

Supporting The Digitalization of SMEs Through Maturity Models

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Abstract: over the past two years, small and medium-sized enterprises (SMEs) have faced a crisis due to the Coronavirus pandemic. The use of digital tools has been crucial for SMEs to mitigate the negative impacts of Covid-19, but they still face challenges in their digitalization path due to limited resources, skills, and know-how. To address this, policymakers and practitioner in the SME ecosystem need to understand SMEs' level of digitalization and develop strategies for their digital transformation: digital maturity models can help entrepreneurs and consultants to develop a structured digital roadmap that considers SMEs' resources and constraints. However, even if maturity models and readiness model are effective tools, existing models may not account for SMEs' unique characteristics being either developed for large firm or Industry 4.0 enterprises. Thus, researchers need a better theoretical understanding of the various stages of the digitalization process to account for the heterogeneity among firms' current digital states. Therefore, this research, building on pre-existent literature, aims to identify the elements necessary for developing a digital maturity framework specifically for SMEs. This qualitative research study uses a multiple case study approach, identifying 18 cases of Italian SMEs. The selection of the sample was carried out to consider the industry (manufacturing or services), the size (small or medium) and the geographical location (Northern Italy, Central Italy, Southern Italy), to grant a higher heterogeneity and to allow a better understanding of SMEs approach to digitalization. By departing from existing models exclusively designed for large or manufacturing companies, this research enriches our understanding of digital maturity models for SMEs. Based on the research carried out, a three-layer framework is proposed to illustrate the elements to be considered in the construction of a framework and their connections. The proposed model considers dimensions and elements related to SMEs integrated processes, relationship between SMEs and external actors, and the context in which they operate.

Keywords: Case Study, Digital Maturity, Digital Transformation, Maturity Models, SMEs

1. Introduction

As underscored by the OECD (2020), the COVID-19 pandemic has acted as a destabilizing force for SMEs in the past two years. The utilization of digital tools among SMEs emerged as a contributing factor in mitigating the adverse consequences of Covid-19 (OECD 2020). For numerous instances, these tools were the "lifeline" that enabled their survival (Mandviwalla & Flanagan, 2021). Nonetheless, SMEs are currently confronted with various obstacles along their digitization journey. These challenges are rooted in a scarcity of resources, skills, and expertise, hindering their ability to fully harness the benefits presented by digital technologies (Amaral & Peças, 2021; Soluk & Kammerlander, 2021). Consequently, the development of digital maturity models becomes of paramount importance. These models must serve as tools that empower policymakers and stakeholders embedded within the SME ecosystem. This empowers them to comprehend the true extent of digitization within small and medium-sized enterprises and to devise optimal strategies that foster the digital transformation of such entities.

However, as articulated by Mittal, Khan, Romero, and Wuest (2018), digital maturity models, primarily crafted for larger corporations, are unlikely to capture the intricacies inherent in the economic and relational ecosystem of SMEs. This research seeks to bridge this gap in the literature by addressing the following research question: How should a digital maturity framework be devised to suit the distinct context of SMEs? Subsequent sections encompass the following subjects: a) providing a theoretical contextualization concerning the significance of SMEs and the role of digital maturity models; b) elucidating the research methodology applied; c) presenting the findings derived from interviews conducted with SMEs; and d) engaging in deliberations while presenting a proposed framework. Ultimately, the study concludes by offering insights into its constraints and suggesting avenues for future research.

2. Literature review

2.1 The relevance of SMEs digital maturity

Digitalization constitutes a fundamental imperative for companies seeking to engage with the emerging industrial revolution (Amaral & Peças, 2021). Nonetheless, the process of digitalization, which seeks to "enhance an entity through substantial alterations to its attributes using a blend of information, computation, communication, and connectivity technologies" (Mandviwalla & Flanagan, 2021), is relatively less advanced within SMEs. This disparity stems from various constraints that render SMEs more encumbered in adopting novel technologies (Amaral & Peças, 2021). Simultaneously, the landscape of digital transformation is engendering swift shifts within industry and society, extending opportunities in terms of scale, scope, and velocity (Mandviwalla & Flanagan, 2021). SMEs, in particular, find themselves propelled towards intricate trajectories of growth (Denicolai, Zucchella & Magnani, 2021).

