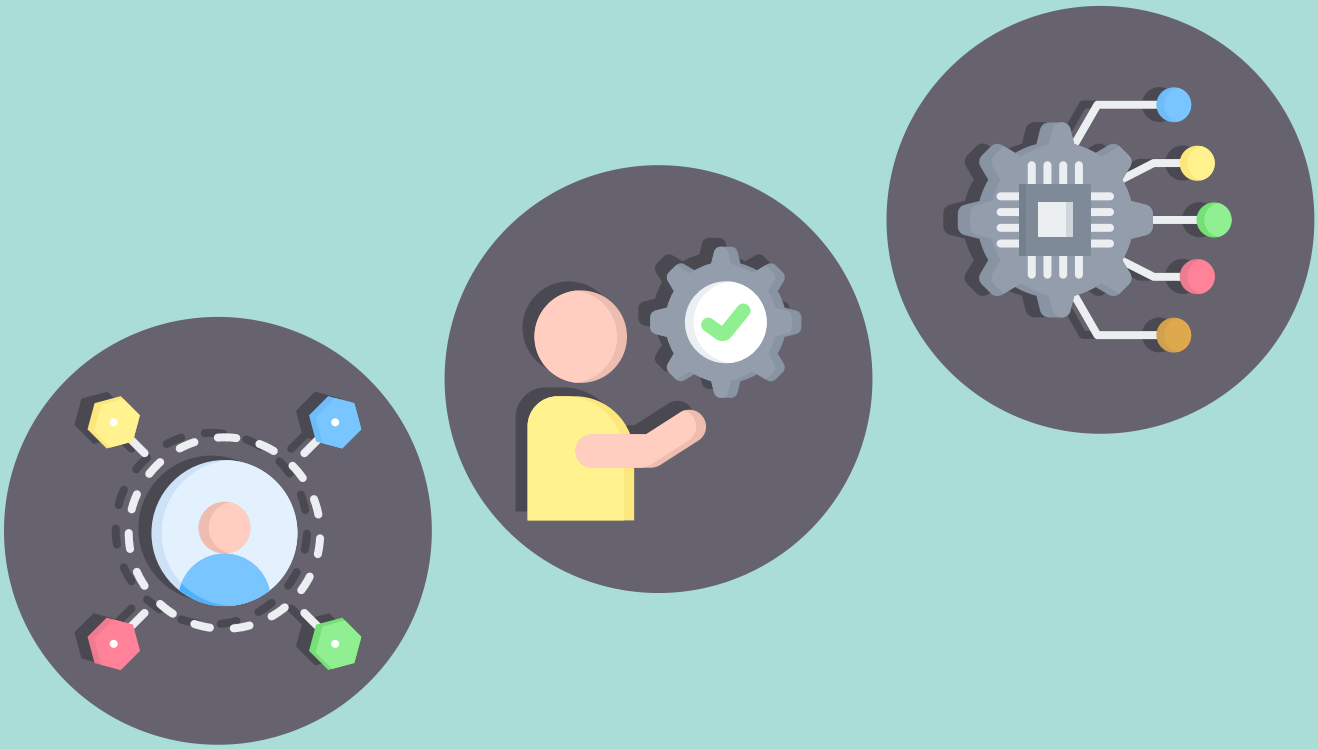
Capability Maturity Models for Digital Transformation and Sustainable Competitiveness in Small and Medium-sized Enterprises



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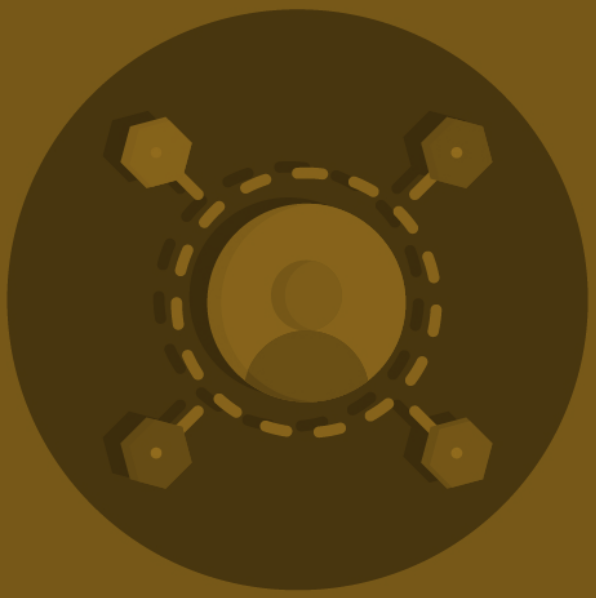

