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Article

Multilevel Resilience for Digital Maturity in the Era of the Sustainable Development Goals: Evidence From China

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Abstract

In the era of the Sustainable Development Goals (SDGs), digital transformation is essential for firms to maintain competitive advantages and ensure long-term survival, yet rapid technological updates generate volatility, technostress, and adaptation pressures that undermine resilience. Understanding the dynamic capabilities and microfoundations of digital maturity is essential for firms to navigate rapidly evolving competitive environments. Focusing on multilevel resilience, spanning the individual, team, and organizational levels, we explore how these capabilities interact across levels and can be leveraged. Drawing on a dataset of 146 managers from Chinese enterprises, our findings reveal the bottom-up mechanisms through which these levels of resilience interact to foster digital maturity. This study offers critical insights for managers seeking to build systemic resilience to drive digital transformation in the SDG era.

Keywords: digital maturity; multilevel resilience; employee resilience; team resilience; organizational resilience; Sustainable Development Goals
JEL: M19, L29, O33

1. Introduction

The Sustainable Development Goals (SDGs) present enterprises worldwide with formidable challenges while also outlining a strategic direction for future growth. Within this global framework, digital transformation has evolved from an option into a necessity, enabling firms to enhance operational efficiency, innovate business models, and make substantial contributions to the SDGs (Saha et al., 2024; Varriale et al., 2025). This connection is particularly salient and complex in China. Advanced technologies, such as artificial intelligence (AI) and cloud computing, are being rapidly and deeply embedded across industries, increasing firm entry and exit rates, and reshaping market and competitive dynamics in China (Larson, 2018; Lu et al., 2024). However, this rapid technological infusion is a double-edged sword: while it creates opportunities for efficiency and innovation, it also generates volatility and uncertainty within organizations (Lu et al., 2024). Employees increasingly experience technostress and continuous adaptation pressure—factors that, if unmanaged, may evolve into resistance and talent loss (Bausch et al., 2024; Liu et al., 2024a; Trenerry et al., 2021), ultimately undermining corporate sustainable development. The double-edged effect highlights the need for a resilient and human-centered approach which balances competitive imperatives with safeguards for employee well-being, inclusive adaptation, and long-term organizational sustainability to promote digital transformation (Liu et al., 2024b; Honglei et al., 2025).

Resilience, understood as the capacity for positive adaptation in the face of adversity and uncertainty (Duchek, 2020), emerges as a particularly relevant antecedent in this context. Existing research has identified various antecedents of digital transformation across multiple levels, including workforce agility, collaboration, and digital skills (Kudyba et al., 2020; Muduli and Choudhury, 2025; Sousa-Zomer et al., 2020). Unlike technical or digital skills that can quickly become outdated, resilience provides relatively stable, enduring capabilities that support ongoing coping, learning, and recovery (Hartmann et al., 2020). When it comes to resilience, while prior reviews highlight the role of workplace resilience at the individual and team levels in preparing organizations for digital change (Trenerry et al., 2021), empirical investigations of resilience in digital transformation contexts remain limited, particularly with respect to cross-level interactions (Bahyan et al., 2025; Hartmann et al., 2020). Against this background, we propose that the cross-level forms of resilience, ranging from individual coping with uncertainty to team coordination and organizational agile responses (Hartmann et al., 2020), potentially contribute to digital transformation as they lead to positive adaptation in the face of adversity.

Digital transformation is a profound, organization-wide process of strategic and systemic change that entails the fundamental redesigning of business processes, value propositions, and organizational culture. Given the continuous advancement of technology, this is an ever-changing, perpetual process (Leso et al., 2024; Sousa-Zomer et al., 2020). This enduring nature underscores the importance of digital maturity as a critical benchmark and measurable indicator of progress (He et al., 2023; Hortovanyi et al., 2023;

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Omol et al., 2025). Specifically, digital maturity captures the degree of advancement achieved along this journey, reflecting the extent to which digital technologies and practices are strategically integrated across an organization's people, culture, tasks, and products (Leso et al., 2024; Westerman et al., 2012). Empirically, digital maturity has been increasingly adopted as a reliable variable in relevant research (He et al., 2023; Omol et al., 2025; Ostmeier and Strobel, 2022). For instance, He et al. (2023) employed maturity measures to examine the relationship between digital transformation and organizational resilience; similarly, recent studies in small and medium-sized enterprises (SMEs) and emerging markets have utilized digital maturity to examine the dynamics between employee skills, organizational capabilities, and digital transformation (Omol et al., 2025; Ostmeier and Strobel, 2022).

In this study, based on dynamic capabilities theory, we build a robust framework for understanding how organizations achieve high levels of digital maturity. We propose that multilevel resilience, including employee resilience, team resilience, and organizational resilience, is a significant capability that drives digital maturity. Building on the microfoundational perspective of dynamic capabilities (Felin and Foss, 2005; Leso et al., 2024; Warner and Wäger, 2019), we reveal that employee resilience and team resilience serve as the microfoundations of organizational resilience as well as the interplay of microfoundations across levels. By proposing this bottom-up mechanism, we offer a new internal capability perspective for promoting digital transformation in the SDG era.

2. Theoretical Background

The adoption of digital technologies, including social, mobile, analytics, platforms, and ecosystems, has disrupted or reshaped consumer behaviors, expectations, and competitive landscapes, leading to increased attention to dynamic capabilities theory (Vial, 2019). This theory was initially proposed to examine how firms integrate, build, and reconfigure internal and external resources and competencies to adapt to turbulent environments, as well as how such dynamic capabilities can be leveraged to create and sustain competitive advantage (Teece et al., 1997). Based on dynamic capabilities theory, digitalization capabilities can be viewed as the degree to which a company's management systems enable the integration of data and processes with the help of different digital technologies, corresponding to the three core dimensions of sensing, seizing, and reconfiguring (Li et al., 2022). A step further is the stream of research exploring the microfoundations that underpin firms' ability to integrate, build, and reconfigure resources. Teece (2007) notes that the microfoundations of dynamic capabilities are distinct skills, processes, procedures, organizational structures, decision rules, and disciplines that undergird enterprise-level sensing, seizing, and reconfiguring capacities. Kowalski et al. (2025) define dynamic capabilities for digital transformation as digital sensing, digital seizing, and digital reconfiguring, underpinned by microfoundations such as analytics for the customer experience journey and digital analytics innovation management, which collectively drive digital transformation; Sousa-Zomer et al. (2020) point out three main microfoundations, namely digital-savvy skills, digital intensity, and context for action, that interact and build a digital transforming capability.

