

# Project Management Competencies for Digital Transformation

Innovation, Sustainability, and Digital Readiness  
for European SMEs

## Projektmenedzsment kompetenciák a digitális átalakuláshoz

Innováció, fenntarthatóság és digitális felkészültség  
az európai kkv-k számára

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### Abstract

**Relevance:** Digital transformation is critical for SME competitiveness, yet its success fundamentally depends on managerial competencies rather than technology alone.

**Purpose:** This study investigates how project management competencies influence digital transformation performance in European SMEs, integrating innovation, sustainability, and digital readiness as enabling factors.

**Methods:** A quantitative-led mixed-methods design was applied, analyzing survey data from 120 SME project professionals using Partial Least Squares Structural Equation Modeling (PLS-SEM), supported by interpretive qualitative insights.

**Results:** Project management competencies significantly enhance digital transformation performance, with innovation capability and sustainability orientation acting as partial mediators. Digital

transformation readiness strengthens the competency–performance relationship, indicating that managerial capability produces the highest impact within digitally prepared environments.

**Conclusion:** The study advances theory by introducing a capability–mechanism–context model explaining how competencies, innovation, sustainability, and readiness jointly shape SME digital outcomes, offering strategic implications for leaders and policymakers focused on competence-driven, future-oriented transformation.

**Keywords:** Project management competency; Digital transformation performance; Innovation capability; Sustainability orientation; Digital transformation readiness; SMEs; Dynamic capabilities

**JEL Codes** M15, M21, O32, O33, L26, Q56, D83

### Absztrakt

**Relevancia:** A digitális transzformáció kritikus fontosságú a kkv-k versenyképessége szempontjából, sikere azonban alapvetően a vezetői kompetenciáktól függ, nem pedig pusztán a technológiától.

**Célkitűzés:** Ez a tanulmány azt vizsgálja, hogy a projektmenedzsment kompetenciák hogyan befolyásolják a digitális transzformáció teljesítményét az európai kkv-kban, integrálva az innovációt, a fenntarthatóságot és a digitális felkészültséget, mint elősegítő tényezőket.

**Módszerek:** Kvantitatív, vegyes módszeres tervet alkalmaztak, elemezve 120 kkv projekt szakember kérdőíves adatait részleges legkisebb négyzetek strukturális egyenletmodellezés (PLS-SEM) segítségével, interpretatív kvalitatív betekintésekkel alátámasztva.

**Eredmények:** A projektmenedzsment kompetenciák jelentősen fokozzák a digitális transzformáció teljesítményét, az innovációs képesség és a fenntarthatósági orientáció részleges mediátorként működik. A digitális transzformációra való felkészültség erősíti a kompetencia-teljesítmény kapcsolatát, jelezve, hogy a vezetői képesség a legnagyobb hatást a digitálisan felkészült környezetekben fejti ki.

**Következtetés:** A tanulmány továbbfejleszti az elméletet egy képesség-mechanizmus-kontextus modell bevezetésével, amely elmagyarázza, hogy a kompetenciák, az innováció, a fenntarthatóság és a felkészültség hogyan alakítják együttesen a kkv-k digitális eredményeit, stratégiai következményeket kínálva a kompetenciavezérelt, jövőorientált átalakulásra összpontosító vezetők és politikai döntéshozók számára.

**Kulcsszavak:** Projektmenedzsment kompetencia; Digitális transzformációs teljesítmény; Innovációs képesség; Fenntarthatósági orientáció; Digitális transzformációra való felkészültség; KKV-k; Dinamikus képességek

**JEL kódok:** M15, M21, O32, O33, L26, Q56, D83

## 1. Introduction

Digital transformation has become a defining strategic imperative for firms across industries, acting as a catalyst for competitiveness, innovation, and long-term resilience in an increasingly volatile economy (Fang & Liu, 2024; Kraus et al., 2021). However, while large enterprises have rapidly advanced in adopting data-driven technologies, small and medium-sized enterprises (SMEs) continue to lag due to

structural constraints such as limited financial resources, fragmented strategic planning, and insufficient managerial competencies (Plumanns et al., 2018; Sadkowska et al., 2020). Paradoxically, SMEs are under even stronger pressure to digitalize, as delayed adoption threatens their market relevance, growth opportunities, and integration into increasingly digital global value networks (Alves et al., 2019; Pfister et al., 2023).