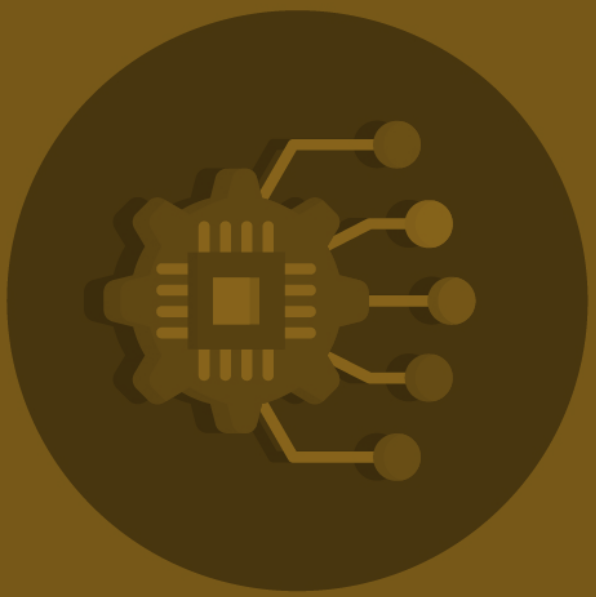

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PREFACE

The Productivity Insights (P-Insights) series is an extension of the Productivity Talk (P-Talk) series, which is a flagship program under the APO Secretariat's digital information initiative. Originally designed to maximize the full potential of the APO's digital outreach, the interactive, livestreamed P-Talks bring together practitioners, experts, policymakers, and ordinary citizens from all walks of life with a passion for productivity to share their experiences, views, and practical tips on productivity improvement. With speakers from every corner of the world, the P-Talks effectively convey productivity information to APO members and beyond. However, it was recognized that many of the P-Talk speakers had much more to offer beyond the 60-minute presentations and Q&A sessions that are the hallmarks of the series. To take full advantage of their broad knowledge and expertise, the APO invites some to elaborate on their P-Talks, resulting in this publication. It is hoped that the P-Insights series will give readers a deeper understanding of the practices and applications of productivity.

INTRODUCTION

Digital technologies are evolving faster than organizations can absorb them. While this rapid development offers significant opportunities for innovation and growth, it simultaneously presents complex challenges in managing digital transformation. Digital technologies enable data-driven decision-making, allowing businesses to design, test, and iterate new products more rapidly and at lower cost through virtual platforms. Additionally, they facilitate end-to-end supply chain visibility and traceability, which are critical for risk mitigation and regulatory compliance. From a human capital perspective, digital tools empower employees to enhance their productivity, collaborate more effectively, and engage in continuous skill development. However, realizing these benefits requires a strategic and structured approach, underscoring the need for maturity models to guide technology adoption and capability development in practice.

Although the benefits of digital transformation are widely recognized, industry surveys, such as those conducted by McKinsey, indicate that the success rate of digital transformation projects remains below 30% (de la Boutetiere et al., 2018). This low rate underscores a fundamental misconception: digital transformation is not merely a technological upgrade but a comprehensive organizational change that impacts strategy, processes, capabilities, and culture. Organizations that fail to grasp this broader scope often encounter significant barriers during implementation. One common challenge is integration difficulties, where existing systems and resources are either incompatible or difficult to align with new digital technologies. In many cases, the absence of digital literacy or insufficient technical skills among employees leads to underutilization or ineffective deployment of new tools. Digital transformation requires strong data governance and cybersecurity, areas where many firms lack expertise. Moreover, the pace of technological advancement frequently outstrips organizations' capacity to adapt, leading to hesitation in decision-making and delays in project initiation due to fears of obsolescence or malinvestment. Employee resistance is another persistent issue. Concerns about job security, especially the fear of technology replacing human roles, can generate opposition to transformation initiatives and impede adoption.

In small and medium-sized enterprises (SMEs), these challenges become even more pronounced due to structural limitations and resource constraints. SMEs typically operate with limited financial, technical, and human capital alongside shorter-term strategic orientations and lower resilience to both external and internal disruptions than large enterprises. Unlike larger organizations, SMEs often struggle to establish dedicated leadership teams to manage digital transformation initiatives. Limited networks reduce SMEs' ability to identify and adopt appropriate technologies. This often results in misaligned or ad hoc digital initiatives.

Successful digital transformation requires more than just investing in new technologies; it depends on building the right capabilities within the organization. The resource-based view model highlights internal strengths as a source of advantage, while the dynamic capability view stresses the ability to adapt and innovate. In this context, structured capability building helps businesses develop the skills, processes, and leadership needed to use digital technologies effectively. For SMEs, which often lack specialist resources, this structured approach is especially important to avoid wasted investments and ensure that digital tools support real business needs. Using structured models, such as capability maturity models, can help organizations build the capabilities needed for successful digital transformation. They provide a structured framework that allows firms to assess their current position, identify gaps, and set clear, achievable goals for improvement. Rather than relying on guesswork or one-size-fits-all solutions, maturity models offer a step-by-step roadmap that aligns capability development with business strategy. For SMEs in particular, maturity models simplify complex decisions by guiding where to start, what to prioritize, and how to progress over time. They support benchmarking and guide technology investment and skill development. By linking assessment with action, maturity models turn digital transformation from a vague ambition into a practical, manageable journey.