We also notice another cluster of research that highlights the complex, continuous process of digital transformation, which is often examined from a knowledge-based perspective grounded in dynamic capabilities theory. The reason for this focus, as Mele et al. (2024) argue, is that dynamic capabilities are not only necessary to implement the changes characterizing digital transformation successfully but also to generate new knowledge for digital transformation. The knowledge-based dynamic capabilities enable firms to respond to change and overcome organizational barriers by leveraging digital knowledge within the organization.

These aspects reveal the efforts in securing a sustainable competitive advantage in an inherently ever-changing environment. Any transient technological advantage may be short-lived, and sustainable competitiveness does not stem from the fleeting technology itself, but is rooted in deeper, relatively stable microfoundations that underpin an organization's continuous learning, renewal of knowledge, and adaptation (Leso et al., 2024; Sousa-Zomer et al., 2020). This transformation requires building an intrinsic capacity to continuously respond to future changes (Leso et al., 2024). This study conceptualizes multilevel resilience as a nested system that links dynamic capability and its microfoundations within the context of digital transformation. At the organizational level, resilience evolves into a dynamic capability, the firm's higher-order capability to purposefully reallocate resources, redesign structures, and sustain functionality in the face of disruption (Jiang et al., 2019). This organizational resilience enables continuous adjustment and strategic renewal, thereby enabling firms to adapt to a context constantly shaped by changes. At the employee and team levels, resilience manifests differently. Examples include adaptive cognition (at the employee level), learning (at both the employee and team levels), and collaborative routines (at the team level) (Felin and Foss, 2005; Hartmann et al., 2020), constituting the microfoundations for organizational resilience. Meanwhile, employee, team, and organizational resilience may have a collective impact on digital maturity. As Kuntz et al. (2017) explain with the concept of "mutual enhancement", the organization with resilience provides the overarching context and resources, which employees leverage to engage in resilient behaviors, thereby contributing to organizational resilience. Individual capabilities such as employee resilience are coordinated through team-level dynamics (Hartmann et al., 2020). This can be understood as a process of reciprocal

reinforcement across levels, wherein resilience at each level mutually strengthens and is strengthened by the others.

Digital transformation represents a dynamic and progressive shift that drives fundamental changes in organizational structure and strategy and thus demands a "maturity" perspective as this lens reframes the journey from abrupt, episodic change to a gradual process of organizational adaptation and learning (Leso et al., 2024). To conceptualize and measure this transformation, we adopt the maturity perspective proposed by Westerman et al. (2012). Digital maturity comprises two interrelated dimensions: digital intensity, which captures a firm's investment in technology-enabled initiatives to transform its customer engagement, internal operations, and business models; and transformation management intensity, which encompasses the leadership capabilities, vision, and governance mechanisms required to drive enterprise-wide change (Westerman et al., 2012). This dual-dimensional conceptualization provides a comprehensive and empirically grounded representation of how firms progress along their digital transformation journey.

In this study, we propose that employee and team resilience form the microfoundations of organizational resilience and that these multilevel resilience components jointly contribute to digital maturity. We further discuss how resilience at each level contributes to digital maturity.

Given the causal complexity and emergent, cross-level nature of multilevel resilience as microfoundations of dynamic capabilities in digital maturity, this study adopts a question-driven, phenomenon-based empirical approach (Graebner et al., 2023). As Graebner et al. (2023) argue, many strategically relevant phenomena resist traditional hypothetico-deductive logic due to novelty, limited prior empirical work, and ambiguous cross-level predictions. A question-driven framework allows for systematic exploration of underlying mechanisms across levels and configurational patterns without imposing premature directional constraints. Accordingly, we advance three focused research questions to guide the inquiry into how resilience at individual, team, and organizational levels interacts to foster digital maturity in turbulent environments.

3. Conceptual Model Development

3.1 Organizational Resilience for Digital Maturity

Organizational resilience is a concept that has been defined in multiple ways across the management literature. Scholars have variously described it as a capability, capacity, characteristic, outcome, process, behavior, strategy or approach, type of performance, or a mix of these, depending on the theoretical lens adopted (Hillmann and Guenther, 2021). For instance, from a process perspective, Sutcliffe and Vogus (2003) propose that resilience provides insight into how organizations continually achieve desirable outcomes amidst adversity, strain, and significant barriers to adaptation or development. In this view, resilience is not a static attribute, but a dynamic, continuous process through which organizations make sense of adversity, adapt routines, and learn from crisis to achieve resilient outcomes (Napier et al., 2024; Sutcliffe and Vogus, 2003). Besides, the capability perspective conceptualizes resilience as an organizational ability or capacity rooted in resources, routines, and dynamic management practices. Lengnick-Hall et al. (2011) define resilience as a firm's ability to effectively absorb, develop situation-specific responses to, and ultimately engage in transformative activities to capitalize on disruptive surprises that potentially threaten organizational survival. From a dynamic capability perspective, resilience emerges from a configuration of organizational capabilities that enable sensing, responding, and reconfiguring in dynamic contexts (Duchek, 2014; Lengnick-Hall et al., 2011; Teece, 2007). Given the inherent adaptability, learning, and reconfiguration attributes of resilience, a recent study regards organizational resilience as a specific type of dynamic capability (Khan et al., 2019). Understanding this concept requires understanding the forms of processes, tasks, operations, and routines which can be labeled as the capacity of organizations to prepare and cope during times of hardship and uncertainty in their environment (Khan et al., 2019). Organizational resilience is a dynamic capability based on three dimensions: resilient sensing (routines for identifying internal and external anomalies, sharing insights, and seizing opportunities); resilient seizing (processes for analyzing vulnerabilities and investing in internal/external resources to address them); and resilient reconfiguration (abilities to reduce silo thinking, unify strategic vision, and reconfigure assets in response to market/technological changes) (Khan et al., 2019).

