, Value Proposition, Transformation, Technology, and Culture exhibit the greatest variability, particularly for Value Proposition, Technology, and Culture. This variability is largely due to higher maximum values relative to the median in these subcategories, with differences ranging from 0.7 to 0.9.

Regression analysis

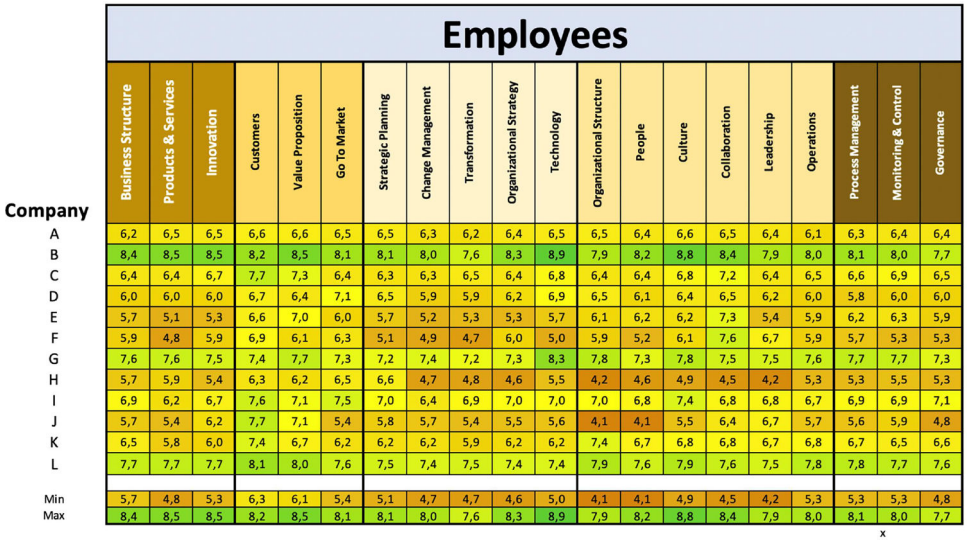
Due to the consistent high ranking of the subcategory Customers in terms of readiness levels and NPS, we performed a regression analysis to explore its relationship with the other subcategories. The results are summarized in Table 12.

The regression analysis results indicate that Go to Market, and Value Proposition each have a p-value less than 0.001, and Monitoring & Control has a p-value of 0.013. Because all p-values are below the 0.05 significance level, it can be concluded that the coefficients for these variables are different from 0 in the population. Among them, Value Proposition shows the highest standardized coefficient with a value of 0.49, indicating the most significant influence.

Together with Customers, Value Proposition consistently ranks highest in readiness levels and NPS (and lowest in gaps). Hence, we

Table 11
Employee participation rate.

Id	Company label	# Employees	Industry	Responses (%)
1	Company A	200	Advisory Services	156 (78%)
2	Company B	100	Advisory Services	81 (81%)
3	Company C	80	Healthcare	60 (75%)
4	Company D	80	Healthcare	77 (97%)
5	Company E	40	Advisory Services	29 (73%)
6	Company F	10	Manufacturing	9 (90%)
7	Company G	50	Retail	43 (86%)
8	Company H	40	Retail	30 (75%)
9	Company I	25	Manufacturing	21 (84%)
10	Company J	20	Logistics	15 (75%)
11	Company K	40	Logistics	33 (83%)
12	Company L	50	Logistics	46 (92%)

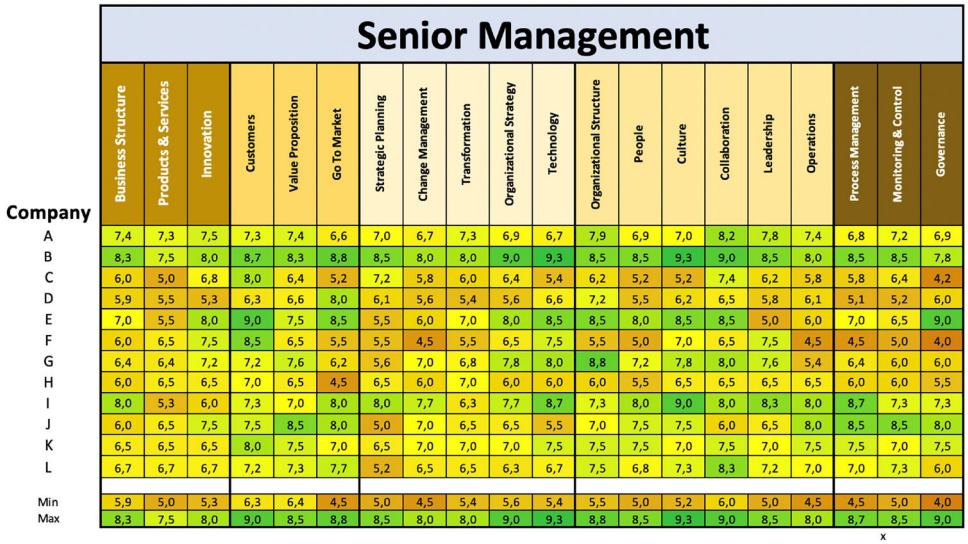


Employees

Company	Business Structure	Products & Services	Innovation	Customers	Value Proposition	Go To Market	Strategic Planning	Change Management	Transformation	Organizational Strategy	Technology	Organizational Structure	People	Culture	Collaboration	Leadership	Operations	Process Management	Monitoring & Control	Governance
A	6,2	6,5	6,5	6,6	6,6	6,5	6,5	6,3	6,2	6,4	6,5	6,5	6,4	6,6	6,5	6,4	6,1	6,3	6,4	6,4
B	8,4	8,5	8,5	8,2	8,5	8,1	8,1	8,0	7,6	8,3	8,9	7,9	8,2	8,8	8,4	7,9	8,0	8,1	8,0	7,7
C	6,4	6,4	6,7	7,7	7,3	6,4	6,3	6,3	6,5	6,4	6,8	6,4	6,4	6,8	7,2	6,4	6,5	6,6	6,9	6,5
D	6,0	6,0	6,0	6,7	6,4	7,1	6,5	5,9	5,9	6,2	6,9	6,5	6,1	6,4	6,5	6,2	6,0	5,8	6,0	6,0
E	5,7	5,1	5,3	6,6	7,0	6,0	5,7	5,2	5,3	5,3	5,7	6,1	6,2	6,2	7,3	5,4	5,9	6,2	6,3	5,9
F	5,9	4,8	5,9	6,9	6,1	6,3	5,1	4,9	4,7	6,0	5,0	5,9	5,2	6,1	7,6	6,7	5,9	5,7	5,3	5,3
G	7,6	7,6	7,5	7,4	7,7	7,3	7,2	7,4	7,2	7,3	8,3	7,8	7,3	7,8	7,5	7,5	7,6	7,7	7,7	7,3
H	5,7	5,9	5,4	6,3	6,2	6,5	6,6	4,7	4,8	4,6	5,5	4,2	4,6	4,9	4,5	4,2	5,3	5,3	5,5	5,3
I	6,9	6,2	6,7	7,6	7,1	7,5	7,0	6,4	6,9	7,0	7,0	7,0	6,8	7,4	6,8	6,8	6,7	6,9	6,9	7,1
J	5,7	5,4	6,2	7,7	7,1	5,4	5,8	5,7	5,4	5,5	5,6	4,1	4,1	5,5	6,4	6,7	5,7	5,6	5,9	4,8
K	6,5	5,8	6,0	7,4	6,7	6,2	6,2	6,2	5,9	6,2	6,2	7,4	6,7	6,8	6,8	6,7	6,8	6,7	6,5	6,6
L	7,7	7,7	7,7	8,1	8,0	7,6	7,5	7,4	7,5	7,4	7,4	7,9	7,6	7,9	7,6	7,5	7,8	7,8	7,7	7,6
Min	5,7	4,8	5,3	6,3	6,1	5,4	5,1	4,7	4,7	4,6	5,0	4,1	4,1	4,9	4,5	4,2	5,3	5,3	5,3	4,8
Max	8,4	8,5	8,5	8,2	8,5	8,1	8,1	8,0	7,6	8,3	8,9	7,9	8,2	8,8	8,4	7,9	8,0	8,1	8,0	7,7

x

Fig. 10. Aggregate view of the assessment results for all companies in each dimension.