This P-Insights report has three key objectives. First, it offers a comparative analysis of leading global maturity models used to assess and guide digital transformation, examining their structures, focus areas, and applicability across different organizational contexts. Second, it shares insights and lessons learned from the practical implementation of a capability maturity assessment tool, DigiCap, in 36 manufacturing SMEs in the United Kingdom (UK), highlighting challenges, success factors, and contextual considerations. Third,

it introduces a new hybrid maturity model that integrates strategic profiling, capability assessment, and digital technology mapping. Developed and tested through industry engagement, this model addresses the limitations of existing tools by offering a context-sensitive, action-oriented framework tailored to the needs of SMEs undergoing digital transformation.

UNDERSTANDING CAPABILITY MATURITY MODELS

Maturity models were originally developed to support organizations in improving their software development processes (Paulk et al., 1994, p. 5). Their use has expanded to fields including operations, supply chains, and digital transformation. A maturity model can be defined as a conceptual framework that consists of a series of discrete maturity levels for a specific class of processes within one or more business domains (Becker et al., 2009). It represents an expected or desired path of evolution for those processes. In terms of purpose, maturity models are generally grouped into three types: descriptive, prescriptive, and comparative (Poeppelbuss & Roglinger, 2011). Descriptive models assess current states, prescriptive models suggest improvements, and comparative models enable benchmarking.

While both readiness indexes and maturity models aim to assess an organization's capability for digital transformation, they differ in focus, methodology, and intended outcomes. Readiness indexes are typically designed to evaluate an organization's preparedness for change, offering a snapshot of the gaps that must be addressed before digital technologies can be successfully adopted. In contrast, maturity models provide a longitudinal view of organizational development by mapping progression through defined stages, from ad hoc or initial levels to more advanced, optimized states. They focus on guiding capability building over time and offer a structured pathway for sustainable transformation. While readiness indexes are more diagnostic and short-term in orientation, maturity models are developmental and strategic, supporting continuous improvement.

Maturity models offer several benefits for organizations undergoing digital transformation or capability development. One of their primary advantages is providing a structured framework that enables organizations to assess their current state and plan for systematic improvement over time (Becker et al., 2009; Paulk et al., 1994). By dividing complex processes into clearly defined stages, maturity models help organizations prioritize actions and allocate

resources effectively. They also promote a common language and shared understanding across departments, which is particularly useful for aligning cross-functional teams around transformation goals. Furthermore, maturity models support internal and external benchmarking, allowing organizations to compare their capabilities against past performance or industry standards (Poeppelbuss & Roglinger, 2011). This benchmarking drives continuous improvement and fosters accountability. In addition, maturity models act as a strategic roadmap, guiding organizations toward long-term capability building rather than short-term technological fixes (Cinar et al., 2021). They support better decisions and align technology adoption with strategy.

Maturity models serve as valuable tools in performance measurement by providing structured criteria that link capability development to organizational outcomes. Bititci et al. (2015) emphasize that maturity models help organizations assess their current performance against defined maturity levels, enabling a more nuanced understanding of strengths, weaknesses, and improvement priorities. Rather than focusing solely on output-based metrics, maturity models introduce a process-oriented dimension to performance measurement, evaluating how well systems, practices, and behaviors support strategic objectives. This alignment enhances the relevance of performance indicators, promotes continuous improvement, and supports decision-making grounded in both capability progression and measurable results.

DEVELOPING A CAPABILITY MATURITY MODEL

The literature reveals a variety of approaches to the development of capability maturity models. These approaches are often shaped by disciplinary focus, domain specificity, and methodological preferences. Some models have been designed based on extensive literature reviews and conceptual frameworks (de Bruin et al., 2005), while others emerge from empirical observations and case-based inputs, especially within industry-specific contexts such as construction (Adekunle et al., 2022) or digital transformation (Gokalp & Martinez, 2022). For example, Becker et al. (2009) advocate a process-oriented design grounded in model theory, while other studies rely on expert consensus (e.g., the Delphi method), benchmarking exercises, or adaptations of existing frameworks like capability maturity model integration. Literature reveals inconsistencies and limited validation (de Bruin et al., 2005; Gokalp & Martinez, 2022).

The development of a robust and effective capability maturity model requires a structured and transparent methodology that aligns with both theoretical principles and practical application. Building on insights from the literature and addressing gaps identified in existing models, this study proposes a seven-phase development framework (see Figure 1) designed to guide the systematic creation of maturity models across various domains. The framework begins by defining scope, objectives, and stakeholders. The next phase involves choosing an appropriate development approach, whether top-down, bottom-up, or hybrid, based on the nature of the domain and available data. Maturity levels are then defined along a progression from ad hoc to optimized, offering a clear path for organizational growth. Key dimensions such as technology, people, and governance are identified. A core component is the design of a rigorous assessment mechanism, typically using structured instruments like surveys or self-assessment tools, aligned with maturity levels. To ensure credibility and applicability, the model must then be validated through empirical studies, using case-based or expert-driven methods. Finally, models should be refined iteratively, ideally via digital platforms. These activities together form the foundation of a maturity model that is both scientifically grounded and practically valuable.