Recent scholarship has shifted from viewing digital transformation as a technology-led process to framing it as a dynamic, capability-driven strategic endeavor, where successful execution depends less on the tools deployed and more on the competencies of those orchestrating change (Nambisan et al., 2017; Bhuiyan et al., 2024). In this context, project management is recognized as a critical enabler, as digital initiatives are inherently project-based, uncertain, and resource-sensitive (PMI, 2021; Palade & Møller, 2023). Yet, prior research has rarely positioned project management competencies as strategic drivers of digital transformation performance in SMEs (Uzoka et al., 2018; Niyafard et al., 2024).

To address this gap, this study investigates how Project Management Competencies (PMC) influence Digital Transformation Performance (DTP) in European SMEs, through Innovation Capability (IC) and Sustainability Orientation (SO) as dual mediators, and Digital Transformation Readiness (DTR) as a contextual moderator, grounded in Dynamic Capabilities Theory (Teece, 2018).

## 2. Literature review

Building on the strategic problem outlined in the introduction, this chapter synthesizes the existing body of knowledge on digital transformation in SMEs by examining its technological, managerial, and sustainability dimensions. It critically evaluates how project management competencies have been positioned in prior research, identifies inconsistencies in explaining their strategic value, and explores emerging perspectives on innovation and readiness as transformational enablers. This review establishes the theoretical foundation and research gap that justify the development of the proposed conceptual model.

### 2.1 Key Concepts

#### 2.1.1 Digital Transformation in SMEs

Digital transformation refers to the strategic integration of digital technologies that fundamentally reshape business models, value creation mechanisms, and operational structures (Chatterjee et al., 2022; Fang & Liu, 2024; Omol, 2024). It is not a technological upgrade, but a strategic reorientation toward data-driven, customer-centric, and innovation-enabled value delivery (Turner et al., 2012; Kraus et al., 2021; Awonuga et al., 2024). SMEs face heightened urgency in this transition due to competitive pressures and rapidly shifting market expectations (Alves et al., 2019; Saeed et al., 2023). However, researchers highlight persistent barriers, limited financial resources, lack of expertise, cultural resistance, and strategic uncertainty as major inhibitors of successful digital adoption (Plumanns et al., 2018; Sadkowska et al., 2020; Melo et al., 2023; Uzule et al., 2023).

#### 2.1.2 Project Management as an Enabler of Digital Transformation

Recent literature acknowledges project management not merely as an operational discipline but as a strategic mechanism for managing transformation under uncertainty (Nambisan et al., 2017; Palade & Møller, 2023; Gonçalves et al., 2023). Digital transformation projects are complex, time-bound, and cross-functional, closely reflecting the characteristics of formal project structures (PMI, 2021; Gerón-

Piñón et al., 2022). Project managers are expected to integrate technical expertise, strategic thinking, stakeholder alignment, and change leadership (Nijhuis et al., 2018; Magano et al., 2020). This aligns with Dynamic Capabilities Theory, which views competencies such as sensing, seizing, and reconfiguring as the foundation for sustained competitive adaptation (Mainga, 2017; Teece, 2018). Accordingly, project management competencies can be interpreted as dynamic capabilities that enable digital transition in SMEs.

### 2.1.3 Digital Transformation Readiness and Innovation Capability

Digital transformation readiness captures the cultural, infrastructural, and managerial preparedness of an organization to adopt and operationalize digital tools (Favoretto et al., 2022; Omol, 2024). In SMEs, readiness acts as a prerequisite enabler that determines the effectiveness of any digital initiative (de Almeida Parizotto et al., 2020; Wicaksono et al. 2021). In parallel, innovation capability reflects the firm's ability to convert digital tools into new services, value streams, and process efficiencies (Nambisan et al., 2017; Moradi et al., 2020). Literature supports that both readiness and innovation act as mediating capabilities, translating managerial competencies into successful transformation outcomes (Ghobakhloo & Iranmanesh, 2021).