Senior Management

Company	Business Structure	Products & Services	Innovation	Customers	Value Proposition	Go To Market	Strategic Planning	Change Management	Transformation	Organizational Strategy	Technology	Organizational Structure	People	Culture	Collaboration	Leadership	Operations	Process Management	Monitoring & Control	Governance
A	7,4	7,3	7,5	7,3	7,4	6,6	7,0	6,7	7,3	6,9	6,7	7,9	6,9	7,0	8,2	7,8	7,4	6,8	7,2	6,9
B	8,3	7,5	8,0	8,7	8,3	8,8	8,5	8,0	8,0	9,0	9,3	8,5	8,5	9,3	9,0	8,5	8,0	8,5	8,5	7,8
C	6,0	5,0	6,8	8,0	6,4	5,2	7,2	5,8	6,0	6,4	5,4	6,2	5,2	5,2	7,4	6,2	5,8	5,8	6,4	4,2
D	5,9	5,5	5,3	6,3	6,6	8,0	6,1	5,6	5,4	5,6	6,6	7,2	5,5	6,2	6,5	5,8	6,1	5,1	5,2	6,0
E	7,0	5,5	8,0	9,0	7,5	8,5	5,5	6,0	7,0	8,0	8,5	8,5	8,0	8,5	8,5	5,0	6,0	7,0	6,5	9,0
F	6,0	6,5	7,5	8,5	6,5	5,5	5,5	4,5	5,5	6,5	7,5	5,5	5,0	7,0	6,5	7,5	4,5	4,5	5,0	4,0
G	6,4	6,4	7,2	7,2	7,6	6,2	5,6	7,0	6,8	7,8	8,0	8,8	7,2	7,8	8,0	7,6	5,4	6,4	6,0	6,0
H	6,0	6,5	6,5	7,0	6,5	4,5	6,5	6,0	7,0	6,0	6,0	6,0	5,5	6,5	6,5	6,5	6,5	6,0	6,0	5,5
I	8,0	5,3	6,0	7,3	7,0	8,0	8,0	7,7	6,3	7,7	8,7	7,3	8,0	9,0	8,0	8,3	8,0	8,7	7,3	7,3
J	6,0	6,5	7,5	7,5	8,5	8,0	5,0	7,0	6,5	6,5	5,5	7,0	7,5	7,5	6,0	6,5	8,0	8,5	8,5	8,0
K	6,5	6,5	6,5	8,0	7,5	7,0	6,5	7,0	7,0	7,0	7,5	7,5	7,5	7,0	7,5	7,0	7,5	7,5	7,0	7,5
L	6,7	6,7	6,7	7,2	7,3	7,7	5,2	6,5	6,5	6,3	6,7	7,5	6,8	7,3	8,3	7,2	7,0	7,0	7,3	6,0
Min	5,9	5,0	5,3	6,3	6,4	4,5	5,0	4,5	5,4	5,6	5,4	5,5	5,0	5,2	6,0	5,0	4,5	4,5	5,0	4,0
Max	8,3	7,5	8,0	9,0	8,5	8,8	8,5	8,0	8,0	9,0	9,3	8,8	8,5	9,3	9,0	8,5	8,0	8,7	8,5	9,0

x

Fig. 11. Aggregate view of senior management assessment in each dimension.

conducted a similar regression analysis to understand its relationship to the remaining subcategories. The results are summarized in Table 13.

The results in Table 13 indicate that Innovation, Customers, Go to Market, Organizational Structure, and People are the subcategories with p-values < 0.05.

The regression analysis results indicate that Innovation, Customers, and People each have a p-value less than 0.001, Go to Market has a p-value of 0.009, and Organizational Structure has a p-value of 0.026. Since all p-values are below the 0.05 significance level, it can be concluded that the coefficients for these variables are different from 0 in the population. Among them, Customers shows the highest standardized coefficient with a value of 0.38, indicating the most significant influence.

In a similar analysis, we examined the subcategories of Change Management, Transformation, and Operations, which are at the low end of the readiness assessment in the different analyses.

In Table 14, we summarize the regression analysis results for Change Management.

The regression analysis results indicate that all examined subcategories have significant coefficients. Strategic Planning, Transformation, and Organizational Strategy each have a p-value less than 0.001, Culture has a p-value of 0.039, and Operations has a p-value of 0.006. Because all p-values are below the 0.05 significance level, it can be concluded that the coefficients for these variables are different from 0 in the population. Among them, Transformation shows the highest standardized coefficient with a value of 0.39, indicating the most significant influence. The remaining subcategories exhibit smaller influences, with coefficients of 0.16, 0.17, 0.09 and 0.11.

In Table 15, we summarize the results of the regression analysis of Transformation.

The regression analysis results indicate that Change Management and Organizational Strategy each have a p-value less than 0.001, Leadership has a p-value of 0.013, Governance has a p-value of 0.007, Products & Services has a p-value of 0.025, and Strategic Planning has a p-value of 0.002. Because all p values are below the 0.05 significance level, it can be concluded that the coefficients for these variables are different from 0 in the population. Change Management shows the highest standardized coefficient, with a value of 0.38, indicating the most significant influence.

In Table 16, we summarize the results of the regression analysis of

Perception Gap

Company	Business Structure	Products & Services	Innovation	Customers	Value Proposition	Go To Market	Strategic Planning	Change Management	Transformation	Organizational Strategy	Technology	Organizational Structure	People	Culture	Collaboration	Leadership	Operations	Process Management	Monitoring & Control	Governance	
A	-1,2	-0,8	-1,0	-0,6	-0,8	-0,1	-0,5	-0,4	-1,0	-0,5	-0,2	-1,4	-0,5	-0,4	-1,7	-1,4	-1,3	-0,5	-0,8	-0,5	35%
B	0,0	-1,0	-0,5	-0,5	-0,2	-0,8	-0,4	0,0	-0,4	-0,7	-0,4	-0,6	-0,3	-0,6	-0,6	-0,6	0,0	-0,4	-0,5	-0,2	0%
C	-0,4	-1,4	-0,1	-0,3	-0,9	-1,2	-0,9	-0,5	-0,5	-0,1	-1,4	-0,1	-1,2	-1,6	-0,3	-0,2	-0,7	-0,8	-0,4	-2,3	30%
D	0,0	-0,5	-0,7	-0,4	-0,2	-0,9	-0,4	-0,2	-0,5	-0,6	-0,3	-0,7	-0,6	-0,2	-0,1	-0,4	-0,1	-0,7	-0,7	0,0	0%
E	-1,3	-0,4	-2,7	-2,4	-0,5	-2,5	-0,2	-0,8	-1,7	-2,7	-2,8	-2,4	-1,8	-2,3	-1,2	-0,4	-0,1	-0,8	-0,2	-3,1	60%
F	-0,1	-1,7	-1,6	-1,6	-0,4	-0,8	-0,4	-0,4	-0,8	-0,5	-2,5	-0,4	-0,2	-0,9	-1,1	-0,8	-1,4	-1,2	-0,3	-1,3	40%
G	-1,2	-1,2	-0,3	-0,2	-0,1	-1,1	-1,6	-0,4	-0,4	-0,5	-0,3	-1,0	-0,1	0,0	-0,5	-0,1	-2,2	-1,3	-1,7	-1,3	40%
H	-0,3	-0,6	-1,1	-0,7	-0,3	-2,0	-0,1	-1,3	-2,2	-1,4	-0,5	-1,8	-0,9	-1,6	-2,0	-2,3	-1,2	-0,7	-0,5	-0,2	50%
I	-1,1	-0,9	-0,7	-0,2	-0,1	-0,5	-1,0	-1,2	-0,5	-0,7	-1,7	-0,3	-1,2	-1,6	-1,2	-1,6	-1,3	-1,8	-0,5	-0,2	45%
J	-0,3	-1,1	-1,3	-0,2	-1,4	-2,6	-0,8	-1,3	-1,1	-1,0	-0,1	-2,9	-3,4	-2,0	-0,4	-0,2	-2,3	-2,9	-2,6	-3,2	70%
K	0,0	-0,7	-0,5	-0,6	-0,8	-0,8	-0,3	-0,8	-1,1	-0,8	-1,3	-0,1	-0,8	-0,2	-0,7	-0,3	-0,7	-0,8	-0,5	-0,9	10%
L	-1,0	-1,1	-1,1	-1,0	-0,6	-0,1	-2,4	-0,9	-1,0	-1,1	-0,7	-0,4	-0,7	-0,6	-0,7	-0,3	-0,8	-0,8	-0,4	-1,6	30%
Min	-1,3	-1,7	-2,7	-2,4	-1,4	-2,6	-2,4	-1,3	-2,2	-2,7	-2,8	-2,9	-3,4	-2,3	-2,0	-2,3	-2,3	-2,9	-2,6	-3,2	
Max	0,0	-0,4	-0,1	-0,2	-0,1	-0,1	-0,1	0,0	-0,4	-0,1	-0,1	-0,1	-0,1	0,0	-0,1	-0,1	0,0	-0,4	-0,2	0,0	
PG%	33%	42%	50%	17%	8%	42%	17%	25%	50%	33%	42%	33%	33%	42%	42%	25%	50%	33%	17%	50%	

Fig. 12. Perception gap of each subcategory in each company.