FIGURE 1

SEVEN-PHASE FRAMEWORK FOR CAPABILITY MATURITY MODEL DEVELOPMENT AND KEY ACTIVITIES.

Phase 1: Define the Scope and Objectives

- Identify the domain for which the capability maturity model will be developed (e.g., IT, supply chain, business processes).
- Define the problem statement and expected outcomes.
- Engage stakeholders (academia, practitioners, policymakers) for relevance validation.

Phase 2: Choose a Development Approach

- Top-down approach: Define maturity stages first, then establish dimensions and measurement criteria.
- Bottom-up approach: Identify key metrics and behaviors first, then categorize them into maturity levels.
- Hybrid approach: Combine elements of both top-down and bottom-up methods.

Phase 3: Define Maturity Levels

- Initial (ad hoc)
- Repeatable (managed at project level)
- Defined (standardized across organization)
- Managed (measured and controlled)
- Optimized (continuous improvement)

Phase 4: Identify Key Dimensions and Indicators

- Define the critical capabilities or process areas that need assessment.
- Each dimension should have a set of criteria to determine maturity progression.
- Example dimensions: technology, people, processes, strategy, governance.

Phase 5: Develop an Assessment Mechanism

- Create an assessment framework using surveys, interviews, or expert panels.
- Utilize structured instruments like Likert-scale questionnaires or self-assessment matrices.
- Ensure that the scoring mechanism aligns with the maturity levels.

Phase 6: Validate the Model

- Conduct empirical validation through case studies, pilot studies, and expert reviews.
- Ensure reliability and consistency by testing with multiple organizations.
- Apply methods such as the Delphi technique or quantitative validation to refine the model.

Phase 7: Implement, Iterate, and Improve

- Deploy the model in real-world settings and collect feedback.
- Use the feedback to refine and enhance usability, accuracy, and effectiveness.
- Consider digital tools for automated assessments and reporting.

Source: Author.

BENCHMARKING GLOBAL MATURITY MODELS FOR DIGITAL TRANSFORMATION

The literature and practice around digital transformation have led to the development of a wide range of maturity models and readiness assessment tools, each aiming to support organizations in evaluating and guiding their digital transformation journeys. While these models vary in structure, scope, and conceptual foundations, they share the overarching goal of helping organizations, particularly manufacturers, progress through Industry 4.0 adoption in a structured and strategic manner (Inan et al., 2025). Table 1 presents an overview of several widely recognized international models used to benchmark digital transformation maturity.

TABLE 1

COMPARISON OF DIGITAL TRANSFORMATION MATURITY MODELS.

Name	Developer	Purpose
Smart Industry Readiness Index (SIRI)	Singapore's Economic Development Board	SIRI is a widely adopted global tool that evaluates digital capabilities across three pillars: process, technology, and organization. Each pillar is further broken down into 16 dimensions, offering detailed insights into an enterprise's digital maturity. Its structured, multilevel design makes it adaptable to both SMEs and larger firms, though implementation may require facilitation support.

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Name	Developer	Purpose
IMPULS Industry 4.0 Readiness Model	IMPULS Foundation of the German Engineering Federation	IMPULS defines six maturity stages, ranging from Outsider (Level 0) to Top Performer (Level 5). It assesses organizations across six dimensions, including strategy, smart factory implementation, and IT infrastructure. While comprehensive, the model assumes structured progression pathways that may be more applicable to large enterprises with formal transformation teams.
Boston Consulting Group Digital Acceleration Index (BCG DAI)	Boston Consulting Group	The tool evaluates various digital capabilities across different pillars, such as technology adoption, leadership, talent, and innovation. It offers both sectoral and global comparisons, helping firms understand how their digital maturity compares to that of their peers. Its focus on high-level strategy and cross-functional integration supports enterprise-wide transformation but may require adaptation in SMEs.
APO Digital Readiness Assessment	Asian Productivity Organization (APO)	The APO Digital Readiness Assessment is structured around three core dimensions: product and process, manufacturing and operations, and organization and strategy. It evaluates readiness across four maturity levels: starter, transitional, experienced, and performer.

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Name	Developer	Purpose
DDX Digital Transformation Assessment Model	Turkish Management Sciences Institute (TUSSIDE), Scientific and Technological Research Council of Turkiye (TUBITAK)	DDX is a national maturity model supported by the Turkish Ministry of Industry and Technology. Using the D3A Digital Transformation Assessment Tool developed by Bogazici University, it evaluates organizations across five core domains to assess readiness and maturity for Industry 4.0. The model emphasizes operational integration, technology use, and strategic alignment, providing SMEs with a context-sensitive tool that reflects national priorities and constraints.