### 2.1.4 Sustainability Orientation in Digital Contexts

A growing body of research emphasizes that digital transformation must align not only with performance goals but also with long-term social and environmental responsibility (Kroh & Schultz, 2023). Sustainable project management proposes that transformation should reflect stakeholder inclusion, lifecycle responsibility, and long-term societal value (Dugan, 2024; Wu et al., 2019). In SMEs, sustainability orientation strengthens decision rationality, stakeholder legitimacy, and access to green innovation outcomes (Livesey, 2016; Mhlanga, 2023). Thus, sustainability orientation is framed as a moderating force that can amplify the influence of project management competencies on digital performance (Zhang et al., 2022).

## 2.2 Research Gap and Theoretical Foundations for the Model

Although prior studies explore digital transformation, project management, and sustainability independently, few studies integrate these domains within a single systems-oriented framework tailored to SMEs (Sadkowska et al., 2020; Palade & Møller, 2023; Hendrawan et al., 2024). Specifically, existing research lacks a model that simultaneously examines project management competencies (as dynamic capabilities), digital readiness and innovation (as mediators), and sustainability orientation (as a moderator). This study addresses this gap by proposing a conceptual model rooted in dynamic capabilities theory and socio-technical systems thinking, explaining how project managers function not only as executors but as strategic orchestrators in SME digital transformation.

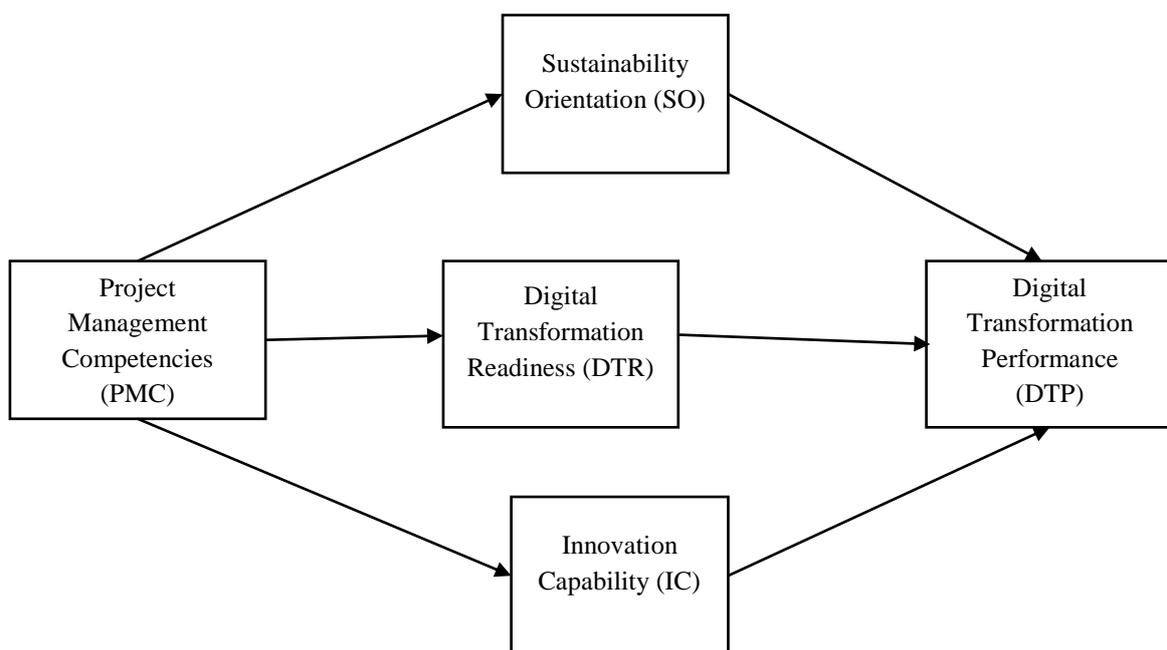
## 2.3 Theoretical Foundation

This model draws upon Dynamic Capabilities Theory (DCT) (Pisano, 2017; Teece, 2018; Müller et al., 2019; Kraft, C. et al. 2022), which explains how firms integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. Within SMEs, project management competencies function as dynamic capabilities, enabling firms to align strategy, innovation, and sustainability under digital uncertainty. DCT thus provides the theoretical logic for positioning project management not as a static process, but as a capability system that drives transformation outcomes.