By employing readiness models and digital maturity models, entrepreneurs and consultants can lay out a methodical digital roadmap that takes into account the resources and limitations characteristic of SMEs. On the other hand, researchers stand to gain from a more comprehensive theoretical framework encompassing the distinct phases of the digitalization journey. This would enable them to recognize the diversity existing among firms regarding their current degree of digital integration (Soluk & Kammerlander, 2021).

2.2 Maturity and Readiness model

Given the challenges confronting SMEs, the process of digitization is often approached incrementally (Depaoli, Za & Scornavacca, 2020). Consequently, significant efforts have been directed towards enhancing the qualification of this phenomenon through readiness assessments in order to gradually navigate the intricacies of digitization (Li, Su, Zhang & Mao, 2018). The pioneering role of consultancy firms in introducing the concept of maturity models is underscored by Trotta & Garengo (2019), who term them as the "first movers" of this strategy. These firms recognized the need for a comprehensive tool that not only aids in project governance but also simplifies communication about the intricate subject of Digitalization (Trotta & Garengo, 2019). However, the scales used by practitioners are often ill-suited for SMEs, as they are predominantly tailored towards larger enterprises (North et al., 2020). Furthermore, these scales typically lack the necessary attributes of replicability, generalizability, and transparency that are expected of scientific publications (North et al., 2020; Trotta & Garengo, 2019). Additionally, a considerable number of recently developed maturity models have a primary focus on Industry 4.0 transformations (Klohs & Sandkuhl, 2020).

It is widely recognized that SMEs often struggle to grasp the true essence of digitalization or digital transformation (Pirola, Cimini, Pinto, 2019), leading to potential misinformed decisions by managers and entrepreneurs. Maturity models offer the potential to elucidate their digital roadmap (Zapata, Berrah & Tabourot, 2020), unlocking the actual potential of their technologies (Kääriäinen, Kuusisto, Pussinen, Saarela, Saari & Hänninen, 2020). These models allow for a multidimensional analysis that bridges organizational needs with operational insights (Trotta & Garengo, 2019), enabling SMEs to enhance their business performance through a systematic approach to digitalization (Depaoli et al., 2020).

According to certain authors like Wendler (2012), maturity models are commonly conceptualized as multi-dimensional frameworks. Some researchers have integrated evaluations of factors that influence a company's digital maturity into their models, such as leadership, ambidexterity, or technology integration (González-Varona, Acebes, Poza & López-Paredes, 2020; Pirola et al., 2019). Others adopt a business process management approach, focusing on the six core elements of BPM – strategic alignment, governance, method, information technology, people and culture – which are considered prerequisites for digital transformation, as they underpin the restructuring of business models (Fischer et al., 2020). Alternatively, some scholars deviate from traditional perspectives, delving into the correlation between competences and a company's level of digitalization, resulting in maturity models based on the theory of Digital Maturity Competences (DMC; Li et al., 2018).

Upon meticulous scrutiny of the literature, eight distinct dimensions emerge as commonly considered when devising assessment models for digital maturity: digital strategy and roadmap (Pirola et al., 2019; Eller et al. 2020; Zangiacomi et al., 2020), employee skill and culture (Jeansson & Bredmar, 2019; Pirola et al., 2019; Eller et al. 2020; Zangiacomi et al., 2020), organizational flexibility and adaptability (Pirola et al., 2019; Eller et al., 2020; Del Giudice et al., 2021; Park et al., 2020; Zangiacomi et al., 2020), information technology (Pirola et al., 2019; Eller et al., 2020), integration (Jeansson & Bredmar, 2019; Pirola et al., 2019), customers (Jeansson &

Bredmar, 2019; Pirola et al., 2019; Eller et al., 2020), external environment (Jeansson & Bredmar, 2019; Pirola et al., 2019; Del Giudice et al., 2021; Zangiacomi et al., 2020), and performance and benefits (Jeansson & Bredmar, 2019; Pirola et al., 2019; Eller et al., 2020; Zangiacomi et al., 2020).

3. Methodology

The present study has been conceived as a descriptive multiple case study, aligning with the works of Eisenhardt (1989), Eisenhardt & Graebner (2007), and Yin (2014). The case study methodology is particularly fitting when research inquiries are open-ended and aim to dissect intricate phenomena (Yin, 2014), such as the digitalization processes within SMEs. The overarching objective of this investigation is to unravel the underlying mechanisms and dynamics that govern the digitalization processes in SMEs. Given the nature of the research questions and its objectives, the most appropriate approach is to adopt the individual SME as the unit of analysis.