Organizational resilience can contribute to digital maturity, as outlined in dynamic capabilities theory, specifically through sensing, seizing, and reconfiguration. First, organizations with adaptability, a distinct characteristic of organizational resilience, can effectively collect environmental information and interact more efficiently with the digital environment (Liu et al., 2021). Furthermore, those resilient organizations proactively anticipate potential threats and identify digital opportunities, thereby strengthening environmental awareness (Bahyan et al., 2025). Second, the seizing dimension reflects the organization's ability to mobilize and allocate resources in response to digital opportunities. Organizational resilience manifests through adaptive and learning capabilities that enable firms to interpret digital signals and translate them into actionable strategies (Liu et al., 2021). Third, through collaboration, cross-functional coordination, and capability renewal (Zutshi et al., 2021), firms with high organizational resilience can reallocate resources, streamline digital workflows, and sustain transformation momentum, reflecting their reconfiguration ability. Prior empirical research also demonstrates that openness to novel technologies fosters flexible structures that enhance innovation performance and improve the management of disruptions (Mandal and Saravanan, 2019).

Although prior studies have examined the role of organizational resilience, the primary focus has been limited to exploring the characteristics or aspects of organizational resilience, rather than examining organizational resilience as a dynamic capability in digital transformation. Őri et al. (2024) offer one of the first attempts to examine the role of organizational resilience in digitalization within the context of COVID-19. Their model reveals that organizational resilience exerts only an indirect impact on digitalization when combined with available resources. An uncertain environment encourages companies to go digital, and resilient firms require less external financial support to achieve their digitalization goals. Therefore, this study seeks a deeper understanding of the role of organizational resilience as a dynamic capability in promoting digital maturity within different cultural contexts. We posit that organizational resilience, as a significant dynamic capability, inherently possesses the potential to foster digital maturity.

RQ1: How does organizational resilience contribute to digital maturity?

3.2 Team Resilience for Digital Maturity

Team resilience refers to the collective capacity of a work group to rebound from adversity and emerge stronger and more resourceful (Blatt, 2009). It encompasses shared beliefs in team efficacy, leaders' framing of challenges, and members' collaborative pursuit of common goals supported by organizational resources (Rodríguez-Sánchez and Vera Perea, 2015). Within the framework of dynamic capabilities theory, Felin et al. (2012) define microfoundations as theoretical explanations that link lower-level analytical units (N-1) to phenomena observed at higher analytical levels (N). Eisenhardt et al. (2010) further point out the importance of a team/group level of microfoundations: "Microfoundations mean the underlying individual-level and group-level actions that shape strategy, organization, and, more broadly, dynamic capabilities". In this view, team-level resilience potentially represents the microfoundation through which resilience is enacted at the organizational level. As teams constitute the core operating units of an organization, their adaptive behaviors, such as rapid reorganization, constructive conflict management, and mutual support, translate individual learning and flexibility into collective capability building (Grimm et al., 2023; West et al., 2009). Through these routines, team resilience contributes to the renewal of organizational systems, forming the behavioral substrate upon which organizational resilience develops.

Beyond this microfoundational contribution, team resilience can also directly influence digital maturity. Resilient teams engage in continuous learning, reflection, and experimentation, promoting the integration of digital tools and agile practices across projects (Brykman and King, 2021). When organizations leverage the potential of learning in the design and delivery of digital content, they foster informal problem-solving, knowledge sharing, and ultimately user-generated content (Sousa and Rocha, 2019), reflecting the institutionalization of data-driven processes integral to digital maturity. In this sense, team resilience serves as both a building block of organizational resilience and an independent driver of digital maturity.

RQ2: How does team resilience contribute to digital maturity?

3.3 Employee Resilience for Digital Maturity

Resilience has been widely recognized as a multilevel phenomenon that emerges from the interactions among individuals, teams, and organizations (Raetze et al., 2021). From a dynamic capability perspective, individuals matter and microfoundations are needed for explanation in strategic organizations (Felin and Foss, 2005). As Felin and Foss (2005) emphasize, "one must understand the underlying abilities, actions, choices, and motivations of the individuals involved". At the individual level, employee resilience refers to an employee's capability to continuously adapt, recover, and remain productive under stress and change. It is a personal and organization-supported capability that leverages resources such as optimism, positive emotions, self-efficacy, and social support (Bahyan et al., 2025; Kuntz et al., 2017). These resources, leveraged by employees, are instrumental in the mutual enhancement of employees and organizations, thereby developing and sustaining organizational resilience (Kuntz et al., 2017). Resilient employee behaviors, such as demonstrating adaptability, innovation, and proactivity in daily work, constitute the bedrock of inherent resilience within organizations, which develops through exposure to routine challenges (Kuntz et al., 2017). The adaptive, innovative, and proactive behaviors of resilient employees build the organization's capability for dynamic adjustment and sustained operation, which contributes to digital maturity, a state that demands strong adaptability and the capabilities to cope with challenges brought by technologies.

In this sense, employee resilience serves as a microfoundational mechanism through which individual-level adaptive behaviors and learning are transformed into higher-order collective capabilities, thereby underpinning organizational resilience. Besides, empirical evidence supports that this bottom-up mechanism includes not only the organizational level, but also the team level. Individual interpretations of adversity and recovery shape team-level perceptions of collective resilience (Gucciardi et al., 2018), while persistent employee adaptability and problem-solving behaviors enhance both project-level and organizational resilience (Liang and Cao, 2021; Wang and Wang, 2024). Therefore, this study explores:

RQ3: How does employee resilience contribute to digital maturity?