NET PROMOTER SCORE

Company	Business Structure	Products & Services	Innovation	Customers	Value Proposition	Go To Market	Strategic Planning	Change Management	Transformation	Organizational Strategy	Technology	Organizational Structure	People	Culture	Collaboration	Leadership	Operations	Process Management	Monitoring & Control	Governance
A	-50,3	-37,4	-42,6	-35,5	-35,5	-36,8	-38,1	-41,9	-51,6	-42,6	-33,5	-32,9	-44,5	-36,8	-34,8	-38,7	-47,7	-44,5	-43,9	-39,4
B	46,7	46,7	40,0	46,7	66,7	33,3	33,3	33,3	20,0	53,3	80,0	60,0	26,7	40,0	40,0	53,3	20,0	13,3	20,0	13,3
C	-35,0	-35,0	-13,3	21,7	1,7	-26,7	-35,0	-30,0	-21,7	-25,0	-10,0	-15,0	-20,0	-15,0	0,0	-21,7	-15,0	-15,0	-13,3	-20,0
D	-51,9	-50,6	-53,2	-24,7	-36,4	-11,7	-31,2	-49,4	-53,2	-39,0	-15,6	-20,8	-39,0	-29,9	-23,4	-36,4	-45,5	-50,6	-46,8	-41,6
E	-48,3	-65,5	-72,4	-31,0	-6,9	-24,1	-58,6	-55,2	-55,2	-58,6	-44,8	-27,6	-37,9	-37,9	-3,4	-58,6	-44,8	-34,5	-34,5	-37,9
F	-44,4	-77,8	-44,4	-11,1	-33,3	-22,2	-55,6	-66,7	-55,6	-44,4	-44,4	-44,4	-55,6	-22,2	0,0	0,0	-44,4	-44,4	-33,3	-44,4
G	29,4	17,6	17,6	-17,6	17,6	5,9	11,8	5,9	-5,9	0,0	29,4	5,9	0,0	23,5	11,8	5,9	17,6	11,8	11,8	11,8
H	-46,4	-50,0	-53,6	-17,9	-28,6	-21,4	-14,3	-67,9	-75,0	-67,9	-39,3	-67,9	-64,3	-67,9	-64,3	-82,1	-42,9	-53,6	-53,6	-50,0
I	-21,1	-52,6	-21,1	5,3	-5,3	5,3	-31,6	-47,4	-15,8	-10,5	-10,5	-5,3	-5,3	15,8	-26,3	-15,8	-31,6	-31,6	-26,3	-5,3
J	-66,7	-80,0	-46,7	20,0	-6,7	-66,7	-46,7	-60,0	-73,3	-73,3	-53,3	-86,7	-93,3	-73,3	-40,0	-20,0	-53,3	-53,3	-46,7	-73,3
K	-27,3	-42,4	-42,4	12,1	-12,1	-39,4	-36,4	-36,4	-39,4	-36,4	-33,3	6,1	-12,1	-6,1	-3,0	-21,2	-15,2	-21,2	-18,2	-9,1
L	16,1	22,6	25,8	54,8	51,6	32,3	19,4	12,9	19,4	19,4	25,8	54,8	32,3	54,8	41,9	22,6	45,2	38,7	38,7	29,0

Fig. 13. Perception gap of each subcategory in each company.

Operations.

The regression analysis results indicate that People, Leadership, and Monitoring & Control each have a *p*-value less than 0.001, Innovation has a *p*-value of 0.003, and Change Management has a *p*-value of 0.006. Because all *p*-values are below the 0.05 significance level, it can be concluded that the coefficients for these variables are different from 0 in the population. Among them, Leadership shows the highest standardized coefficient with a value of 0.23, indicating the most significant influence.

Descriptive analysis

Lastly, to understand how the industry segment affects readiness levels, we analyzed the overall results based on the company's industry segment.

Fig. 15 represents the frequency of responses by industry.

Although the advisory services and healthcare industries account for many of the responses, each industry provides a reasonable number of relevant answers for our analysis.

Fig. 16 summarizes the mean readiness rates of all employees, broken down by industry segment.

Considering the segments, the data presented in Fig. 16 offer insights that align with previous data in this research. However, the figure also provides additional data points.

Once again, the data confirm that Customers and Value Propositions are the most advanced behaviors across all segments. In four segments (60%—80%), the rate is above 7, indicating a structured readiness level. As in previous data, People and Culture rank among the top four most advanced behaviors, with 60% of segments also rating above 7 (structured).

The segment-based analysis reveals that Change Management, Transformation, and Governance have the lowest readiness levels across all segments. This finding is further confirmed when we apply the mean of means, which is the segment average.

From a segment perspective, Advisory Services shows the highest readiness level in seven subcategories: Products and Services, Innovation, Organizational Structure, Technology, People, Culture, and

Company	Business Structure	Products & Services	Innovation	Customers	Value Proposition	Go To Market	Strategic Planning	Change Management	Transformation	Organizational Strategy	Technology	Organizational Structure	People	Culture	Collaboration	Leadership	Operations	Process Management	Monitoring & Control	Governance
A	2,3	2,3	2,3	2,3	2,2	2,3	2,2	2,3	2,2	2,2	2,5	2,5	2,2	2,4	2,4	2,5	2,4	2,3	2,3	2,4
B	1,7	1,9	1,7	2	1,7	1,9	1,9	1,9	2,2	1,9	1,7	2,3	2	1,6	1,8	2,1	2	2	2,2	2,2
C	2,2	2,2	2,3	2,4	2,3	2,5	2,3	2,5	2,5	2,4	2,6	2,9	2,6	2,2	2,4	2,5	2,6	2,5	2,5	2,7
D	2,2	2	1,9	2,2	2,1	2,2	1,9	2,1	2	2	2	2,4	2,1	2,1	2,3	2,1	2,2	2,2	2,1	2,2
E	2,3	2,2	1,9	2,3	2,3	3	2	2,5	2,4	2,4	2,6	2,7	2,1	2,1	2,3	2,3	2,4	2,2	2,1	2,5
F	2,1	2,1	1,9	2,3	2,9	2	2,9	2,2	2,7	2,3	3,1	2,5	2,3	2,8	1,7	2,4	2,5	2,7	2,9	3
G	2	2	2	2	2	2,1	2	2	1,9	2	1,7	2,1	2,2	1,9	2,1	2	2,1	1,8	1,9	2,2
H	2,3	2,2	2,4	2,3	2,3	2,2	2,2	2	2,4	2,4	2,5	2,3	2,5	2,3	2,1	2,1	2,4	2,4	2,2	2,4
I	2,2	2	2,2	1,9	1,9	1,8	1,7	1,9	2	2,1	2,1	2,5	2,6	2,1	2,1	2,2	1,9	1,8	2,1	2
J	1,4	1,4	1,9	1,2	1,4	1,7	2	1,7	1,5	1,8	2,2	1,8	1,4	1,1	1,9	2	2,4	2,2	2,2	2,3
K	2,3	2,4	2,2	2,3	2,5	2,1	2,3	2,1	2,3	2,2	2,2	2,2	2,3	2,4	2,4	2,1	2,2	2,3	2,5	2,6
L	2	2	2,1	2	2,1	2,3	2,1	2,2	2,1	2,1	2,1	2,3	2,2	1,9	2,4	2,1	2	1,9	1,9	2,1
Min	1,4	1,4	1,7	1,2	1,4	1,7	1,7	1,7	1,5	1,8	1,7	1,8	1,4	1,1	1,7	2	1,9	1,8	1,9	2
Max	2,3	2,4	2,4	2,4	2,9	3	2,9	2,5	2,7	2,4	3,1	2,9	2,6	2,8	2,4	2,5	2,6	2,7	2,9	3
Diff	**0,9**	**1**	**0,7**	**1,2**	**1,5**	**1,2**	**1,2**	**0,8**	**1,3**	**0,6**	**1,5**	**1,1**	**1,2**	**1,7**	**0,7**	**0,6**	**0,7**	**0,9**	**1**	**1**
Median	2,2	2,1	2,1	2,3	2,2	2,2	2,1	2,1	2,2	2,2	2,2	2,4	2,2	2,1	2,2	2,1	2,3	2,2	2,2	2,4

Fig. 14. Standard deviation across each company and subcategory.