The European Union Commission (2014) defines micro, small, and medium-sized enterprises (SMEs) as entities employing fewer than 250 individuals, with an annual turnover not surpassing EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million. Nonetheless, for the purposes of this study, only the small and medium-sized category was considered. Comparing with micro enterprises would introduce complexities due to substantial structural and financial differences. Additionally, for a more accurate comprehension of the digitalization potential, autonomous SMEs as classified by the European Union Commission (2014) were chosen as the research's unit of analysis.

The case selection process stands as a pivotal aspect in the construction of theory from cases (Eisenhardt, 1989). To bolster the external validity of this research, the adoption of multiple case studies is preferred over single case studies (Yin, 2014), since the intent to generalize findings necessitates the examination of a broader spectrum of cases. To maximize insights, a methodical approach to the sampling process was employed, yielding three primary dimensions: Industry (manufacturing vs. services); size (small $10 < AWU < 50$ vs. medium $50 < AWU < 250$); geographical location (Northern Italy, Central Italy, Southern Italy). In order to provide an overview as comprehensive as possible of the SME category, we have also mapped the economic sector of activity (Ateco 2007 classification), regrouped in order to narrow down the sectors to the only ones deemed suitable for carrying out the research. In particular: the "Agriculture, forestry and fishing" division was excluded because of the choice of focusing on manufacturing and services; "Public administration and defense; compulsory social insurance" and "Extraterritorial organizations and bodies" were considered out of scope; "Arts, sports, entertainment and recreation activities" and "Activities of families and cohabitation as employers for domestic staff, production of undifferentiated goods and services, for their own use by families and cohabitation" were evaluated as too specific and not strictly related to the industries under exam; the "Other service activities" group was deemed too broad and generic. Once the criteria for ensuring heterogeneity within the sample were settled, the actual search for cases was performed. This activity was carried out through the support of Bureau Van Dijk's AIDA database of Italian firms (*Analisi Informatizzata delle Aziende Italiane*), then contacted by phone calls, e-mails, or official websites. To understand whether the selected SMEs could be included in the research scope defined above, we verified through the websites: the accuracy of the information provided by AIDA; whether the firm was actually part of a larger group; whether the firm had access to significant external financial resources through other means. In some cases, the "staff headcount" required to be adjusted according to the number declared by the company. This meticulous selection process resulted in the assembly of a diverse sample comprising 18 cases, thoughtfully anonymized to ensure the confidentiality of the SMEs involved. Respondents were told at the beginning of the interview how the collected data would be used. Each interviewee was assigned an alphanumeric code, with which to report the citations in the paper.

After having transcribed verbatim each interview, a coding procedure was initiated, following the Gioia Methodology (Gioia et al., 2012). According to Strauss & Corbin (1998) coding is defined as "the analytical process of examining data line by line or paragraph by paragraph looking for significant events, experiences, feelings, and so on, that are then denoted as concepts". The first critical step is the definition of the coding strategy. Consistently with the design and purpose of the research described so far, a mix of deductive and inductive approaches was deemed the most appropriate solution. The procedure started with a within-case analysis and then moved to a cross-case synthesis to aggregate the findings and build a more robust basis for the development of a theoretical framework. In the first-order analysis, the attempt was to remain as faithful as possible to the words of the interviewees. In this perspective, both in-vivo and constructed codes have been adopted to label salient points of the collected empirical evidence. Despite the large number of labels generated, in this first phase little effort was made to distill categories. This was done on purpose following Gioia et al. (2012) advice of "getting lost before you can get found". Then, in the second-order analysis labels were grouped

together and categorized according to the corresponding sphere of pertinence. In this phase a process of triangulation between the evidence collected in the field and the theoretical realms related to SMEs digitalization was carried out, questioning each time whether the concepts developed were both consistent with the literature and able to explain the phenomena observed in reality (Gioia et al., 2012). Once the categories were formed, the process of abstraction went on with their further aggregation into themes. In this phase the focus was on two fronts: on one side themes validating extant theories and propositions emerged, while on the other side novel concepts for enriching the scientific framework “leaped out”. This process made it possible to break down the data collected by organizing them in a well-defined structure that lays the foundations and facilitates the presentation of the results and the discussion of the findings presented in the following chapters.