4. Method

4.1 Data Collection and Sample

We collected data through two channels. We directly contacted the companies and sent online questionnaires. Moreover, we also collected data through Credamo, a Chinese data collection platform (similar to Amazon Mechanical Turk). For both channels, we designed the same criteria: for example, managers were required to have at least two years of tenure in their current companies, and the responses were kept anonymous.

A questionnaire was administered online between May 2024 and January 2026. We finally received responses from 86 managers via the first channel and 60 responses via the second channel. Therefore, we ultimately obtained 146 responses in total. Since all questions were mandatory, there were no missing data. To avoid common method bias (CMB) at a very early stage, we implemented the following strategies: (1) Anonymous survey. We required respondents to read the research explanation and consent form before answering, ensuring they understood the purpose of the study and the use of the data. This helps reduce social desirability bias, as they know their responses will not be identified or tracked. (2) One respondent per department. We collected only one sample from each department of a company to reduce the potential for comparison and competition among respondents within the same department, thereby lowering the risk of CMB. (3) Cross-industry data collection. We conducted extensive data collection across various industries, ensuring a diverse distribution of industries in our sample, which reduces CMB. The profiles of respondents and companies are shown in Table 1.

The majority of respondents were between the ages of 30 and 50 (80.8%). In terms of gender, there was a slight majority of females (56.8%) over males (43.2%). The respondents' positions were distributed among frontline managers (42.5%), middle managers (43.8%), and senior managers (13.7%).

The majority of enterprises were 11 to 30 years old. In addition, most enterprises had 1000 or fewer employees. The companies were categorized into four types: private enterprises (60.3%), state-owned enterprises (32.2%), mixed-ownership enterprises (4.1%), and foreign-owned enterprises (3.4%). These companies had a wide range of business scopes and the largest portion was in manufacturing, including electronic products, medical devices, food, furniture, etc.

4.2 Measurement

To measure the key constructs, this study used existing scales from the literature. Since the original items were in English, we applied a back-translation approach. The questionnaire sent to respondents was presented in Chinese. All measures were assessed using a seven-point Likert scale, in which one represented "strongly disagree" and seven represented "strongly agree".

Employee resilience (ER) was measured using the 9-item EmpRes scale developed by Näswall et al. (2019). An example item is "Employees in my company can effectively collaborate with others to handle unexpected challenges at work".

Team resilience (TR) was measured by a 7-item scale developed by Salanova et al. (2013) based on Mallak's (1998) principles for implementing resilience in organizations. An example item is "In difficult situations, my team tries to look for the positive side".

Organizational resilience (OR) was measured by a 10-item scale proposed by Connor and Davidson (2003) and Campbell-Sills and Stein (2007). An example item is "Our organization has been able to adapt to changes because of environmental turbulence".

Digital maturity (DM) was measured using a two-dimensional digital maturity scale developed by the MIT Center for Digital Business and Capgemini Consulting. He et al. (2023) proposed that digital maturity provides effective scoring criteria to benchmark companies' status and performance in digital transformation.

It consists of two dimensions: digital intensity (DI) and transformation management intensity (TMI) (He et al., 2023; Westerman et al., 2012). Digital intensity refers to "investment in technology-enabled initiatives to change how the company operates its customer engagements, internal operations, and even business models" (Westerman et al., 2012). An example item is "We are using digital technologies (such as analytics, social media, mobile, and embedded devices) to understand our customers better". Transformation management intensity refers to "the leadership capabilities necessary to drive digital transformation in the organization" (Westerman et al., 2012, p. 2). An example item is: "Senior executives have a transformative vision of the digital future of our company".

We included firm size as a control variable because it may potentially influence digital maturity in the Chinese context. SMEs often face greater resource constraints and adaptation barriers in digital transformation compared to larger firms, which typically have more slack resources for technology investment and more advanced digital processes (Kumar et al., 2025; OECD, 2021).

4.3 Data Analysis

This study used a two-step analysis approach. Firstly, we examined the relationship between different levels of resilience and how multilevel resilience leads to digital maturity from a bottom-up perspective, using a partial least squares structural equation modeling (PLS-SEM) technique with SmartPLS (version 3; SmartPLS GmbH, Monheim am Rhein, Germany). We then conducted a configuration analysis using fuzzy-set qualitative comparative analysis (fsQCA). This enabled us to capture the combinations of multilevel resilience that lead to digital maturity. These two approaches are complementary and provide deep in-

Table 1. Respondent characteristics and company profiles.

		Frequency	Percent	Valid percent	Cumulative percent
Respondent age	≤29	15	10.30	10.30	10.30
	30–50	118	80.80	80.80	91.10
	≥51	13	8.90	8.90	100.00
Respondent gender	Male	63	43.20	43.20	43.20
	Female	83	56.80	56.80	100.00
Respondent position	Frontline managers	62	42.50	42.50	42.50
	Middle managers	64	43.80	43.80	86.30
	Senior managers	20	13.70	13.70	100.00
Company age	≤10	30	20.50	20.50	20.50
	11–30	82	56.20	56.20	76.70
	≥31	34	23.30	23.30	100.00
Company size (Number of employees)	≤100	62	42.50	42.50	42.50
	101–1000	64	43.80	43.80	86.30
	≥1001	20	13.70	13.70	100.00
Company type	State-owned enterprise	47	32.20	32.20	32.20
	Mixed-ownership	6	4.10	4.10	36.30
	Private enterprise	88	60.30	60.30	96.60
	Foreign-owned enterprise	5	3.40	3.40	100.00
Industry	Insurance	3	2.05	2.05	2.05
	Mining	1	0.68	0.68	2.74
	Food services	1	0.68	0.68	3.42
	E-commerce	1	0.68	0.68	4.11
	Real estate	9	6.16	6.16	10.27
	Meeting services	1	0.68	0.68	10.96
	Construction	4	2.74	2.74	13.70
	Education	1	0.68	0.68	14.38
	Finance	29	19.86	19.86	34.25
	Tourism	5	3.42	3.42	37.67
	Wholesale	3	2.05	2.05	39.73
	Software and technical information services	5	3.42	3.42	43.15
	Business services	3	2.05	2.05	45.21
	Tele-communications service	1	0.68	0.68	45.89
	Logistics	1	0.68	0.68	46.58
	Research and experimental development	1	0.68	0.68	47.26
	Elderly care services	7	4.79	4.79	52.05
	Manufacturing	67	45.89	45.89	97.95
	Consulting services	3	2.05	2.05	100.00

sights into the relationships among constructs (Salem et al., 2023). More specifically, the multivariate analysis identified the main resilience factors driving digital maturity, while fsQCA offers a more comprehensive understanding of how the three levels of resilience interact to result in high-/low levels of digital maturity.