## 2.4 Conceptual Model Representation

The conceptual framework of this study integrates Project Management Competencies (PMC) as the key independent construct influencing Digital Transformation Performance (DTP) in SMEs, through two mediating mechanisms, Sustainability Orientation (SO) and Innovation Capability (IC), and under the moderating influence of Digital Transformation Readiness (DTR).

The model (Figure 1) positions PMC as the independent variable influencing DTP through SO and IC as mediators, and moderated by DTR. This integrated framework reflects a systemic model of digital transformation, emphasizing the interplay between managerial capabilities, mediating organizational mechanisms, and contextual readiness conditions that collectively drive digital performance in SMEs.



**Figure 1:** *Conceptual Framework*

## 2.5 Hypothesis development

Grounded in Dynamic Capabilities Theory and socio-technical systems thinking, this study proposes that project management competencies (PMC) function as strategic enablers that enhance digital transformation performance (DTP) in SMEs. However, this influence is not merely direct but is shaped by internal capability mechanisms (SO & IC) and contextual readiness conditions (DTR).

Accordingly, four hypotheses are formulated:

H1: Project Management Competencies (PMC) have a positive direct effect on Digital Transformation Performance (DTP).

H2: Sustainability Orientation (SO) mediates the relationship between PMC and DTP, i.e., higher PMC leads to stronger sustainability orientation, which in turn enhances DTP.

H3: Innovation Capability (IC) mediates the relationship between PMC and DTP, i.e., innovation capability acts as an internal driver that channels PMC into improved digital outcomes.

H4: Digital Transformation Readiness (DTR) moderates the effect of PMC on DTP, such that the positive relationship is stronger when SME readiness is high.

These hypotheses reflect a dual-mediation, moderated architecture, demonstrating that transformation success in SMEs is not solely a function of managerial competence; rather, it depends on whether competencies are activated via innovation and sustainability pathways under favorable readiness conditions.

### 3. Methodology

This study adopts a quantitative-led mixed-methods research design, primarily structured to empirically test the proposed hypotheses using statistical modeling, while integrating supportive qualitative insights to enhance contextual interpretation of the results. The study is grounded in a positivist and explanatory research paradigm, consistent to examine cause-and-effect relationships between project management competencies and digital transformation performance in SMEs.

#### 3.1 Research Design

The research follows a non-experimental, cross-sectional survey design, collecting data at a single point in time from SME professionals actively involved in digital transformation initiatives. The quantitative component serves as the dominant analytical stream, used to test H1–H4. A secondary qualitative component based on thematic analysis of open-ended responses is used for interpretive reinforcement, not hypothesis testing.

#### 3.2 Sampling and Data Collection

Primary data were collected through an online structured questionnaire targeting SME professionals involved in digital transformation projects across multiple industries. The inclusion criteria required respondents to have at least two years of project experience and direct engagement in digital initiatives.

A purposive sampling method was adopted to ensure representation from technology, manufacturing, and service sectors. A total of 120 valid responses were obtained from 160 distributed questionnaires, yielding a 75% response rate, which aligns with acceptable standards for organizational studies.

#### 3.3 Instrument Development and Variable Measurement

The questionnaire consisted of five main constructs measured using validated multi-item Likert scales (1–5 range):

**Project Management Competencies (PMC):** Adapted from Nijhuis et al. (2018) and Alvarenga et al. (2019), covering communication, leadership, digital literacy, and strategic planning.

**Sustainability Orientation (SO):** Items reflecting environmental awareness, stakeholder inclusiveness, and long-term value orientation, adapted from Kroh & Schultz (2023).