4. Findings

ID	Industry	Ateco code 2007	Geographic location	Staff headcount (adjusted)	Revenue	Balance sheet total	Interviewee role
M1	Manufacturing	255000 Forging, pressing, stamping and roll forming of metal; powder metallurgy	Puglia	241	34.916 k€	50.596 k€	General Manager
M2	Manufacturing	131000 Preparation and spinning of textile fibers	Piedmont	150	20.595 k€	32.526 k€	Marketing and communication manager + CEO
M3	Manufacturing	281200 Manufacture of fluid dynamic equipment	Lombardy	128	25.990 k€	37.812 k€	CEO
M4	Manufacturing	412000 Construction of residential and non-residential buildings	Lazio	84	24.943 k€	23.172 k€	Administrative manager
M5	Manufacturing	233200 Manufacture of bricks, tiles and other building products in terracotta	Lombardy	35	5.612 k€	10.161 k€	CEO + General manager
M6	Manufacturing	267011 Manufacture of optical elements and precision optical instruments	Veneto	31	7.858 k€	9.194 k€	CEO
M7	Manufacturing	110210 Production of table wines and v.p.q.r.d	Calabria	25	7.095 k€	15.890 k€	Marketing and sales manager
M8	Manufacturing	107120 Production of fresh pastry	Tuscany	14	1.023 k€	1.048 k€	CEO
S1	Services	370000 Collection and purification of waste water	Lazio	150	12.772 k€	9.020 k€	Safety, quality and environment manager
S2	Services	620100 Production of software not related to the edition	Emilia Romagna	112	22.282 k€	22.574 k€	CEO
S3	Services	494100 Transport of goods by road	Campania	87	15.386 k€	10.875 k€	CEO
S4	Services	467410 Wholesale of articles of iron and other metals (hardware store)	Lombardy	85	27.846 k€	32.620 k€	CEO
S5	Services	620100 Production of software not related to the edition	Lombardy	71	7.558 k€	8.730 k€	Governance and privacy manager
S6	Services	479130 Retail trade of any type of product by correspondence, radio, telephone	Emilia Romagna	65	2.722 k€	2.562 k€	Warehouse manager
S7	Services	869021 Physiotherapy	Molise	45	955 k€	7.808 k€	Managing director
S8	Services	551000 Hotels	Lombardy	42	1.300 k€	1.765 k€	CEO
S9	Services	662202 Insurance agents	Tuscany	40	2.815 k€	2.828 k€	CEO
S10	Services	782000 Activities of temporary work supply agencies (interim)	Lombardy	16	4.784 k€	2.163 k€	CEO + Service center manager

Figure 1: List of interviews

4.1 Internal Layer

Based on our interview findings, it is evident that skills, culture, adaptability, flexibility, and shared best practices are closely correlated with digital maturity and hold a pivotal role within SMEs. However, it is crucial to acknowledge that these dimensions are interconnected due to the pervasive nature of digitalization. In fact, a robust commitment and a mindset that prioritizes people facilitate the implementation of the digital roadmap with reduced effort. As emphasized by a participant, *"The most critical and most important asset is the people, because they are the ones who create the most value for any company. So, this is the first step, that is, having a team, having a company focused on the same goal and convinced to do so"* (S5, Governance and Privacy Manager). Technologies further enable enhanced information sharing and significantly influence organizational work methods, subsequently affecting the People & Culture dimension. This sentiment is echoed by another participant, *"We must, so to speak, facilitate integration between people. So, if this integration already exists within the supplier, that's fine, otherwise if this technology or need is not inherent to the suppliers we have, we try to find market-wide solutions that allow us to provide a solution to this thing, compatibly with what are the investments"* (M6, CEO).

4.2 External Layer

Now shifting to an external perspective, we delve into the environment within which SMEs operate. Our empirical evidence underscores that the roles of customers and suppliers in shaping digital maturity are inherently similar. Consequently, it can be confirmed that the behavior of both customers and suppliers positively influences technology adoption (Jeansson & Bredmar, 2019). However, some interviews also reveal the potential negative impact that these external actors might exert on digital maturity. In these scenarios, the mediating role of company size comes to light: when an SME is smaller than its customer base or its suppliers, the implementation or hindrance of digital initiatives by these external actors tends to be simpler. Conversely, when SMEs surpass their customers and suppliers in size, they can stimulate technology adoption throughout the supply chain. This factor substantially influences the evaluation of digital maturity, as certain companies, constrained by external factors, might struggle to digitalize processes and enhance their digital maturity.