Note: SMEs, small and medium-sized enterprises.
Source: Author.

This benchmarking exercise highlights that while global maturity models provide structured pathways to guide digital transformation, their design, focus, and applicability vary significantly. Models such as the Smart Industry Readiness Index (SIRI) and the IMPULS Industry 4.0 readiness model are widely used (Schumacher et al., 2016). However, these models largely emphasize technological deployment and assume a linear progression through predefined stages, often overlooking the strategic context in which firms operate (Qureshi et al., 2023). As a result, SMEs may struggle to align with models designed for large firms (Mittal et al., 2018).

The variation across maturity models underscores the critical need for leaders and managers to carefully evaluate which model or tool best aligns with their organizational objectives, sector-specific needs, and national ecosystem conditions. While models like the DDX Digital Transformation Assessment Model by TUSSIDE (Turkiye) and the APO Digital Readiness Assessment (Asia-Pacific) offer tailored insights for SMEs and developing economies, others such as SIRI and the Boston Consulting Group Digital Acceleration Index (BCG DAI) are better suited for firms with broader strategic scope and

internal transformation capacity. Importantly, the choice of maturity model is not merely a technical consideration but also a strategic decision-making point, as different models serve different purposes, whether for readiness diagnosis, capability development, or long-term strategic alignment. A poor choice risks misaligned investments and poor adoption.

Therefore, there is a pressing need to move beyond one-size-fits-all approaches and adopt or develop strategy-driven maturity assessment tools that integrate technological readiness with business context and strategic intent (Khourshed et al., 2023; Bititci et al., 2012). This study responds to this need by exploring how maturity models can serve not only as assessment frameworks but also as enablers of sustainable and strategically aligned digital transformation in the manufacturing SME landscape.

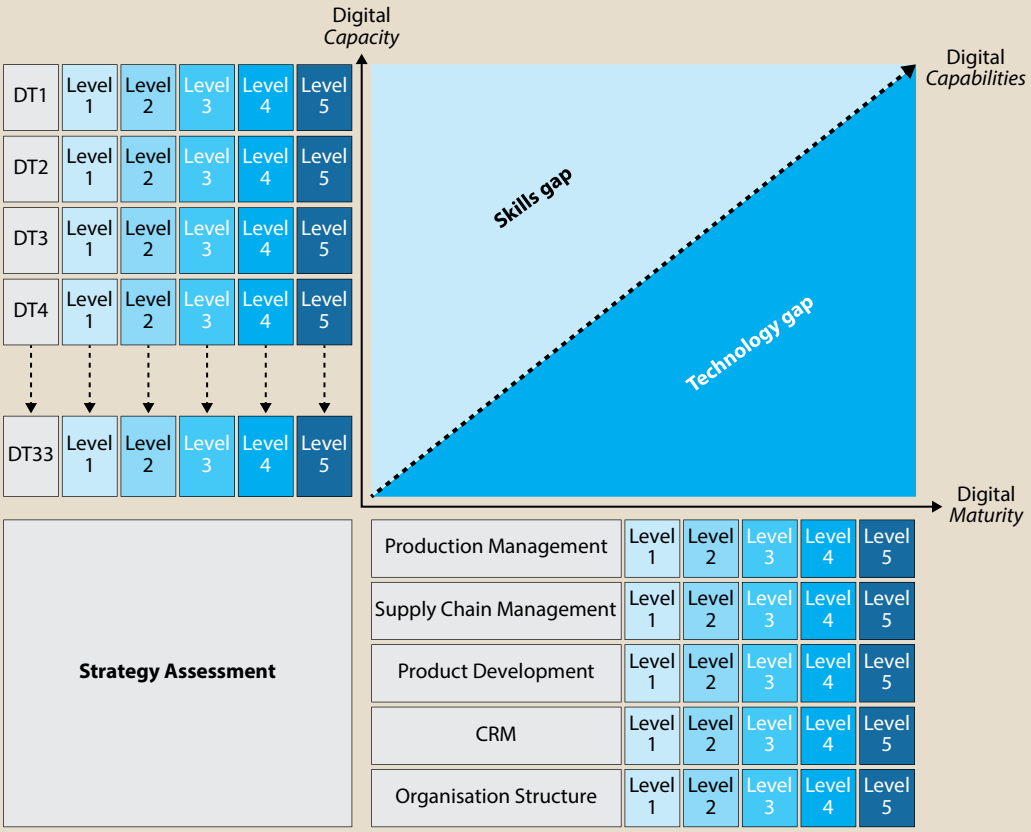
DESIGNING THE DIGICAP MATURITY MODEL FOR MANUFACTURING SMES

The rationale for developing a digital capability assessment tool (DigiCap) came from the limitations observed in existing maturity models and readiness assessments, which often prioritize technological deployment without adequately considering the strategic context of transformation, particularly for SMEs. As highlighted in the literature, many current tools assume a linear, one-size-fits-all progression and overlook firm-specific factors such as market positioning, order winners, product complexity, and operational constraints (Khourshed et al., 2023; Qureshi et al., 2023). DigiCap addresses these shortcomings by providing a strategy-driven, context-sensitive assessment tool built on a structured framework. It evaluates not only digital readiness but also an organization's alignment with long-term value creation goals. DigiCap combines an assessment methodology, a strategic framework of dimensions and maturity levels, and practical implementation guidance, making it an assessment tool rather than a standalone model. It is grounded in dynamic capabilities and informed by existing frameworks.