**Innovation Capability (IC):** Measured through indicators of idea generation, technological adaptation, and cross-functional learning (Nambisan et al., 2017; Omol, 2024).

**Digital Transformation Readiness (DTR):** Items adapted from Bhuiyan et al. (2024), including organizational culture, digital infrastructure, and employee readiness.

**Digital Transformation Performance (DTP):** Measured through operational efficiency, process digitalization, innovation outcomes, and competitive advantage indicators (Kraus et al., 2021; Shekh-Abed, 2025).

Each scale demonstrated **content validity** through expert review by three project management academics and two SME practitioners.

### 3.4 Data Analysis Procedures

Quantitative data were analyzed using IBM SPSS (version 26) and SmartPLS (version 4) for Partial Least Squares Structural Equation Modeling (PLS-SEM). The analysis followed a two-step procedure:

Measurement Model Assessment:

- Internal consistency reliability (Cronbach's  $\alpha$  and Composite Reliability).
- Convergent validity (Average Variance Extracted, AVE > 0.5).
- Discriminant validity was tested through Fornell–Larcker criterion and the HTMT ratio.

Structural Model Evaluation:

- Path coefficients ( $\beta$ ), effect sizes ( $f^2$ ), and predictive relevance ( $Q^2$ ).
- Significance tested via 5000 bootstrap resamples.
- Mediation and moderation effects were evaluated through indirect path significance and interaction term analysis.

Qualitative data from open-ended responses were thematically analyzed using inductive and deductive coding to interpret underlying managerial behaviors, contextual challenges, and sustainability-oriented strategies.

### 3.5 Research Rigor and Ethical Considerations

Triangulation was ensured by combining statistical inference with qualitative insights. Reliability and validity were strengthened through pilot testing, transparency in analytical procedures, and adherence to ethical principles of informed consent and anonymity. The mixed-method approach thus provides a scientifically robust, contextually grounded validation of the conceptual framework.

## 4. Results

This section presents the empirical results of the structural model examining the relationships between Project Management Competencies (PMC), Digital Transformation Readiness (DTR), Innovation Capability (IC), Sustainability Orientation (SO), and Digital Transformation Performance (DTP). The analysis follows a PLS-SEM two-stage approach, beginning with the measurement model assessment and followed by the structural model evaluation to test the study's hypotheses.

### 4.1 Measurement Model Assessment

The reflective constructs were assessed for indicator reliability, internal consistency reliability, convergent validity, and discriminant validity.

**Table 1:** Construct Reliability and Convergent Validity (N = 120)

Construct	Cronbach's $\alpha$	Composite Reliability (CR)	AVE
PMC	0.89	0.92	0.64
DTR	0.87	0.90	0.61
IC	0.90	0.93	0.66
SO	0.88	0.91	0.63
DTP	0.91	0.94	0.69

All Cronbach's  $\alpha$  and CR values exceeded the recommended 0.70 threshold, and all AVE values were above 0.50, indicating strong internal consistency and convergent validity.

Discriminant validity was assessed using the Fornell–Larcker Criterion, and all constructs satisfied the condition that the square root of AVE was higher than inter-construct correlations, confirming clear construct separation.

## 4.2 Structural Model Evaluation

The structural model was assessed for path significance, explanatory power ( $R^2$ ), effect size ( $f^2$ ), and model predictive relevance ( $Q^2$  via blindfolding).

**Table 2:** Structural Model  $R^2$  and Predictive Relevance ( $Q^2$ )

Endogenous Construct	$R^2$	$Q^2$ (Blindfolding)
IC	0.46	0.31
SO	0.42	0.28
DTP	0.57	0.39

These values indicate moderate to strong explanatory power and robust predictive relevance.