A broader array of stakeholders, including competitors, consultants, universities, research entities, and public agencies, also contribute to the improvement of digital maturity. However, SMEs express that some stakeholders, such as consultants and universities, could enhance their contribution to digitalization efforts. As articulated by a participant, *"The facilitators of this, including the universities, competence centers, the digital innovation hubs, all these people here, including you, it's a bit of a mess"* (M3, CEO). Competitors wield a distinct influence, often driving companies to adopt projects due to market competitiveness. *"Sometimes we thought this was a waste of money, always like I told you from our parents. However, we gradually led them, through competitors, to change their mindset by telling them things like, 'Did you see? They did this, they have the website, they have...'. Let's say that we pushed them and this desire to excel led them to listen to us allowing us to catch up with the times"* (S3, CEO). The competitive market environment gives rise to several initiatives. The influence of competitors is pertinent across all scales of SMEs. Lastly, Digital Service Providers (DSPs) stand as the central reference point for all digital projects within SMEs. Their contribution extends beyond technology provision, as they also act as guides throughout the digital journey.

4.3 Relationship between Internal and External Layer

The factor that significantly contributes to defining digital maturity is the Applicability dimension. Positioned as an intermediary layer between SMEs and external actors, this dimension, despite its background role, exercises substantial influence over all other dimensions within the framework. On occasion, internal processes remain nondigitalized due to the analog version's superior effectiveness. As expressed by a CEO (M3), *"I don't know, the kanban with tags, maybe tomorrow we will also do the digital kanban, it already exists, and we can do it, but if the green, yellow and red card works perfectly, as has been done for thirty years in Toyota and twenty in Italy, it works well and its point of strength is also this stuff, why digitalize it?"* This phenomenon extends to the external perspective as well. The Applicability dimension shapes the dynamic between SMEs and their customers and suppliers, it molds the influence of Digital Service Providers (DSPs) on digitalization, and it sculpts the interactions between exogenous factors, other stakeholders, and SMEs.

4.4 The Environment

Throughout our interviews, the impact of the Covid-19 pandemic frequently emerged, underscoring it as an exogenous factor influencing digital transformation. This reinforces the notion that socio-economic conditions significantly mold organizational methods and practices, thereby affecting SMEs' digital maturity (Mandviwalla & Flanagan, 2021). For instance, a participant noted, *"In the period of Covid we could not go around and since we had to present the new collection...we created a virtual showroom to present the collection made using CAD...useful or not useful? At that moment it was required...However, at that moment, during the three-and-a-half-month lockdown, we created a virtual showroom"* (M2, Marketing and Communication Manager).

The overall technological know-how within the economy and the availability of required competencies to integrate these technologies hold a significant influence on digital maturity. This assessment pertains to the advancement of technologies within a specific context. While a technology might be immature and not implemented during a certain period, it may enable new processes and innovations over time. A participant aptly stated, *"In my opinion sooner or later we will also think of the metaverse, perhaps better sooner than later because maybe after it's late...Now the technology has a short life cycle"* (S5, Governance and Privacy Manager). This dynamic necessitates frequent recalibration of maturity models to ensure accurate assessment of SMEs, offering the potential for an innovative evolution in readiness models by accommodating varying time periods for assessments.

Furthermore, the Legal Framework significantly influences technology adoption. As several authors highlight, public institutions indeed impact SMEs' digitalization efforts, as echoed by our interviews. *"These are years of exceptional investments for us, because the various opportunities and tax advantages linked to 4.0 combined with Sabatini have given us crazy leverage"* (M5, CEO). Lastly, the geographical and socio-economic context should not be disregarded. In some instances, this external factor assumes the role of the primary catalyst for digitalization. *"The digitalization comes from, I would say 70 (external factor) and 30 (internal factor)"* (S9, CEO). Nevertheless, context-specific challenges can impede growth, as reflected in the sentiment, *"In Italy, personnel management is enough...we don't focus so much on people, that is, in Italy there are the lowest salaries in Europe"* (S9, CEO). Accounting for these dimensions in digital maturity evaluations is paramount, facilitating benchmarking among companies operating within diverse environments.