Table 12
Regression analysis of customers.

	Unstandardized coefficients	Standardized coefficients				95% Confidence interval for B	
Model	B	Beta	Standard error	t	p	Lower bound	Upper bound
(Constant)	0.79		0.19	4.05	<0.001	0.4	1.17
BUSINESS STRUCTURE	0.07	0.08	0.04	1.89	.06	0	0.15
PRODUCTS & SERVICES	0.07	0.07	0.05	1.58	.115	-0.02	0.16
INNOVATION	-0.02	-0.02	0.05	-0.51	.614	-0.12	0.07
VALUE PROPOSITION	0.49	0.49	0.04	11.52	<0.001	0.4	0.57
GO TO MARKET	0.17	0.17	0.04	4.15	<0.001	0.09	0.24
STRATEGIC PLANNING	0.01	0.01	0.05	0.25	.806	-0.09	0.11
CHANGE MANAGEMENT	0.06	0.06	0.05	1.19	.233	-0.04	0.16
TRANSFORMATION	-0.04	-0.04	0.05	-0.72	.472	-0.13	0.06
ORGANIZATIONAL STRATEGY	0.06	0.06	0.05	1.24	.217	-0.04	0.15
TECHNOLOGY	-0.01	-0.01	0.04	-0.18	.86	-0.08	0.07
ORGANIZATIONAL STRUCTURE	0.05	0.05	0.04	1.3	.193	-0.02	0.12
PEOPLE	-0.07	-0.08	0.05	-1.6	.111	-0.16	0.02
CULTURE	-0.04	-0.04	0.05	-0.82	.414	-0.15	0.06
COLLABORATION	0.05	0.06	0.04	1.34	.18	-0.03	0.13
LEADERSHIP	0.02	0.02	0.04	0.55	.582	-0.06	0.1
OPERATIONS	-0.08	-0.08	0.05	-1.61	.108	-0.17	0.02
PROCESS MANAGEMENT	0.03	0.03	0.05	0.58	.56	-0.07	0.12
MONITORING & CONTROL	0.13	0.13	0.05	2.5	.013	0.03	0.23
GOVERNANCE	-0.02	-0.03	0.04	-0.54	.588	-0.11	0.06

Collaboration. We can also observe that Logistics shows the most advanced readiness level in 11 subcategories: Business Structure, Customers, Value Proposition, Change Management, Transformation, Organizational Structure, Leadership, Operations, Process Management, Monitoring and Control, and Governance.

On the lower end of the readiness scale, the healthcare segment stands out, with more than 50% of its subcategories rated at the lowest level (11 out of 20), followed by Retail at 30% and Manufacturing at 15%.

Lastly, from a readiness level, in the Manufacturing segment, Products and Services and Change Management are identified as the lowest rated of all different subcategories across all the segments. In contrast, Customers and Value Propositions in the Logistics segment are rated at the most advanced level.

Discussion

One of the initial challenges companies indicated while executing the study was the fear of low participation, based on their experiences with previous surveys. Although this issue has been identified as a challenge across all companies, our study achieved a strong participation rate, consistently above 73%, with the majority of companies (58%) exceeding 80%. During the execution of the assessment, employees were given one week to complete it, during which senior management issued a mid-week reminder, which proved effective. While we cannot fully deduce why our participation rate was relatively high, it appears to be strongly linked to the high commitment of senior management, which positively reflected on their teams, even in companies with as few as nine employees and as many as 200. This level of participation is fundamental because it allows us to look at the data and draw conclusions that are more relatable to the company due to a significant percentage of their employees being reflected in the results. This fact has enabled us to have more candid conversations with the different companies when presenting the results. Companies further indicated that this assessment was a valid representation of their workforce, thus enhancing the validity of our findings.

Looking at the readiness levels, the results vary from company to company and subcategory to subcategory, which indicates that the model is neither biased nor skewed. Our objective was not to explain the reasons behind different variations but to reveal them to the different

Table 13
Regression analysis of value proposition.

	Unstandardized coefficients	Standardized coefficients				95% confidence interval for B	
Model	B	Beta	Standard error	t	p	Lower bound	Upper bound
(Constant)	0.31		0.17	1.79	.073	-0.03	0.66
BUSINESS STRUCTURE	-0.03	-0.03	0.04	-0.96	.34	-0.1	0.04
PRODUCTS & SERVICES	-0.01	-0.01	0.04	-0.16	.876	-0.09	0.07
INNOVATION	0.15	0.16	0.04	3.62	<0.001	0.07	0.24
CUSTOMERS	0.38	0.38	0.03	11.52	<0.001	0.32	0.45
GO TO MARKET	0.09	0.1	0.04	2.61	.009	0.02	0.16
STRATEGIC PLANNING	0.08	0.08	0.05	1.86	.063	0	0.17
CHANGE MANAGEMENT	0.06	0.06	0.04	1.27	.206	-0.03	0.14
TRANSFORMATION	0.02	0.02	0.04	0.5	.618	-0.07	0.11
ORGANIZATIONAL STRATEGY	-0.02	-0.02	0.04	-0.55	.583	-0.11	0.06
TECHNOLOGY	0.03	0.03	0.03	0.8	.421	-0.04	0.09
ORGANIZATIONAL STRUCTURE	-0.07	-0.08	0.03	-2.24	.026	-0.13	-0.01
PEOPLE	0.16	0.17	0.04	3.85	<0.001	0.08	0.24
CULTURE	0.02	0.02	0.05	0.4	.692	-0.07	0.11
COLLABORATION	0.02	0.02	0.04	0.59	.558	-0.05	0.09
LEADERSHIP	0.01	0.01	0.04	0.16	.875	-0.07	0.08
OPERATIONS	0.01	0.01	0.04	0.28	.78	-0.07	0.1
PROCESS MANAGEMENT	0	0	0.04	0.01	.99	-0.08	0.08
MONITORING & CONTROL	0.08	0.08	0.05	1.7	.09	-0.01	0.17
GOVERNANCE	0.01	0.01	0.04	0.24	.813	-0.07	0.09

Table 14
Regression analysis of change management.

	Unstandardized coefficients	Standardized coefficients				95% confidence interval for B	
Model	B	Beta	Standard error	t	p	Lower bound	Upper bound
(Constant)	-0.17		0.17	-1.04	.298	-0.5	0.16
BUSINESS STRUCTURE	0.03	0.03	0.03	1.03	.306	-0.03	0.1
PRODUCTS & SERVICES	0.03	0.03	0.04	0.89	.371	-0.04	0.11
INNOVATION	0	0	0.04	-0.08	.933	-0.08	0.08
CUSTOMERS	0.04	0.04	0.04	1.19	.233	-0.03	0.11
VALUE PROPOSITION	0.05	0.05	0.04	1.27	.206	-0.03	0.13
GO TO MARKET	-0.05	-0.05	0.03	-1.51	.131	-0.12	0.02
STRATEGIC PLANNING	0.17	0.16	0.04	4.09	<0.001	0.09	0.26
TRANSFORMATION	0.39	0.39	0.04	9.96	<0.001	0.31	0.47
ORGANIZATIONAL STRATEGY	0.17	0.17	0.04	4.26	<0.001	0.09	0.25
TECHNOLOGY	0.01	0.01	0.03	0.44	.657	-0.05	0.08
ORGANIZATIONAL STRUCTURE	-0.03	-0.04	0.03	-1.12	.263	-0.09	0.03
PEOPLE	0.02	0.02	0.04	0.44	.657	-0.06	0.09
CULTURE	0.09	0.09	0.04	2.07	.039	0	0.18
COLLABORATION	-0.01	-0.01	0.03	-0.36	.721	-0.08	0.05
LEADERSHIP	-0.02	-0.03	0.03	-0.72	.473	-0.09	0.04
OPERATIONS	0.11	0.11	0.04	2.77	.006	0.03	0.19
PROCESS MANAGEMENT	0.03	0.03	0.04	0.65	.517	-0.05	0.1
MONITORING & CONTROL	-0.06	-0.06	0.04	-1.45	.149	-0.15	0.02
GOVERNANCE	0.04	0.04	0.04	0.97	.334	-0.04	0.11

companies and extract as many insights as possible from this study. This objective was achieved. By implementing the DORAM across 12 companies, we gathered some valuable insights that support previous research and contribute new data to the research field of SMEs and their DT. One of the first findings is related to the precise pattern that puts the subcategory Customers and Value Proposition at the highest level of readiness within organizations. This consistency indicates a substantial market-centric approach that is prevalent among SMEs. Ultimately, defining these subcategories at the highest level of readiness indicates that most companies believe they center their strategies around customers, understand their needs, use these insights to improve their relationships, and map their value proposition to match that understanding.