4.4 Common Method Bias

We also conducted Harman's single-factor test to examine common method bias. Harman's test has been widely used in empirical studies exploring the determinants of resilience. Podsakoff et al. (2003) indicated that no substantial common method bias exists when the variance explained by the first factor fails to reach 50% of the total variance. Our results showed that the first factor explained 42.665% of the total variance, which is less than 50%. Moreover, eight factors were extracted, meeting the requirement of more than one factor being present. Therefore, common method bias is not a serious issue in our study. The results are presented in Table 2.

Table 2. Harman's single-factor test.

Component	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	19.626	42.665	42.665	19.626	42.665	42.665
2	3.422	7.440	50.104	3.422	7.440	50.104
3	2.446	5.317	55.422	2.446	5.317	55.422
4	1.284	2.792	58.214	1.284	2.792	58.214
5	1.233	2.680	60.894	1.233	2.680	60.894
6	1.129	2.455	63.349	1.129	2.455	63.349
7	1.058	2.301	65.649	1.058	2.301	65.649
8	1.016	2.209	67.858	1.016	2.209	67.858
9	0.950	2.065	69.924			
10	0.880	1.912	71.836			
11	0.814	1.770	73.605			
12	0.768	1.670	75.276			
13	0.763	1.658	76.934			
14	0.676	1.470	78.405			
15	0.661	1.437	79.841			
16	0.622	1.352	81.193			
17	0.609	1.325	82.518			
18	0.558	1.213	83.731			
19	0.534	1.160	84.891			
20	0.504	1.095	85.985			
21	0.476	1.035	87.020			
22	0.456	0.990	88.010			
23	0.440	0.956	88.966			
24	0.409	0.888	89.854			
25	0.383	0.833	90.688			
26	0.374	0.814	91.502			
27	0.332	0.722	92.223			
28	0.312	0.678	92.901			
29	0.307	0.668	93.569			
30	0.288	0.626	94.195			
31	0.273	0.594	94.789			
32	0.259	0.562	95.351			
33	0.247	0.537	95.888			
34	0.230	0.500	96.388			
35	0.226	0.492	96.880			
36	0.190	0.412	97.292			
37	0.172	0.374	97.667			
38	0.157	0.342	98.009			
39	0.147	0.319	98.328			
40	0.141	0.307	98.635			
41	0.125	0.272	98.907			
42	0.124	0.270	99.177			
43	0.114	0.248	99.425			
44	0.103	0.224	99.649			
45	0.090	0.195	99.844			
46	0.072	0.156	100			

Extraction method: principal component analysis.

5. PLS-SEM Results

5.1 Reliability and Validity

Most outer loadings exceeded the recommended threshold of 0.70 (Hair et al., 2017), except for ER1 (0.561), ER2 (0.586), ER7 (0.618), ER8 (0.601), TMI3 (0.648), and TMI5 (0.649). Items with loadings below 0.70 were evaluated for potential removal to enhance indicator reliability, as loadings in this range explain less than 50% of the vari-

ance in the indicators. After careful assessment, these six items were removed. Post-removal, each construct retained a sufficient number of indicators; the deletion did not affect the theoretical phenomenon under investigation, and the remaining indicators still adequately captured the core dimensions defined in the theoretical framework. Their deletion resulted in improved or stable loadings for the majority of the retained items (see Table 3 for the comparison of original and post-removal loadings). All average variance extracted (AVE) values significantly surpassed the 0.50 cutoff, demonstrating adequate convergent validity (Fornell and Larcker, 1981; Hair et al., 2017). The measures of Cronbach's Alpha, reliability coefficient (rho_A), and composite reliability (CR) were significantly higher than 0.70, indicating high scale reliability and internal consistency (see Table 4).

Fornell and Larcker's (1981) criterion was used to assess discriminant validity. Table 5 shows that the criterion was satisfied for DM, ER, and OR(Fornell and Larcker, 1981).For the TR-ER pair, however, the square root of AVE for TR (0.748) was marginally lower than its correlation with ER (0.781), although the square root of AVE for ER (0.789) exceeded its correlation with TR. Thus, discriminant validity was partially established. This pattern is consistent with the theoretical expectation that ER and TR are closely related multilevel constructs.

5.2 Structural Model Assessment

The standardized root mean square residual (SRMR) was 0.057, significantly lower than the threshold of 0.08 (Henseler et al., 2016), indicating that the overall model fit was adequate.

Table 6 shows the estimated path coefficients for the hypothesized relationships. As expected, there was a bottom-up relationship among the levels of resilience. Employee resilience positively influenced team resilience ($\beta = 0.781$, $p < 0.001$), and team resilience, in turn, positively influenced organizational resilience ($\beta = 0.667$, $p < 0.001$). However, employee resilience did not have a direct influence on organizational resilience ($\beta = 0.044$, $p > 0.05$). Employee resilience indirectly influenced organizational resilience via team resilience ($\beta = 0.521$, $p < 0.001$). The total coefficient from employee resilience to organizational resilience was 0.565 ($p < 0.001$). Correspondingly, the variance accounted for (VAF) was 92.2%, indicating full mediation.