5. Findings and framework

5.1 An introduction to the framework

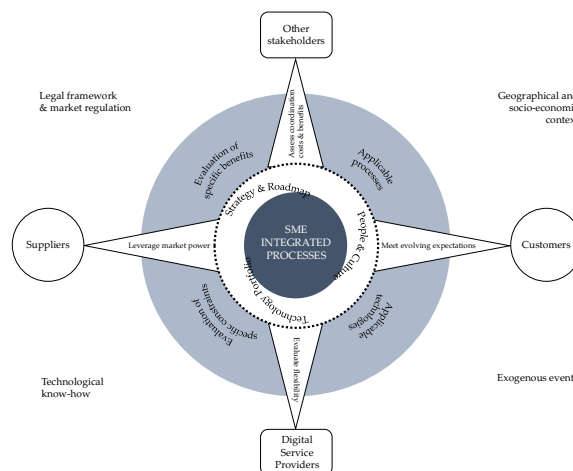


Figure 2: SMEs Digital Maturity Framework.

5.2 An introduction to the framework

The primary objective of this framework is to furnish a comprehensive guideline for the equitable evaluation of digital maturity, encompassing diverse perspectives for assessing small and medium enterprises. Consequently, Figure 1 illustrates the framework as a compass, signifying the principal dimensions that drive SMEs' digitalization endeavors while acknowledging the inherent nature of these enterprises. Our research involves refining the comprehension of the primary dimensions identified in existing research, with the aim of encompassing all SMEs, along with their unique characteristics and distinctions. The eight fundamental dimensions serve as the cornerstone for the proposed model, anchoring our research from a theoretical standpoint.

However, the framework's dimensions do not align exactly with those enumerated in the literature review; instead, certain dimensions are consolidated within a common theme. This is evident for the People & Culture dimension, which amalgamates Employee Skill and Culture alongside Organizational Flexibility and Adaptability. A similar grouping occurs in the Technology Portfolio dimension, which converges Integration and Information Technology.

5.3 Nucleus

Central to our framework, People & Culture, Technology Portfolio, and Strategy & Roadmap form the essence of SMEs, collectively converging into the Integrated Processes dimension that functions as a crucial connector. Our interviews emphasize the pivotal role of People & Culture as a catalyst for digitalization, thereby validating contributions from various seminal studies (Eller et al., 2020; Jeansson & Bredmar, 2019; Pirola et al., 2019; Zangiacomi et al., 2020). The Technology Portfolio dimension directly contributes to digital maturity, considering that digital technologies constitute the tools that facilitate transformation. Earlier research underscores the necessity of technology integration for digital maturity. The Strategy & Roadmap dimension, as the third dimension, is considered pivotal for digital maturity by a majority of authors (Eller et al., 2020; Jeansson &

Bredmar, 2019; Pirola et al., 2019; Zangiacomi et al., 2020). It is widely acknowledged that Strategy & Roadmap reflects a company's capability to implement, evaluate, and define digital objectives. However, further emphasis on this dimension is necessary, as existing literature scarcely addresses Strategy & Roadmap from the perspective of service-oriented SMEs. By considering Strategy & Roadmap, the framework accommodates the diverse nature of SMEs, whether they are engaged in manufacturing or services, enabling a tailored assessment approach. These dimensions substantially influence the Integrated Processes dimension. Nonetheless, when authors develop models and assessment tools focusing on production processes, the categories often pertain strictly to manufacturing machinery, sensors, and products.

5.4 Relationships

Processes transcend SME boundaries, establishing connections with other entities in the framework. Within the SME network, four pivotal relationships warrant attention, represented as the cardinal points: Customers, Suppliers, Digital Service Providers (DSPs), and Other Stakeholders. Customers' significance is echoed in other studies (Eller et al., 2020; Jeansson & Bredmar, 2019; Pirola et al., 2019), while the role of suppliers garners less mention. Our findings, however, indicate that the roles of customers and suppliers in shaping digital maturity are fundamentally akin. Thus, it can be confirmed that the behavior of both customers and suppliers positively influences technology adoption (Jeansson & Bredmar, 2019). While seminal studies acknowledge DSPs' role in digital transformation, none highlight their substantial contribution to SMEs. In our research, DSPs are shown to exert a positive impact on digitalization, particularly in the context of Strategy & Roadmap, People & Culture, and the Technology Portfolio. Applicability influences interactions between SMEs, customers, suppliers, DSPs, external factors, and other stakeholders. Consequently, Applicability serves as a filter that guides interactions among framework entities, aligning with SMEs' pursuit of benefits.