As illustrated in Figure 2, DigiCap is structured into three interconnected blocks. The first stage focuses on evaluating the strategic orientation of the SME by examining its market position, competitive priorities, and the short- to long-term trends shaping its sector. This strategic profiling ensures that subsequent capability evaluations are grounded in the business context. The second stage comprises a maturity assessment across six key organizational dimensions: organization culture and learning, organization structure, customer relationship management, product development, supply chain management, and production management. The final block assesses the firm's digital technology capacity; it captures the presence and usage of 33 manufacturing-related digital technologies and identifies infrastructure and capability gaps.

FIGURE 2

DIGICAP MATURITY ASSESSMENT FRAMEWORK.



Note: CRM, customer relationship management; DT, digital technology.
Source: Inan et al., 2025.

The DigiCap assessment supports assessors in identifying the appropriate next steps by diagnosing whether a firm's capability gaps stem from technological deficiencies, skill shortages, or both. For instance, if an organization possesses certain digital technologies but is unable to translate them into operational capabilities, it likely lacks the necessary skills to effectively utilize those technologies. In such cases, gaps can be addressed through training, partnerships, or external expertise. Conversely, a firm may possess the knowledge and intent to leverage technology, such as a

manufacturing execution system to monitor and improve overall equipment effectiveness, yet may lack the foundational infrastructure, such as reliable data or the capacity to collect it consistently. In this situation, the recommendation would be to implement a pilot data collection initiative or deploy a manufacturing execution system to enhance the firm's digital capacity and support capability development. This dual-focus approach, evaluating both technological and human readiness, sets DigiCap apart from traditional maturity assessment methodologies.

LESSONS FROM UK IMPLEMENTATION

The implementation of the DigiCap assessment in 36 UK-based manufacturing SMEs provided meaningful diagnostic insights into the digital transformation landscape of small firms. The combination of gemba walks and structured self-assessment tools proved particularly effective in identifying both visible and latent capability gaps. Self-assessments showed biases, highlighting the value of expert facilitation. These findings highlight the importance of expert facilitation in guiding assessments, interpreting criteria accurately, and ensuring realistic responses that align with actual practices.

Crucially, the gemba walks enhanced the diagnostic depth by enabling assessors to observe real-time practices, validate reported processes, and engage in context-specific discussions with key personnel. This dual-method approach helped bridge the gap between perception and practice, offering a more nuanced understanding of where firms stand in their transformation journey. Self-assessments are scalable, but on-site facilitation is essential.

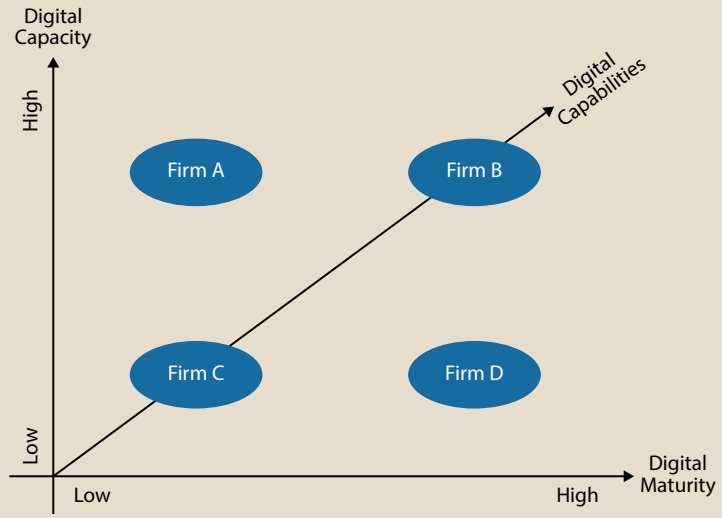
The findings reveal that while SMEs have a solid understanding of their customers' needs, they often face difficulties in applying digital tools to meet those demands effectively. Although there is a willingness to invest in digital technologies, many SMEs lack clarity on how to initiate their digital transformation and are uncertain which areas to prioritize. At the operational level, data collection systems, particularly in production, remain underdeveloped, limiting the firms' ability to measure performance or conduct meaningful analysis. Even when data is available, it is not being fully utilized to drive process improvements or create added value. Technology choices are often ad hoc and lack strategic support. This results in inconsistent outcomes and missed opportunities for sustainable capability development.