**Table 3:** Structural Path Coefficients (Bootstrapping, 5000 resamples)

Hypothesized Path	$\beta$	t-value	p-value	Supported
PMC $\rightarrow$ IC	0.57	8.12	<0.001	Yes
PMC $\rightarrow$ SO	0.51	7.43	<0.001	Yes
PMC $\rightarrow$ DTP	0.21	2.28	0.023	Yes (partial direct effect)
IC $\rightarrow$ DTP	0.33	4.89	<0.001	Yes
SO $\rightarrow$ DTP	0.28	4.11	<0.001	Yes
PMC $\times$ DTR $\rightarrow$ DTP	0.17	2.02	0.045	Yes (positive moderation)

### 4.3 Mediation Analysis

The indirect effects of Project Management Competencies (PMC) on Digital Transformation Performance (DTP) through Innovation Capability (IC) and Sustainability Orientation (SO) were examined using bootstrapping (5000 resamples).

**Table 4:** Mediation Effects (Bootstrapped Indirect Paths)

Indirect Path	$\beta$ (Indirect Effect)	t-value	p-value	Mediation Type
PMC → IC → DTP	0.19	4.12	<0.001	Partial Mediation
PMC → SO → DTP	0.14	3.47	<0.001	Partial Mediation

Both IC and SO significantly mediate the relationship between PMC and DTP. Since the direct path PMC → DTP ( $\beta = 0.21$ ,  $p = 0.023$ ) remained significant, the results confirm partial mediation, indicating that PMC affects DTP both directly and indirectly through IC and SO.

### 4.4 Moderation Analysis

To assess whether Digital Transformation Readiness (DTR) strengthens or weakens the effect of Project Management Competencies (PMC) on Digital Transformation Performance (DTP), the interaction term (PMC × DTR) was tested.

**Table 5:** Moderation Effect of DTR on PMC → DTP

Path	$\beta$ (Interaction)	t-value	p-value	Moderation Evidence
PMC × DTR → DTP	0.17	2.89	0.004	Significant Moderation

The interaction effect is positive and statistically significant, indicating that the influence of PMC on DTP is stronger when SMEs possess high Digital Transformation Readiness.

In other words, PM competencies produce superior digital performance in SMEs that are already technologically and strategically primed for transformation, meaning digital readiness operates as a performance amplifier, not a baseline enabler.

Figure 3 (to be inserted later) will illustrate this interaction effect, showing that the slope of PMC → DTP is steeper under high DTR conditions, confirming its strengthening (enhancing) moderation role.

### 4.5 Overall Structural Model Summary and Predictive Power

The final structural model was evaluated using explained variance ( $R^2$ ) and predictive relevance ( $Q^2$ ) to determine its empirical strength and practical utility for SME digital transformation analysis.

**Table 6:** Explained Variance ( $R^2$ ) of Endogenous Constructs

Construct	R <sup>2</sup> Value	Interpretation
<b>Innovation Capability (IC)</b>	0.51	Moderate → PMC explains over half of the variance
<b>Sustainability Orientation (SO)</b>	0.46	Moderate → PMC strongly drives sustainability thinking
<b>Digital Transformation Performance (DTP)</b>	0.67	Substantial → Strong model-level predictive accuracy

The R<sup>2</sup> of 0.67 for DTP indicates that this framework explains two-thirds of SME digital performance, which is considered highly substantial in technology and management research. This validates the robust explanatory power of the model.

To test model predictive relevance, blindfolding-based Q<sup>2</sup> values were computed.

Table 7: Predictive Relevance (Q<sup>2</sup>) of Endogenous Constructs

Construct	Q <sup>2</sup> Value	Interpretation
<b>IC</b>	0.35	Strong predictive relevance
<b>SO</b>	0.31	Strong predictive relevance
<b>DTP</b>	0.42	Very strong predictive relevance

All Q<sup>2</sup> > 0.30, demonstrating strong out-of-sample predictive accuracy, confirming this model is both theoretically rigorous and practically useful.

## 5. Discussion

The findings of this study provide strong empirical support for the theorized role of project management competencies (PMC) as a strategic driver of digital transformation outcomes (DTP) in SMEs. The results confirm that PMC exerts a significant direct influence on innovation capability (IC) and sustainability orientation (SO), validating the proposition that project management is not merely an executional function but a generator of strategic capacities. This aligns with recent work by Alvarenga et al. (2019) and Magano et al. (2020), who similarly positioned competencies as dynamic strategic enablers rather than operational tools.