5.5 Context

Lastly, informed by interview insights, the context should be assessed based on technological know-how, exogenous events, the legal framework, and geographical and socioeconomic conditions. Our interviews reveal that assessing digital maturity warrants an evolving approach; this accommodates instances where an SME might be deemed digitally mature within a specific context, only to transition to digital immaturity as the context evolves. This feature endows our model with the capacity to reflect potential demotion to lower digital maturity levels. Furthermore, the four elements comprising the external layer of our framework should be viewed as interconnected components.

6. Managerial and policy implication

This framework presents significant opportunities for small and medium-sized enterprises and policymakers. The use of digitalization level assessments – which consider only the elements present in the core of the model (People & Culture, Strategy & Roadmap, Technology Portfolio) – can undoubtedly enable individual SMEs to develop a digital transformation strategy. This approach is appropriate and effective in formulating transformation strategies at the level of individual companies, and it is well-suited for consulting firms and technology transfer centers that support small and medium-sized enterprises. Furthermore, this approach could be well-suited for companies that are at the beginning of their digital transformation journey. However, the utilization of a comprehensive digital maturity model can serve in developing the awareness that a digital transformation process shouldn't be merely seen as the digitization of processes or the organization, but as a growth journey in which the stakeholders with whom the company interacts and the technical, socio-economic, and regulatory context in which the small to medium-sized enterprise operates are also involved. The development of this awareness is important, as it can lead the entrepreneur to view digital transformation not only as a tactical response to opportunities or challenges that may arise, but also as a strategic response that could potentially lead to a reconsideration of their own business model.

Developing a comprehensive model that maps the digital transformation of small and medium-sized enterprises presents significant advantages for policymakers. Firstly, it can enable them to devise effective public policies to support digitalization that can assist SMEs considering the economic and technological landscape within which businesses operate. Secondly, it can allow them to pursue a dynamic analysis of digital maturity within a country,

considering not only the socio-economic context and external events but also the legal framework and regulations. This approach might also demonstrate greater efficacy in countries where the digital transformation process is already underway and widespread. Thirdly, the development of a comprehensive model can facilitate comparative analyses among different countries, thanks to the emphasis placed on the "relationships" layer and the context.

The development of a comprehensive digital maturity model should not be seen as an alternative tool to the individual assessment, but rather should be used as a complementary tool. These approaches should be used jointly to both navigate SMEs' digital journeys but also to enable policymakers to craft informed and effective policies that foster digitalization across diverse business landscapes.

7. Concluding Remarks, Limitations, and Future Directions

This research attains a dual objective: it both confirms dimensions underscored by previous researchers, enhancing them with finer details, and diverges from contributions exclusively tailored for large or manufacturing companies, offering a distinct digital maturity model tailored for SMEs. Yet, limitations persist. Firstly, this study offers a "high-level" perspective, with interviews solely involving C-level managers and executives. Future research could incorporate a broader array of informants from varying hierarchical levels. Secondly, a scarcity of diverse viewpoints from other ecosystem actors represents another limitation. Exploring the phenomenon from different vantage points, such as vendors, could complement and refine our understanding of SMEs' digitalization processes. Thirdly, the effective application of the model to assess SMEs' digital maturity merits attention. Future research should focus on identifying scales and evaluation criteria for the framework's constituent variables. Lastly, the qualitative nature of our methodology restricts the generalizability of findings in terms of numerosity and heterogeneity. This limitation aligns with our research purpose, which necessitated an in-depth investigation to establish a theoretical foundation for comprehending SMEs' digitalization rationale. Nonetheless, future research could enhance generalizability by addressing "idiosyncratic phenomena" (Eisenhardt, 1989) through two pathways:

- Quantitative-research approach: Complement the interpretive-oriented interview approach with more statistical-oriented research.
- Enhanced Heterogeneity: Expand geographical scope or include additional sectors to introduce more diversity within the sample.

Given these limitations, the presented framework is not an end in itself; rather, it marks a preliminary starting point that paves the way for new research avenues.

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