Both team resilience ($\beta = 0.348$, $p < 0.01$) and organizational resilience ($\beta = 0.422$, $p < 0.001$) had a positive influence on digital maturity. The indirect effect analysis revealed three pathways that influenced digital maturity: (1) ER → TR → DM ($\beta = 0.272$, $p < 0.01$). Since the total coefficient from employee resilience to digital maturity was 0.51 ($p < 0.001$) and the VAF was 53.3%, this indicated a partial mediation effect. (2) ER → TR → OR → DM ($\beta = 0.220$, $p < 0.01$) and VAF was 43.1%, indicating a partial mediation effect. (3) TR → OR → DM ($\beta = 0.281$, $p < 0.01$). The total coefficient from team resilience to digital

Table 3. Factor loadings.

Items	Original factor loadings	Factor loadings after item removal
ER1	0.561	Removed
ER2	0.586	Removed
ER3	0.749	0.763
ER4	0.792	0.794
ER5	0.735	0.771
ER6	0.756	0.794
ER7	0.618	Removed
ER8	0.601	Removed
ER9	0.776	0.823
TR1	0.770	0.769
TR2	0.756	0.754
TR3	0.759	0.760
TR4	0.756	0.757
TR5	0.752	0.751
TR6	0.717	0.718
TR7	0.724	0.726
OR1	0.785	0.784
OR2	0.738	0.738
OR3	0.823	0.823
OR4	0.783	0.783
OR5	0.800	0.800
OR6	0.800	0.800
OR7	0.757	0.757
OR8	0.771	0.772
OR9	0.838	0.838
OR10	0.833	0.833
DI1	0.815	0.818
DI2	0.734	0.748
DI3	0.805	0.809
DI4	0.756	0.771
DI5	0.747	0.760
DI6	0.759	0.760
DI7	0.726	0.726
DI8	0.739	0.752
DI9	0.763	0.766
DI10	0.824	0.827
TMI1	0.754	0.755
TMI2	0.737	0.744
TMI3	0.648	Removed
TMI4	0.785	0.778
TMI5	0.649	Removed
TMI6	0.712	0.706
TMI7	0.786	0.768
TMI8	0.785	0.786
TMI9	0.724	0.717
TMI10	0.778	0.783

Note: ER, employee resilience; TR, team resilience; OR, organizational resilience; DI, digital intensity; TMI, transformation management intensity.

Table 4. Reliability and validity.

	Cronbach's Alpha	rho_A	CR	AVE
DM	0.958	0.959	0.962	0.587
ER	0.849	0.850	0.892	0.623
OR	0.934	0.935	0.944	0.629
TR	0.869	0.869	0.899	0.560

Note: DM, digital maturity; ER, employee resilience; OR, organizational resilience; TR, team resilience; rho_A, reliability coefficient; CR, composite reliability; AVE, average variance extracted.

Table 5. Discriminant validity.

	DM	ER	OR	TR
DM	0.766			
ER	0.575	0.789		
OR	0.665	0.565	0.793	
TR	0.638	0.781	0.701	0.748

Note: DM, digital maturity; ER, employee resilience; OR, organizational resilience; TR, team resilience.

maturity was 0.629, and the VAF was 44.7%, indicating a partial mediation effect.

6. FsQCA Result

In this study, employee resilience, team resilience, and organizational resilience were selected as causal conditions. We calculated the average values for these variables. Subsequently, data calibration was conducted according to the criteria proposed by Ragin (2008), which involved setting the 5th percentile as "fully out", the 95th percentile as "fully in", and the 50th percentile as the "crossover point". Then we proceeded to analyze the necessity and sufficiency of the causal conditions. A configuration becomes necessary when the consistency score exceeds 0.90 (Ragin, 2008; Schneider and Wagemann, 2012). Table 7 shows that none of the individual antecedent conditions met the criteria for absolute necessity.

Our study used the fsQCA software (version 2.5; University of California, Irvine, CA, USA) to construct a 2^k truth table, where k represents the number of causal conditions. Each row in the table corresponds to a possible configuration of conditions, resulting in a total of 8 rows. Rows with a raw consistency higher than 0.8 (Ragin, 2006) and a proportional reduction in inconsistency (PRI) consistency higher than 0.7 were coded as 1.

The results indicated that the configuration leading to high levels of digital maturity was "ER*TR*OR" with employee resilience and team resilience being core conditions and organizational resilience as a supplementary condition. Conversely, the configuration leading to low levels of digital maturity was "~ER * ~TR* ~OR", with the absence of all three dimensions being core conditions. This finding not only validates the importance of nurturing multilevel resilience for digital maturity but also emphasizes the significant role of both employee resilience and team resilience in achieving high-level digital maturity (see Table 8).

7. Discussion

The adoption of new technologies significantly impacts organizations, reshaping human resource management, altering team collaboration, and demanding new skills and capabilities from employees (Vuchkovski et al., 2023). These pervasive changes and challenges necessitate organizations' development of capabilities to overcome inertia and achieve digital maturity. Drawing on dynamic capabilities theory, this study views organizational resilience as a crucial dynamic capability in developing digital maturity, with team resilience and employee resilience serving as key microfoundations. Employing a dataset from Chinese companies, this study adopts a two-step approach to examine the mechanism between multilevel resilience and digital maturity.

7.1 The Relationship Between Organizational Resilience and Digital Maturity

The results of PLS-SEM demonstrate a direct and positive relationship between organizational resilience and digital maturity. Specifically, organizational resilience enhances an organization's ability to perceive changes in both internal and external environments, facilitating the rapid linking of information, accelerating the decision-making process, and significantly reducing response times. Moreover, organizational resilience enhances an enterprise's capabilities in integration, coordination, and reconstruction, all of which are essential factors for achieving digital maturity.

The findings from fsQCA reaffirm the role of organizational resilience as a supplementary condition in configurations that lead to high digital maturity. It implies that while the presence of organizational resilience is an important factor for digital maturity, it is not the sole determinant of digital maturity. Enterprises may rely on alternative resources, capabilities, or strategies to compensate for the deficiency in organizational resilience, thereby still attaining a certain level of digital maturity. This also underscores the necessity for enterprises to adopt diverse strategies and approaches in pursuit of digital transformation, tailored to the distinct characteristics of the organization and its environment. These findings address RQ1.