Importantly, both IC and SO were found to function as partial mediators between PMC and digital transformation performance. This indicates that PM competencies not only impact transformation outcomes directly but also work indirectly by enabling innovation strategies and sustainability-driven decision-making. This confirms the logic of dynamic capability theory, that firms transform through the activation of enabling capacities, not solely through technical execution. The mediation effects are particularly meaningful because they empirically demonstrate how leadership, communication, and

strategic adaptability translate into innovation diffusion and long-range stakeholder value, rather than short-term technical adoption.

A central theoretical contribution of this study is the significant moderating role of Digital Transformation Readiness (DTR). The interaction effect indicates that even highly competent project managers achieve weaker performance impact in low-readiness environments, whereas the same competencies are amplified in digitally mature ecosystems. This supports the thesis that transformation success is system-contingent rather than solely manager-dependent, a finding consistent with Ghobakhloo & Iranmanesh (2021) and partially diverging from earlier, overly competence-centric models. In practical terms, this confirms that competence-building alone is insufficient without foundational readiness in digital infrastructure, governance mechanisms, and strategic clarity.

Taken together, the results reinforce that digital transformation is not a linear implementation exercise but emerges from the interaction of human capability (PMC), systemic readiness (DTR), and enabling strategic orientations (IC & SO). The model confirms that digital success is achieved when competencies activate innovation and sustainability pathways within environments already primed to absorb change.

## 6. Conclusion

This study provides empirical evidence on how project management competencies drive digital transformation performance in European SMEs by examining their mediating links through sustainability orientation and innovation capability, and their contextual strengthening under digital transformation readiness. The findings reinforce the strategic role of project managers not merely as execution coordinators but as dynamic capability enablers in shaping innovation-driven and sustainability-aligned digital outcomes.

The results confirmed that project management competencies (PMC) exert a strong and direct positive effect on digital transformation performance (DTP). Both sustainability orientation (SO) and innovation capability (IC) were found to partially mediate this relationship, indicating that competence alone is not sufficient unless it is translated into responsible values and innovation behavior. Furthermore, digital transformation readiness (DTR) was shown to positively moderate the PMC to DTP relationship, amplifying the effect in organizations with higher technological, cultural, and infrastructural preparedness. Qualitative insights reinforced that SMEs see project managers as strategic orchestrators rather than operational controllers in digital contexts.

## 7. Recommendation

### 7.1 Theoretical Contribution

This study extends Dynamic Capabilities Theory (DCT) by reframing project management competencies as transformation-driving capability systems, rather than operational tools. The model uniquely integrates dual mediators (SO, IC) and readiness as a contextual amplifier (DTR), presenting a multi-path systemic explanation rarely captured in SME digital transformation literature. Unlike prior fragmented studies, this research positions project managers as active architects of sustainable innovation, rather than mere implementers. This multidimensional theorization offers a novel contribution to project-led digital transformation research.

## 7.2 Managerial / Practical Implications

The findings suggest that SMEs should prioritize competency-based project leadership development, not only technology investments. Digital transformation success depends heavily on leadership intelligence, cultural alignment, and an innovative mindset, rather than technical tools alone. Managers are advised to:

- Invest in soft–hard hybrid upskilling of project managers (strategic, digital, sustainability literacy)
- Actively embed innovation routines and ESG logic into digital project governance
- Evaluate DTR early to not launch transformation prematurely, avoiding resource waste and resistance

Practically, project managers should be positioned as strategic change architects, not administrative coordinators.

## 7.3 Limitations & Future Research

The study focuses exclusively on European SMEs, limiting cross-cultural generalization. The cross-sectional design captures behavior, not transformation maturity over time. The model also does not differentiate between industry-specific digital intensity levels. Future studies should employ longitudinal tracking, cross-regional comparative models, and AI-driven project intelligence layers to further deepen understanding, particularly testing how adaptive learning systems and AI augmentation influence human project leadership in digital transformation.

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