Figure 3 presents a two-dimensional mapping of four case study firms from UK-based manufacturing SMEs based on their levels of digital capacity and

organizational capability, assessed using DigiCap. This mapping illustrates how firms differ not only in terms of technological infrastructure but also in their ability to create value from those technologies. The vertical axis represents digital capacity, which captures the availability and implementation of digital tools and systems. The horizontal axis represents digital maturity, indicating how effectively firms utilize their resources, data, and competencies. The positioning of each firm reflects their current capability and provides insights into where intervention is needed, whether through investing in technology, building skills, or aligning digital tools with strategic goals. This diagnostic approach supports tailored transformation roadmaps for SMEs.

FIGURE 3

DIGITAL CAPACITY VERSUS MATURITY MATRIX.



Source: Author.

Each firm represents a distinct position within the digital capacity and organizational capability matrix, highlighting varied challenges, priorities, and transformation pathways. These case studies reflect the diversity of SME contexts, from firms with strong technological infrastructure but limited strategic direction to those with high capability maturity actively leveraging digital tools for competitive advantage. The insights gathered provide real-

world evidence of how tailored interventions can support firms at different stages of their digital transformation journeys.

Firm A has accumulated a significant volume of data, but decisions are still largely based on gut feeling and employee experience rather than evidence. This has led to persistent profitability issues. Although the firm was considering a customer relationship management investment, our advice was to first focus on developing internal data analytics capabilities and embedding a culture of continuous improvement. Without these foundations, any new technological investment would likely underdeliver.

Firm B stands out as a positive example of how to build real capability around digital technologies. It has made consistent investments in both tools and people, ensuring its workforce can effectively adopt and evolve with new technologies. Its proactive approach includes strategic partnerships and tapping into external funding to accelerate innovation. As a result, it has maintained a strong competitive position and is seen as a sector leader.

Firm C is facing serious competitiveness challenges due to the relocation of production to an offshore facility, which has also impacted local employment. While management is aware that transformation is essential, it is unsure how to begin. We advised prioritizing capability development in key areas such as operational excellence, inventory and warehouse management, automation, and fostering cross-organizational collaboration. This would lay the groundwork for a more resilient and future-ready operation.

Following a recent change in management, Firm D has shown a clear intention to move toward data-driven decision-making. However, its current systems do not generate the level of operational data needed to identify and address performance gaps, especially in production. We recommended targeted investment in Internet of Things (IoT) technologies and better integration of systems, both vertically and horizontally, to help unlock meaningful insights and support smarter, more responsive operations.

STRATEGIC REFLECTIONS AND IMPLICATIONS

Customization Is Key

One of the most critical lessons from the DigiCap implementation is that a one-size-fits-all approach does not work for digital transformation, particularly in the SME landscape. Customization must occur on two levels: sectoral and local. First, sector-specific calibration is essential. For example, the digital maturity needs of a food manufacturing SME differ significantly from those of an original equipment manufacturer. While traceability, hygiene compliance, and shelf life management may dominate in the food sector, original equipment manufacturers often prioritize engineering integration, computer-aided design and computer-aided manufacturing (CAD/CAM) systems, and product life-cycle data. Therefore, maturity models must be flexible enough to reflect the unique operational realities, customer expectations, and regulatory environments of different sectors. Second, localization is equally important. The availability of support ecosystems, funding mechanisms, and digital infrastructure varies not only from country to country but even within the same country. A model that works well in London might be less effective in rural Scotland or North Wales unless adapted to local strengths, limitations, and opportunities. The DigiCap tool's ability to contextualize assessments based on strategic positioning and environmental scanning proved valuable in this regard, enabling more targeted and realistic transformation roadmaps.

Human Capital over Tools

Another key insight is that digital transformation is rarely limited by access to technology. In fact, many SMEs we assessed already possessed digital tools or had begun investing in them. However, the gap was more often in skills, not systems. The inability to convert technological potential into operational capability is largely driven by a lack of digital competencies across the workforce. Many SMEs struggle with acquiring the know-how needed to extract value from the tools they have, whether that be understanding how to

interpret data, manage software platforms, or implement automated workflows. This is why any meaningful transformation must prioritize skill development over pure technological acquisition. Moreover, we observed that lean thinking and digital transformation should not be treated as separate or sequential initiatives. Rather, they are complementary. Digital tools can enhance lean practices through real-time monitoring, predictive maintenance, and process transparency, while lean culture prepares the ground for digital adoption by promoting problem-solving, standardization, and employee involvement. Firms that embedded a culture of continuous improvement were better positioned to exploit digital capabilities meaningfully. Without this cultural foundation, even the most advanced technology risks becoming underutilized or misapplied.