7.2 The Relationship Between Team Resilience and Digital Maturity

Team resilience is also positively related to digital maturity. This implies that team resilience, as a crucial capability, directly impacts organizations during digital trans-

Table 6. Structural model results.

	Path coefficients	Standard deviation	*t*-value	*p*-value	2.50%	97.50%
Direct effect						
Company Size → DM	0.050	0.039	1.279	0.201	–0.009	0.140
ER→ OR	0.044	0.152	0.288	0.773	–0.243	0.359
ER→ TR	0.781	0.038	20.422	<0.001	0.700	0.851
OR → DM	0.422	0.123	3.422	0.001	0.131	0.617
TR→ DM	0.348	0.112	3.108	0.002	0.153	0.600
TR→ OR	0.667	0.095	6.989	<0.001	0.474	0.858
Indirect effect						
ER→ TR → DM	0.272	0.088	3.088	0.002	0.121	0.474
ER → TR → OR → DM	0.220	0.078	2.804	0.005	0.065	0.372
ER → OR → DM	0.018	0.064	0.286	0.775	–0.132	0.139
ER → TR → OR	0.521	0.083	6.248	<0.001	0.371	0.699
TR → OR→ DM	0.281	0.098	2.873	0.004	0.084	0.466

Note: DM, digital maturity; ER, employee resilience; TR, team resilience; OR, organizational resilience.

Table 7. Necessity analysis.

DM			~DM		
	Consistency	Coverage		Consistency	Coverage
ER	0.802	0.864	ER	0.555	0.573
~ER	0.604	0.586	~ER	0.869	0.808
TR	0.791	0.882	TR	0.537	0.574
~TR	0.618	0.582	~TR	0.890	0.803
OR	0.849	0.863	OR	0.610	0.594
~OR	0.601	0.617	~OR	0.859	0.845

Notes: "~" denotes the absence of the causal condition.
DM, digital maturity; ER, employee resilience; TR, team resilience; OR, organizational resilience.

Table 8. Sufficiency analysis.

Sol	ER	TR	OR	Raw coverage	Unique coverage	Consistency
DM	●	●	•	0.686	0.686	0.943
~DM	◎	◎	◎	0.765	0.765	0.915

Notes: • present and not core condition.
● present and core condition.
◎ absent and core condition.
DM, digital maturity; ER, employee resilience; TR, team resilience; OR, organizational resilience.

formation. Team resilience can help organizations manage the uncertainty and complexity arising from technological changes, thereby facilitating the successful implementation of digital transformation.

Furthermore, team resilience can indirectly affect digital maturity by influencing organizational resilience. Team resilience can enhance a team's adaptability to changes by strengthening cooperation and communication among team members, thereby enhancing the resilience of the entire organization. The increase in organizational resilience enables enterprises to absorb new technologies more effectively and utilize them, thereby contributing to the success of digital transformation. This result also suggests that team resilience serves as a microfoundation for the dynamic capability of organizational resilience.

In the configurational analysis, the presence or absence of team resilience is a core condition that leads to high or low levels of digital maturity. Team resilience, on the other hand, focuses on the team, a smaller unit, and emphasizes the team's cooperation, communication, and collective response capabilities when facing challenges. As the basic unit of an organization, teams can directly affect the actual execution and effectiveness of decisions during digital transformation. Additionally, team resilience provides support for other antecedents that promote digital maturity, making team resilience a core condition for the success of digital maturity. The findings address RQ2.

7.3 The Relationship Between Employee Resilience and Digital Maturity

From a bottom-up perspective, employee resilience serves as the foundation of multilevel resilience and can initially enhance digital maturity by influencing team resilience. Employee resilience provides a basis for team resilience by strengthening individuals' adaptability and recovery capabilities, enabling teams to respond more effectively to change and challenges. Teams with strong resilience are more likely to maintain efficiency and innovation during the digital transformation process. Since there is also a bottom-up relationship between team resilience and organizational resilience, an increase in team resilience can further impact the resilience of the entire organization and ultimately affect digital transformation. These findings address RQ3.

7.4 The Relationship Between Multilevel Resilience and Digital Maturity

From employees to teams and then to the entire organization, this bottom-up influence mechanism highlights the importance of cultivating grassroots resilience in the development of an organization's overall capabilities. The enhancement of employee resilience contributes to the adaptability of teams and organizations, while the enhancement of team resilience aids in effective resource allocation and strategic adjustments at higher organizational levels. The mechanism of multilevel resilience provides a solid foundation for digital maturity.

Furthermore, the results of configuration analysis indicate that resilience at different levels interacts with each other, jointly contributing to the formation of digital maturity, with employee resilience and team resilience being core conditions, while organizational resilience serves only as a supplementary condition.

The greater role of employee and team resilience suggests that, in the context of rapid and pervasive digital transformation, the ability for immediate, decentralized adaptation and learning at lower levels is more essential than aggregated organization-level capabilities. In highly volatile environments, lower-level resilience enables quick responses to local challenges and experimentation with digital tools, even before higher-level adjustments can fully take effect. Organizational resilience, while important, helps to enhance these lower-level efforts once they are in place. This layered interaction further emphasizes the crucial role of grassroots resilience in the process of digital transformation.

8. Conclusion

8.1 Theoretical Contributions

First, this study, from a dynamic capabilities perspective, reveals the capabilities that firms can leverage during digital transformation. The ever-changing environment requires developing essential capabilities rather than isolated technologies to achieve success in digital transformation. As this transformation involves a fundamental and systemic reshaping of an organization, simply investing in technology does not guarantee that a company will benefit (Rizana et al., 2025). In our study, multilevel resilience is identified as a capability essential to firms. Recent high-impact scholarship has increasingly framed organizational resilience as a higher-order dynamic capability that enables firms to sense, seize, and reconfigure resources amid digital disruptions and crises (Garrido-Moreno et al., 2024; Goraya et al., 2026; Jiang et al., 2026). Our work extends this literature by exploring how multilevel resilience collectively drives digital maturity, particularly in emerging markets like China, where rapid technological infusion generates technostress and demands adaptive, human-centered responses (Afzal et al., 2024; Liu et al., 2024b). Our focus on employee and team resilience from a grassroots perspective directly aligns with this call.