That market-centric approach is, however, not supported by a similar level of readiness in process, change, or transformational aspects, which could pose significant challenges for these organizations when they plan to scale. Specifically, subcategories such as Change Management, Transformation, Governance, Monitoring and Control, and Operations exhibit the lowest readiness levels overall. This finding is important because these five subcategories focus on how companies structure significant changes, operate with providers, and govern their projects or funds. These two extremes draw a perspective that SMEs may be better prepared (ready) in customer-centric areas, reflecting strong commercial behaviors. It does not mean they have the maturity to achieve it, but at least they present the right behaviors. However, they may present more profound limitations regarding behaviors needed in the more structural areas that enable scale and control over their resources.

Another key finding from our research is the confirmation that employees and senior management share different perceptions of the same behaviors across their organization. This gap is evident in both smaller and larger companies in the range of SMEs. Our study demonstrates that at least 58% of the companies present a perception gap of at least 1 point (representing at least one level difference) in 40% or more of the subcategories. That gap is significant when we look at the impact it may have in the companies. When we discuss the state of being ready, and we confirm that there is different understanding of that state across employees and their senior management, it suggests that efforts to reconcile these differing perceptions may be necessary before introducing

Table 15
Regression analysis of transformation.

	Unstandardized coefficients	Standardized coefficients				95% confidence interval for B	
Model	B	Beta	Standard error	t	p	Lower bound	Upper bound
(Constant)	-0.1		0.16	-0.58	.562	-0.42	0.23
BUSINESS STRUCTURE	0	0	0.03	0.03	.977	-0.06	0.07
PRODUCTS & SERVICES	-0.09	-0.08	0.04	-2.25	.025	-0.16	-0.01
INNOVATION	0.03	0.03	0.04	0.81	.417	-0.05	0.11
CUSTOMERS	-0.02	-0.02	0.03	-0.72	.472	-0.09	0.04
VALUE PROPOSITION	0.02	0.02	0.04	0.5	.618	-0.06	0.1
GO TO MARKET	0.02	0.02	0.03	0.68	.498	-0.04	0.09
STRATEGIC PLANNING	0.13	0.12	0.04	3.14	.002	0.05	0.22
CHANGE MANAGEMENT	0.38	0.38	0.04	9.96	<0.001	0.3	0.45
ORGANIZATIONAL STRATEGY	0.22	0.22	0.04	5.57	<0.001	0.14	0.3
TECHNOLOGY	0	0	0.03	0.02	.981	-0.06	0.06
ORGANIZATIONAL STRUCTURE	0.06	0.06	0.03	1.92	.056	0	0.11
PEOPLE	0.06	0.06	0.04	1.44	.149	-0.02	0.13
CULTURE	-0.06	-0.06	0.04	-1.39	.164	-0.15	0.03
COLLABORATION	0	0	0.03	-0.01	.99	-0.07	0.07
LEADERSHIP	0.08	0.09	0.03	2.49	.013	0.02	0.15
OPERATIONS	0	0	0.04	-0.01	.988	-0.08	0.08
PROCESS MANAGEMENT	-0.02	-0.02	0.04	-0.51	.61	-0.1	0.06
MONITORING & CONTROL	0.08	0.08	0.04	1.87	.061	0	0.16
GOVERNANCE	0.1	0.1	0.04	2.72	.007	0.03	0.17

Table 16
Regression analysis of operations.

	Unstandardized coefficients	Standardized coefficients				95% confidence interval for B	
Model	B	Beta	Standard error	t	p	Lower bound	Upper bound
(Constant)	-0.18		0.17	-1.06	.291	-0.52	0.16
BUSINESS STRUCTURE	0.03	0.03	0.03	1	.317	-0.03	0.1
PRODUCTS & SERVICES	-0.05	-0.05	0.04	-1.29	.196	-0.13	0.03
INNOVATION	0.13	0.12	0.04	3.03	.003	0.04	0.21
CUSTOMERS	-0.06	-0.05	0.04	-1.61	.108	-0.13	0.01
VALUE PROPOSITION	0.01	0.01	0.04	0.28	.78	-0.07	0.09
GO TO MARKET	0.08	0.08	0.04	2.26	.024	0.01	0.15
STRATEGIC PLANNING	-0.02	-0.02	0.04	-0.42	.672	-0.11	0.07
CHANGE MANAGEMENT	0.12	0.12	0.04	2.77	.006	0.03	0.2
TRANSFORMATION	0	0	0.04	-0.01	.988	-0.09	0.09
ORGANIZATIONAL STRATEGY	-0.08	-0.07	0.04	-1.8	.072	-0.16	0.01
TECHNOLOGY	0.01	0.01	0.03	0.28	.776	-0.06	0.07
ORGANIZATIONAL STRUCTURE	0.04	0.04	0.03	1.34	.182	-0.02	0.1
PEOPLE	0.14	0.14	0.04	3.6	<0.001	0.06	0.22
CULTURE	0.02	0.02	0.05	0.43	.667	-0.07	0.11
COLLABORATION	0	0	0.03	0.01	.988	-0.07	0.07
LEADERSHIP	0.23	0.23	0.03	6.72	<0.001	0.16	0.3
PROCESS MANAGEMENT	0.12	0.12	0.04	3.06	.002	0.04	0.21
MONITORING & CONTROL	0.17	0.17	0.04	3.8	<0.001	0.08	0.26
GOVERNANCE	0.12	0.12	0.04	3.12	.002	0.04	0.19

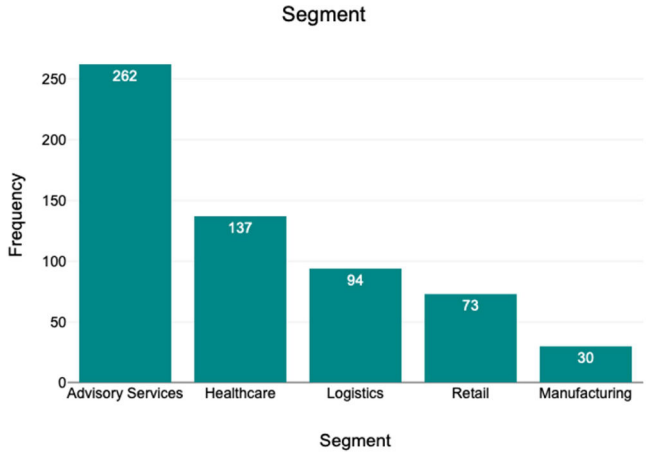


Fig. 15. Frequency of responses by industry segment.

measures to increase readiness levels. Only 17% of the companies did not present at least one subcategory with a perception gap greater than 1 point. Also, in the perception gap analysis, we find data to back up the more evolved state of readiness in the subcategories Customers and Value Proposition because, in addition to being the highest rated, they also have some of the smallest perception gaps. This data point reinforces our previous finding that companies are aligned between employees and senior management and that the companies are market centric. In contrast, subcategories such as Transformation, Operations, and Governance frequently exhibit larger perception gaps (greater than 1 point in more than 50% of the cases).

In our study, we also analyzed the NPS of each subcategory by simply subtracting the percentage of promoters (rating readiness level as 9 or 10) from the percentage of detractors (rating the readiness level as less than or equal to 6). We found that in 75% of the companies, the NPS is consistently negative across all subcategories. This NPS is a good indicator of when companies plan to take action to improve their target behaviors. Although it is impossible to draw a definitive conclusion, a higher level of promoters generally indicates less effort needed to raise