Leadership as Enabler

Leadership emerged as the decisive factor in whether digital transformation efforts gained traction or stalled. In many cases, the difference between progress and stagnation was not technological maturity but leadership maturity. Strong leadership is not just about vision; it is about long-term commitment, empowerment of teams, and the ability to communicate the "why" behind transformation efforts. Leaders who actively engaged in the roadmapping process and internalized its outputs were more likely to drive alignment across the organization. They understood that transformation is a journey requiring iterative investment, learning, and adaptation. Moreover, leadership continuity and strategic alignment are crucial. Several firms we worked with had recently undergone leadership changes, and while new leaders brought energy and ambition, the lack of long-term continuity often resulted in fragmented initiatives. When leadership teams were stable, clear about their priorities, and open to external collaboration, the pace and depth of transformation were significantly higher. In this context, roadmapping emerged as a powerful tool for communication as well as planning. It enabled leaders to align stakeholders, prioritize initiatives, and maintain focus in environments where uncertainty is often the norm. By linking digital transformation directly to operational goals and market drivers, roadmaps made change feel both necessary and achievable.

CONCLUSION AND RECOMMENDATIONS

The findings presented in this paper underline a critical reality: digital transformation is not a destination but a journey, one that demands readiness and adaptive leadership. For SMEs, the pressure to transform digitally is increasing, yet their pathways are often fragmented, resource-constrained, and misaligned with strategic intent. In response to this complexity, maturity models do not offer a magic solution. Rather than prescribe fixed actions, they function as strategic maps designed to guide reflection, prioritization, and coordinated capability development over time.

The value of maturity models lies in their ability to structure what is often an overwhelming task into manageable stages. Instead of treating digitalization as a binary state, where a firm is either "digital" or "not," maturity models offer a nuanced framework to assess where a company stands, where it needs to go, and how best to get there. This perspective helps SMEs avoid investing in isolated technologies without foundational capabilities. As demonstrated through the DigiCap assessment and accompanying case studies, firms that lack strategic alignment skills or data infrastructure often fail to realize the value of their digital investments. In contrast, firms that align technology with their business priorities and build digital capacity alongside organizational capabilities are far more likely to see meaningful performance gains.

However, a key lesson from our UK implementation is that one size does not fit all. Maturity models that lack contextual sensitivity, whether to industry, local infrastructure, or firm-specific challenges, risk offering misleading insights. For example, SMEs operating in food manufacturing face very different digital requirements than those in metal fabrication or electronics. Similarly, regional variation in ecosystem support, funding availability, and workforce skills requires maturity tools to be localized. The DigiCap framework addresses this by incorporating strategic profiling as a first step, ensuring that capability assessment is grounded in the firm's competitive environment,

market trends, and operational focus. This allows for the tailoring of roadmaps that are both relevant and realistic.

At the core of effective digital transformation is strategic alignment. SMEs must resist the temptation to digitalize for the sake of digitalizing. Instead, they should align their efforts with clear strategic priorities, whether that means reducing waste, improving customer responsiveness, or increasing throughput. Without this alignment, technology becomes a distraction rather than a driver. The strategic assessment component of the DigiCap model helps to surface these priorities early in the process, ensuring that digital investments are positioned to support long-term value creation rather than short-term experimentation. Another major barrier SMEs face is the cost, both financial and human, of digital transformation. Many lack the internal expertise to assess, adopt, and integrate new technologies. Others hesitate to commit scarce capital to initiatives with uncertain returns. This is where universities, regional development agencies, and local partnerships can play a transformative role. By offering structured diagnostic tools, access to skilled graduates, pilot project facilitation, and funded innovation vouchers, these ecosystem actors can significantly lower the entry barriers to digitalization. Our experience working with 36 SMEs as part of a national program demonstrates that external facilitation combined with internal commitment creates momentum for change, even in traditionally risk-averse firms.

The final and perhaps most important insight from this study is the need to move beyond dichotomies. Too often, digital and lean are treated as separate or even competing approaches. In reality, they are mutually reinforcing. Lean provides the cultural and process discipline necessary for continuous improvement while digital tools enable greater visibility, responsiveness, and data-driven decision-making. Embedding a lean mindset alongside digital maturity allows firms to build systems that are not only efficient but also adaptive. The most successful SMEs we observed were those that saw capability development as a hybrid journey, one that integrates technology with people, processes, and purpose. Maturity models that reflect this hybrid logic can better support sustainable transformation.

In closing, we offer the following recommendations for policymakers, practitioners, and academic institutions seeking to support digital transformation in SMEs:

- Develop contextualized maturity models tailored to industry, size, and region.
- Promote strategic alignment at the outset of digital initiatives.
- Support skill development with training and mentorship.
- Encourage partnerships between SMEs and universities to reduce risk.
- Adopt a hybrid approach integrating lean, digital, and maturity assessment.

Ultimately, digital transformation is not about chasing the latest technology; it is about building a resilient, learning-oriented organization capable of evolving in a rapidly changing world. Maturity models, when designed and applied thoughtfully, provide the structure and insight needed to make that evolution both achievable and sustainable.

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ABBREVATIONS

APO	Asian Productivity Organization
DigiCap	Digital Capability Assessment
SIRI	Smart Industry Readiness Index
SMEs	Small and medium-sized enterprises
UK	United Kingdom

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