Second, this study extends the existing literature on the mechanisms of multilevel resilience, a domain that is notably underexplored. Current studies emphasizing multilevel resilience mostly explore the topic through conceptual frameworks or systematic reviews (Hartmann et al., 2020; Napier et al., 2024; Raetze et al., 2021). While an empirical focus on multilevel resilience has emerged (e.g., Latukha et al., 2025), further exploration of the internal dynamics among these levels remains necessary. Our study provides empirical evidence for the mechanisms of resilience at multiple levels. Specifically, our research confirms two bottom-up mechanisms leading to digital maturity: (1) ER → TR → DM and (2) ER → TR → OR → DM. Moreover, configurational analysis enables us to identify the combinations leading to high or low levels of digital maturity. The contributing role of multilevel resilience in digital maturity also echoes the evolving discourse on resilience as a dynamic capability that involves not only "building back" from adversity, but also "building back better" and "bouncing forward" during digital transformation (Bartuseviciene et al., 2024; Goraya et al., 2026).

Third, our study contributes to the understanding of the microfoundations of dynamic capabilities. In recent years, the discourse on these microfoundations within digital transformation has come into focus (Chen et al., 2023; Helfat and Peteraf, 2015; Kowalski et al., 2025). Current literature often treats dynamic capabilities merely as antecedents to digital transformation, which limits our understanding of how these microfoundations develop within the capabilities themselves (Leso et al., 2024). Our study advances this inquiry by examining resilience not only as an antecedent but also through its multilevel interactions. Notably, the fsQCA results reveal a counterintuitive pattern: while the absence of all three levels of resilience leads to low digital maturity, employee and team resilience emerge as core conditions for high digital maturity, whereas organizational resilience functions only as a supplementary condition. This finding is noteworthy as it diverges from the traditional view in dynamic capabilities theory, which typically regards organization-level capabilities as the primary drivers of adaptation and renewal (Teece, 2007; Teece et al., 1997). By demonstrating that lower-level elements (employee and team resilience) play a more indispensable role than aggregated higher-level capabilities in China's volatile, high-velocity environment, this study enriches the understanding of microfoundations in contexts characterized by rapid technological change (Felin et al., 2012; Helfat and Martin, 2015). Furthermore, while recent literature focuses on the role of managers or leaders as microfoundations (Annosi et al., 2024; Destrian, 2025), our research provides empirical evidence for the role of employees and teams as microfoundations in digital contexts. This can be explained by the fact that in a dynamic environment, rapid and agile responses by small units matter, highlighting a perspective that puts individuals at the core

and involves them in decision-making and the co-creation of solutions (Schiuma et al., 2024).

8.2 Managerial Implications

The Chinese context warrants particular attention, given China's role as the world's largest emerging economy. This study offers valuable insights for managers seeking to drive digital transformation in a rapidly evolving business landscape. Our findings reveal that employee, team, and organizational resilience jointly drive digital maturity, highlighting the need for coordinated efforts across multiple levels.

Our findings also suggest the importance of individuals or teams, as small units, in navigating digital transformation, which is often regarded as a way to promote agility and a swift response to change (Goraya et al., 2026). We encourage firms to focus on cultivating these capabilities and leveraging small organizational units to achieve digital maturity.

In addition, we emphasize the importance of applying a "human-centered approach" to navigating digital transformation (Schiuma et al., 2024). Digital tools and technology can only boost efficiency and productivity if they are supported by human skills, competencies, mindsets, and dynamic capabilities based on continuous learning, unlearning, openness, and experimentation. Firms should realize that these human skills and competencies, represented in our study as resilience at the employee level, are precious in the SDG era. We urge firms not to overlook human-centered aspects while deploying digital technologies.

This emphasis on lower-level resilience is critical in the Chinese context. While rapid technological diffusion pressures firms to adapt, it often triggers heightened technostress among employees. Without sufficient micro-level resilience, this stress manifests as organizational inertia, where structural rigidities prevent the firm from pivoting effectively (Liu et al., 2024a; Lu et al., 2024). To strengthen employee resilience, firms should implement targeted human resource management policies, such as structured training programs focused on digital skills development (e.g., training addressing AI tools, cloud computing, and data analytics) and well-being-oriented interventions to manage technostress. Such measures equip employees to cope with uncertainties during transformation and foster long-term resilience. Teams can build resilience by adopting initiatives that promote collective adaptability, such as cross-functional workshops to enhance communication and collaboration skills, and structured reflection processes to improve problem-solving and mutual support in complex, volatile settings.

8.3 Limitations and Future Research Suggestions

This study acknowledges several limitations that suggest avenues for future research. Firstly, the causality claims presented are grounded in theoretical logic rather than empirical evidence. Longitudinal studies are recommended to establish causality and capture the dynamics of the mechanism between key constructs. Secondly, although our purposive sample includes a diverse range of Chinese companies, from state-owned to private and foreign-owned enterprises, it limits the generalizability of the findings. Future research should employ larger, random samples or samples from varied cultural contexts to enhance the external validity of the model.

Availability of Data and Materials

All data reported in this paper will be shared by the corresponding author upon reasonable request.

Author Contributions

WG conceptualized the study and wrote the manuscript. KY was responsible for data curation, methodology development, and investigation; she also reviewed and edited the manuscript. ML supervised the overall research project, contributed to the conceptualization and research design, and critically reviewed and edited the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

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Conflicts of Interest

The authors declare no conflicts of interest.

Declaration of AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work, the authors used AI tools, including ChatGPT and Gemini, in order to check spelling and grammar. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

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