	Business Structure	Products & Services	Innovation	Customers	Value Proposition	Go To Market	Strategic Planning	Change Management	Transformation	Organizational Strategy	Technology	Organizational Structure	People	Culture	Collaboration	Leadership	Operations	Process Management	Monitoring & Control	Governance
Advisory Services	6,84	6,94	6,99	7,14	7,26	6,93	6,94	6,71	6,55	6,9	7,17	6,93	6,97	7,22	7,2	6,78	6,68	6,9	6,89	6,77
Healthcare	6,15	6,18	6,32	7,12	6,77	6,77	6,42	6,05	6,15	6,26	6,88	6,46	6,21	6,57	6,76	6,28	6,18	6,14	6,35	6,18
Logistics	6,96	6,68	6,87	7,81	7,37	6,77	6,8	6,72	6,62	6,66	6,7	7,11	6,71	7,15	7,16	7,09	7,11	7,04	7,03	6,79
Retail	6,82	6,92	6,6	6,96	7,08	6,96	6,99	6,29	6,22	6,22	7,15	6,33	6,19	6,62	6,3	6,14	6,66	6,75	6,75	6,51
Manufacturing	6,57	5,77	6,43	7,37	6,83	7,13	6,47	5,97	6,2	6,67	6,37	6,67	6,33	7,03	7	6,73	6,47	6,5	6,4	6,57
Max	6,96	6,94	6,99	7,81	7,37	7,13	6,99	6,72	6,62	6,9	7,17	7,11	6,97	7,22	7,2	7,09	7,11	7,04	7,03	6,79
Min	6,15	5,77	6,32	6,96	6,77	6,77	6,42	5,97	6,15	6,22	6,37	6,33	6,19	6,57	6,3	6,14	6,18	6,14	6,35	6,18
Mean of Mean	6,67	6,50	6,64	7,28	7,06	6,91	6,72	6,35	6,35	6,54	6,85	6,70	6,48	6,92	6,88	6,60	6,62	6,67	6,68	6,56
>7	100%	100%	100%	20%	40%	80%	100%	100%	100%	100%	60%	80%	100%	40%	40%	80%	80%	80%	80%	100%
<7	0%	0%	0%	80%	60%	20%	0%	0%	0%	0%	40%	20%	0%	60%	60%	20%	20%	20%	20%	0%

Fig. 16. Mean broken down by segment.

awareness and drive target behaviors. Certain behaviors are expected to be more advanced in some areas of the company than others, and this NPS can serve as a good indicator of how many of those areas are in an advanced state in their perception. Accordingly, subcategories with higher NPS might represent stronger allies to help the organization evolve.

Nevertheless, in this case, SMEs face a significant challenge because the NPS indicator is clearly on the negative side of the assessment. It is not surprising that the highest NPS scores are consistently found in the subcategories of Customers and Value Proposition, whereas the lowest are in Change Management and Transformation. During the data analysis, we aimed to understand the impact of immature and unstructured levels (as rated by employees) compared to structured and advanced levels. This analysis confirmed our previous findings, once again showing that Customers and Value Proposition are the subcategories that demonstrate the highest level of readiness, already reaching structured or advanced levels. This exercise also shows that Culture and Collaboration are two subcategories demonstrating higher readiness levels, though they are behind the other two. Still, this finding is important, suggesting that SMEs could leverage their culture and learner collaboration to be more customer centric and deliver greater value to their market.

The standard deviation analysis reveals that companies vary between 1.1 and 3.1 depending on the subcategory. However, it is safe to state that the standard deviation ranges, on average, between 2.1 and 2.4. For instance, we can see companies such as Company B with lower deviations, representing a higher level of alignment in the readiness level assessment provided by all employees. Change Management, Collaboration, Leadership, and Operations show the smallest range between minimum and maximum deviations across all companies, suggesting these areas have the highest level of alignment. Although, this alignment does not necessarily indicate a high or low level of readiness, it provides a good indicator of the potential effort required for implementing change. Greater variability in understanding the state of readiness suggests that more effort may be needed to align baseline perceptions. In a more specific analysis, the ones that mark the most absolute alignment are the subcategories in company J, such as Customers and Culture, whereas the lowest level of alignment is exhibited by Company F in Technology, and Company E in Go to Market.

Due to the continuous identification of Customers and Value Proposition at the high end of the readiness level, together with Change Management, Transformation, and Operations at the low end, we conducted regression analyses to understand the relationship between these subcategories and the remaining ones in the model. We can see Customers and Value Proposition have similar results in many of our analyses, and our regression data showed that the same level of relationship exists, with Value Proposition having the most significant influence over Customers (standardized coefficient of 0.49 and p-value < 0.05). This finding indicates that Value Proposition has the highest influence among all subcategories. Similarly, the relationship between Change Management and Transformation was analyzed. The regression analysis demonstrated a more significant influence of Transformation over Change Management (standardized coefficient of 0.39), although not as pronounced as Value Proposition's influence over Customers. However, more subcategories have a lower but more relevant influence. For Change Management, in addition to Transformation, we identified other influential subcategories such as Strategic Planning, Organizational Strategy, Culture, and Operations. We identified Products and Services, Strategic Planning, Organizational Strategy, Leadership, and Governance as influencing Transformation. Finally, we see that Operations is affected by Innovation, Market, Change Management, People, Leadership, Process Management, Monitoring and Control, and Governance. These different relationships are essential to demonstrate that low readiness levels in Change Management, Transformation, and Operations may actually increase the company's risk. The reason is that these three subcategories are influenced by many other subcategories, making it a more complex task to improve their readiness at this level. Therefore, addressing influential subcategories such as Leadership, Strategic Planning, and Organizational Strategy may help improve readiness in these three lower-rated areas.

The industry segment-based analysis again prioritizes Customers and Value Proposition, while People and Culture also play relevant roles at the industry segment level. The analysis further reveals that Transformation, Change Management, and Governance are consistently at the bottom in industry-level readiness.

Data analysis shows Logistics as the segment with the highest readiness levels in more than 50% of the subcategories. In contrast, Healthcare shows the lowest readiness levels in more than 50% of the subcategories. Change Management is particularly problematic in Manufacturing, where it exhibits the lowest readiness of all subcategories across the five industry segments.

The different results highlight a rather complex scenario that, to a certain extent, aligns with the findings of previous research (Voß & Pawlowski, 2019; Silva et al., 2024), which identifies potential misalignment between senior management and general employees as a key factor in inadequate DT results. This exploratory study clearly demonstrates such misalignment and shows that leaders often believe it to be an essential factor that is not consistently considered. In addition, the findings reveal that SMEs tend to focus strongly on external factors, such as value proposition and customers, while neglecting the complexities of internal factors and the way in which they can play an important role. Our analysis clearly points out areas such as operations, change management, and transformation management as often being overlooked. It also shows how some areas depend on each other, especially leadership, which can influence the results seen in other subcategories, such as change management or operations. Ultimately, we see companies presenting different readiness levels in different subdimensions of our model. This finding shows that companies have

different focuses, making each case quite individual.

Contributions to knowledge

We have successfully contributed to the scientific community with a series of formal proposals that are not only connected to our model but are also applicable to other research in the field of DT:

- We introduced a formal definition distinguishing between readiness and maturity, clarifying the difference between DT implementation and DT maximization. Companies can achieve readiness without executing a single transformation. However, achieving that readiness can already lead to improved outcomes because it focuses on behaviors rather than tasks.
- We proposed a harmonized framework encompassing five DT categories and 20 subcategories, which can be integrated into future models or enhance existing ones. This framework offers a harmonized view of all dimensions a company should consider, thus accelerating understanding at all levels of what a DT plan should cover.
- We developed a formal proposal regarding readiness and the target behaviors an organization should pursue. In our context, this output serves as the basis for our DORAM proposal, providing a clear vision of "What does good look like?" that any company can work toward, whether they adopt DORAM or not.

An essential part of our contribution is the exploratory study we conducted with twelve companies using our proposed model. While we cannot wholly extrapolate our findings to all SMEs, the study provides critical data points regarding SME profiles, including specific industries. We observed that these companies strongly focus on Customers, Value Proposition, Culture, and Collaboration. However, greater focus is required in areas that are significant for scaling change, such as Change Management, Leadership, and Operations. This exploratory study offers the scientific community a critical perspective on which areas may require more investment in terms of research, not only in the context of readiness but also in the overall handling of these core business areas that are not specifically digital.

Lastly, our final contribution to the scientific community is the proposal, demonstration, and validation of the DORAM, specifically designed for SMEs. This model offers these companies a groundbreaking tool that provides them the needed level of transparency on where they lag in adopting the right behaviors to maximize their results. Given that SMEs often lack resources and have limited room for failure, our model identifies what areas are focused on and what areas may need more attention. The model does not tell the company what it needs to change in terms of technology but instead says what needs to be addressed in terms of behaviors. A key feature of our model is the separate analysis of employees and senior management as two different entities, with a focus on measuring their alignment as a potential risk when it is too significant. Furthermore, this proposal aims to deliver a unique approach for SMEs to tackle their root issues, which may lead to wasted investments in technology that do not yield the expected results. We believe that this contribution is significant, addressing a central problem that has not yet been fully explored.

Evaluation and validation

One of the final steps in our process involved evaluating the proposed model and collecting feedback related to our demonstration.

Methodology

To conduct the proposed evaluation, we designed a two-phase process:

i. Phase 1 focused on evaluating the demonstration from the results perspective and the quality of the data presented to the various companies where the model was implemented.
ii. Phase 2 focused on evaluating the model's structure and critical assumptions, serving as the final validation of our proposal.

Proposed evaluation questions and validation group

The initial step in delivering this evaluation was to design questions for the different evaluation groups.

The proposed evaluation dimensions and questions are summarized in Table 17.

Before we started the actual evaluation, we designed a process to externally validate our questions within the context of our research.

The questionnaire (see Table 16) was thoroughly validated through an interview.

1. We identified five executives with experience in the field of DT.
   a. Three chief information officers from large organizations.
   b. A vice president of a bank's online banking department.
   c. The CEO of a well-known professional technology services company.
2. Each senior expert participated in a 30- to 45-minute session, which was divided into three parts:
   a. An explanation of the model and its objectives.
   b. A Q&A session.
   c. An explanation of the proposed questions.

Table 17
Evaluation dimensions and questions.

Dimension	Question	Score
RESULTS		
Clarity	Were the assessment results clear, and were any potential gaps well understood?	1: Not at all 5: Completely
Quality	Did you gain insights about your business that add value to the management of your company?	1: Not at all 5: Completely
Approach	Did the assessment of readiness from the employees' perspective, compared to senior management's perspective, provide valuable data points?	1: Not at all 5: Completely
Strategic	Do the assessment results provide a solid base for defining strategic actions to implement in the organization?	1: Not at all 5: Completely
Outcomes	Do you believe that understanding the assessment results and the defined target readiness behaviors will better position your company to improve DT results?	1: Not at all 5: Completely
Net Promoter Score	Would you recommend this assessment to other SME?	1 – 10
MODEL (VALIDATION)		
Applicability	Is the presented model applicable to SME?	1: Not at all 5: Completely
Depth	Do the categories and subcategories cover the most relevant dimensions for assessing readiness behaviors within the company?	1: Not at all 5: Completely
Coverage	Do you consider the four levels defined and the assessment of the behaviors based on the two dimensions (frequency and management) appropriate?	1: Not at all 5: Completely
Completeness	Is the model's approach suitable for evaluating the organization's digital readiness from both employee and senior management perspectives?	1: Not at all 5: Completely
Relevance	Do you believe the model's approach will help SMEs achieve better results in DT?	1: Not at all 5: Completely
Simplicity	Is the model user-friendly for SMEs?	1: Not at all 5: Completely

We also asked for verification and suggestions during these sessions. Based on the feedback, we adjusted some potentially misleading questions. The validation group formally verified all the questions, which gave us the final evaluation dimensions and associated questions.

Score interpretation

The different questions scored on a 5-point scale ultimately provide a result calculated by averaging all answers. The output of that calculation provides a numeric evaluation of each dimension, which should be interpreted according to the following scale:

- 0 to 2.5: The assessment model does not meet the minimum validation criteria.
- 2.6 to 3.9: The assessment model meets the minimum validation criteria, but some gaps must be addressed.
- 4 to 5: The assessment model has met the minimum validation criteria and has a positive impact.

The interpretation of NPS is as follows:

- NPS > 0 = more promoters than detractors.
- NPS < 0 = more detractors than promoters.

The higher the NPS, the better.

Additionally, the score interpretation for the assessment model is:

- **0 to 5:** The model does not meet the minimum validation criteria.
- **5 to 7.5:** The model meets the minimum validation criteria, but some gaps must be addressed.
- **7.6 to 10:** The model has met the minimum validation criteria and has a positive impact.

Approach to evaluation phase 1

The senior leaders of the SMEs were strictly involved in evaluating the results phase of our demonstration and model.

The process was relatively straightforward. During the presentation of each company's results, we asked each management team to provide feedback on experience, the explanation provided, and the overall process to achieve the final results.

We executed the model with 12 companies and received readiness assessments from 50 senior managers across all companies.

Our Phase 1 evaluation was ultimately accepted by 19 senior leaders, each representing one of the participating companies.

These leaders, who covered a range of company sizes, industries, and readiness levels, were invited to complete the online questionnaire presented in Table 16.

Approach to evaluation phase 2

Our approach to evaluating the proposed model in Phase 2 consisted of setting up a focus group with senior SME leaders and industry experts with proven experience in DT. Focus groups aimed to collect and use data in a specific phase of our research through structured interactions with members.

Our focus group consisted of 10 members:

1. Four CEOs from the SMEs where we conducted our demonstration.
2. Five industry experts with experience in senior positions related to DT across various industries.

The focus group was designed to be conducted over 2 h in a remote session held via Microsoft Teams. The session was divided into the following sections:

1. Introduction to the problem and theoretical background of the model: 40 min.
2. Presentation of the study results: 20 min.
3. Silent reading: 30 min (during this time, group members had time to carefully read the document shared containing all the theory and results).
4. Questions & Answers: Group members had the opportunity to ask the researcher questions and clarify any doubts.
5. Online evaluation of the model using the defined questionnaire: 30 min.

Evaluation of phase 1 (Results)

In Phase 1 of our evaluation, we focused on the process of demonstrating results, the quality of the produced outcomes, and their value for SMEs. We received 19 individual evaluations from chief executives, chief financial officers, chief operations officers, and chief marketing officers.

Table 18 summarizes the overall average score calculated for each defined dimension.

In Phase 1, we received a total of 95 responses from 19 leaders across the first five dimensions (excluding the NPS question). Of these, 63% awarded the highest score of five (5), and 35% gave the second highest score of four (4). Hence, 98% of the responses fell within the top two score categories (> 4), indicating that "The assessment model has met the minimum validation criteria and has a positive impact" across all dimensions in Phase 1.

From an NPS perspective, we had no detractors, and 15 out of 19 respondents were promoters, resulting in a high NPS score of +79.

The highest ratings were given to the dimensions Quality and Approach, with an average score of 4.7 out of 5. In contrast, the Strategic dimension received the lowest rating, with a score of 4.5, which is still close to the maximum.

Evaluation of phase 2 (Model validation)

As described in the description of the methodology in this evaluation phase, we assembled a focus group comprising senior SME leaders (CEOs) and a few industry experts to independently validate our model, assumptions, and decisions based on the research carried out. The evaluation and validation from this group are summarized in Table 19.

We received 60 responses across the six dimensions and 10 leaders during Phase 2 of the evaluation. The results showed that 60% of responses were in the highest possible score (5), and 38% were in the second highest score (4). Together, they represent 98% of the responses in the category "> 4", indicating that "The assessment model has met the minimum validation criteria and has a positive impact".

From the overall evaluation results, Relevance received the highest score of 4.7 points, whereas Completeness and Simplicity received the lowest score of 4.5 points. However, even the lowest score falls within the high category (> 4) for this evaluation phase.

Table 18
Evaluation provided by all senior managers in the demonstration.

Dimension	Question	Score
Clarity	Were the assessment results clear, and were the possible gaps well understood?	4.6
Quality	Did you receive insights about your business that add value to the management of your company?	4.7
Approach	Did the assessment of readiness from the employees' perspective, compared to senior management's perspective, provide valuable data points?	4.7
Strategic	Do the assessment results provide a solid base for defining strategic actions to implement in the organization?	4.5
Outcomes	Do you believe that understanding the assessment results and the defined target readiness behaviors will better position your company to improve DT results?	4.6
Net Promoter Score	Would you recommend this assessment to other SMEs?	**+79** (9.2)

Table 19
Model evaluation and validation (Phase 2).

Dimension	Question	Score
Applicability	Is the presented model applicable to SMEs?	4.6
Depth	Do the categories and subcategories cover the most relevant dimensions for assessing readiness behaviors within the company?	4.6
Coverage	Do you consider the four levels defined and the assessment of behaviors based on the two dimensions (frequency and management) appropriate?	4.6
Completeness	Is the model's approach suitable for evaluating the organization's digital readiness from the perspectives of both employees and senior management?	4.5
Relevance	Do you believe the model's approach will help SMEs achieve better results in DT?	4.7
Simplicity	Is the model user friendly for Small & Medium Enterprises?	4.5

In addition to providing the numeric ratings of the different dimensions, we also asked the focus group to suggest possible ways to improve our model. Their proposals are summarized in Table 20.

Discussion

Evaluation phase 1

The original design of Phase 1 enabled us to validate the model's output properly and gain insights into the perspectives of senior leaders in SMEs while using this model.

According to their evaluation, the overall view is that the documentation of results through the output artifacts is obvious, and their company's gaps in readiness at each subcategory are apparent (4.6 points). Additionally, the insights provided about their business will add value to their day-to-day management (4.7 points). In reference to one of the pillars of our model, they believe the comparison between employees and senior management assessment provides critical data points (4.7 points). This validation is important because it supports our initial research questions and the overall driver in this research, where we ran with the hypothesis that these two perspectives are not always aligned and understanding that difference provides essential information in the decision-making process. Lastly, the dimensions of Strategy and Outcomes were similarly highly rated (4.6 and 4.5 points, respectively). These ratings confirm the value of our model's results in terms of defining some strategic actions for the future and in understanding what constitutes advanced readiness. Through our evaluation process, we have received essential confirmation that our artifact is aligned with delivering the needed insights and clarity, helping companies understand what to aim for in advanced states.

Evaluation phase 2

Phase 2 of our evaluation focused more on validating our model's structure and critical decisions.

We assessed the following six dimensions through the focus group:

- Applicability: Focused on validating whether our model applies to SMEs.
- Depth: Focused on validating whether the proposed categories and subcategories cover the most relevant dimensions of DT.
- Coverage: Focused on validating the adequacy of assessing readiness behaviors through their frequency and management, and the presentation of readiness levels in four levels.
- Completeness: Focused on validating the approach of assessing the readiness levels through the two lenses (employee and senior management perspectives).
- Relevance: Focused on validating the relevance of the overall approach to assess readiness levels to maximize DT results in SMEs.
- Simplicity: Focused on validating how user friendly the model is for SMEs.

The focus group provided sufficient evidence to validate all dimensions, each receiving a score greater than 4, indicating strong validation. This result means the model meets the minimum criteria for validation. Almost unanimously, the model received one of the two highest scores (98%), representing an overall positive evaluation. The dimensions exhibited minor differences, with marginal variations between 4.5 and 4.7 points.

Conclusions

SMEs matter, and their failure will significantly impact the overall economy due to their significant contributions to GDP and employment. Therefore, it is critical that we further develop strategies to support these organizations' development and embed newer technologies and ways of working. Through our research, we have been looking at the different gaps in the literature that may exacerbate the development disparity between SMEs and larger enterprises because SMEs often face additional limitations. Our focus has been on the domain of assessment models, particularly concentrating on readiness, which describes the state of being ready to maximize the results of a DT.

To facilitate the summary of our conclusions, we will address the following research questions:

RQ1) How can an assessment model be designed to evaluate SMEs' readiness levels for DT?

After reviewing the literature and the categories and subcategories proposed by Silva et al. (2024), we have distinguished between maturity and readiness. We have also proposed a set of target behaviors defining each subcategory's most advanced state of readiness. Based on these definitions, we have developed an assessment model that strictly focuses on assessing the readiness level of SMEs across five categories and 20 subcategories.

Through the proposed model, we have demonstrated that it is possible to assess the gap in perception between employees and senior management, and during the evaluation of the results, the

Table 20
Focus group recommendations for further development.

Recommendations and remarks from the focus group
The model's current state is to assess the readiness factor accurately. However, some organizations (at least) will want to know which initiatives they should engage in to address areas of lower maturity. In such cases, advisory and consultancy services will likely be required. Could the model be enhanced to collect data that would allow it to propose a tailored plan of initiatives to increase readiness?
Although all the questions are essential in a transformation process, some may be more relevant to a DT process and, consequently, might carry a different weight.
In the future, developing a process to classify a company's score evolution over time could be beneficial.
It is essential to provide a north star behavior for each category during the presentation of results phase, particularly when considering the average values of the answers provided. While this model makes red flags easy to understand, without some guidance, it might confuse a management team that is less prepared to consider change management. For that purpose, a final report is fundamental for supporting management decisions and promoting the proper discussions to define priorities.
Continuous Monitoring and Evaluation: Implement a system for monitoring and evaluating the model's performance. Review key performance metrics regularly and adjust as needed to maintain optimal results.
The model adequately prepares and evaluates the organization and its management. Nevertheless, the maturity/experience of management and employees might play an essential role in the transformation path and success. Investment capacity can also impact the success of the strategy.

senior managers considered those insights to be valuable data points (4.7/5.0)

a. Can the practical case provide enough valuable insights to SMEs to support their future planning with technology? The model is designed to evaluate a diverse range of SMEs. The feedback from senior managers of different SMEs demonstrates that the model can not only be put into practice in the SMEs but also provides a valuable set of data that puts SMEs in a better place for further development. We applied our model to three distinct SMEs and presented the results to their senior management, who provided positive feedback. As the evaluation of the results demonstrates, the model was rated highly by senior management for providing valuable insights (4.7/5.0). It was also considered an excellent basis for further strategic actions (4.5/5.0). It further created the understanding that developing the organization toward the target readiness behaviors would significantly improve the organization's ability to maximize the results of the DT (4.6/5.0).
b. How can this research help SMEs understand what their north star should be to increase their readiness level? This research introduces a new model that assesses an SME's readiness level for DT. Equally importantly, we have also designed the target behaviors for each subcategory of the DT dimensions. Irrespective of the level at which the companies may end up being rated, SMEs will benefit from adopting these target behaviors. Doing so will position them to evolve and become more competitive.

RQ2) Are there any similar patterns across different SMEs that can be used for further research?

As presented in the discussion chapter, our research has identified patterns of critical relevance for SMEs and DT. Our assessment model and this study shows that the companies we studied have made progress in their readiness levels, particularly in the target behaviors related to customers, value proposition, and, to a lesser extent, Culture and Collaboration. These factors are crucial for creating a market-centric company that is ultimately the key to building products customers want. However, we also identified some points of genuine concern that require a significant level of attention. The perception gap between employees and senior management is a reality, which significantly increases the risk of failure (Trenerry et al., 2021). Companies must evolve their behaviors and guarantee that the company is at the same level of understanding. In addition, the subcategories of Change Management, Transformation, Governance, and Operations require more attention from SMEs. These areas are critical to provide standardization and scalability, which are especially important given the limited resources available to SMEs.

RQ3) What is the evaluation and validation given to the model by SMEs' leaders and industry experts?

The DORAM introduces an approach that distinguishes between being prepared to maximize results and merely implementing parts of a transformation. Therefore, the model was designed to drive behaviors rather than just project plans, and it brought together a group of industry leaders and SME senior leaders, allowing us to create an independent panel that could validate all our work and the different decisions taken along the way. The validation results, presented in Table 12, show scores ranging from 4.5 to 4.8 across all dimensions. These results confirm that the model is applicable to SMEs, is simple to use (user-friendly), and is based on appropriate subcategories and categories. Furthermore, it adds value by enhancing companies' preparedness to maximize their results.

Overall, we have successfully answered all the research questions and diligently developed a model that offers significant contributions to both the scientific community and SMEs. Our model introduces a new dimension to the understanding of DT because it tangibly and unequivocally defines the concept of readiness and considers readiness as a crucial aspect not just for implementing a DT but also for maximizing its results. This model has been thoroughly validated by an independent group of leaders in this field.

Opportunities for further research

In the previous sections, we detailed all our processes and contributions. However, the necessary research is still ongoing, and even though we managed to achieve the targeted goals and delivered our proposals, there is still room for further development. Through our evaluation, we collected valuable feedback on areas that could be further developed to achieve even more outstanding results.

We have summarized these essential development areas into three major points:

- DORAM provides excellent transparency into the state of readiness, offering a clear view of the company's level across various areas. One key development area is to leverage data from company assessments and, through the usage of technologies such as machine learning or generative AI, offer more prescriptive recommendations on actions that will effectively promote the desired behaviors more frequently. This approach will remove the potential subjectivity in determining the necessary actions based on the results.
- Readiness should not be measured as a one-time activity. Both we and the companies we assess evolve, and it is essential to consider the trend of this evolution as an additional unit of measure in future model developments. This proposal will provide companies with insights into how they have evolved, which ultimately may help identify which actions had an impact on the original plan.
- The current model version does not assign weights to the subcategories because it assumes each category has equal relevance while being assessed. This allows the company to determine what is most important to tackle based on its strategy and priorities. However, building on the previous two enhancements, there is an opportunity to leverage historical data and business insights to propose different weights for the subcategories. Such a proposal would provide a more tailored view of the report for each company being assessed.

The three proposed future work areas would help DORAM achieve its next level of support for SMEs and are well aligned with the original goals and research questions of this work.

Funding

This work is financed by National Funds through the Portuguese funding agency, FCT (Fundação para a Ciência e a Tecnologia), within project UIDP/50,014/2020. DOI 10.54499/UIDP/50,014/2020 | doi:10.54499/UIDP/50014/2020

CRediT authorship contribution statement

Rui Pedro Silva: Writing – review & editing, Writing – original draft. **Henrique São Mamede:** Writing – review & editing, Conceptualization. **Vitor Santos:** Writing – review & editing.

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