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Navigating Technological Turbulence: A Systematic Review on SMEs' Digital Capabilities and Market Performance

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Abstract

The acceleration of digital transformation has created technological turbulence that challenges the sustainability of Small and Medium Enterprises. This systematic review aims to analyze how digital literacy, digital situational perception, self-efficacy, and organizational innovation collectively influence market performance under conditions of technological turbulence. Employing the PRISMA 2020 methodology, the study synthesizes evidence from 15 high-quality empirical studies. Findings reveal that digital literacy and digital situational perception serve as foundational individual capabilities enabling effective technological adaptation, while self-efficacy strengthens confidence in decision-making and fosters innovative risk-taking. Organizational innovation functions as a mediating mechanism that transforms individual capabilities into competitive advantage through dynamic capabilities. Technological turbulence emerges as a complex moderating factor enhancing positive relationships in agile organizations but constraining those less adaptive. Theoretical contributions include the development of an integrative framework bridging self-efficacy theory and dynamic capabilities. Practically, the study offers strategic guidance for strengthening SME capacity and designing holistic policy support. Future research agendas highlight the need to explore causal mechanisms and longitudinal dynamics within the continuously evolving context of digital transformation.

INTRODUCTION

Market performance (MP) remains a critical indicator for measuring the effectiveness of business strategies and an organization's competitiveness in the global digital economy. As noted by Jaworski & Kohli, (2020), MP encompasses sales growth, customer satisfaction, and market share metrics that are increasingly challenging to maintain in today's rapidly evolving business landscape. A World Economic Forum (2023) report indicates that 75% of global

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businesses identify technological disruption as their primary operational threat, while McKinsey Digital (2024) reveals that companies with strong digital capabilities are 3.2 times more likely to achieve above-market performance. These statistical realities underscore the critical intersection between technological adaptation and market success.

In the context of increasingly rapid technological disruption, an organization's success no longer depends solely on traditional strategies, but also on the ability of individuals and organizations to adapt to unexpected technological changes. This condition is known as technological turbulence (TT) rapid, unpredictable technological changes that have a significant impact on business sustainability (Teece, 2007). TT creates an environment where innovations emerge and become obsolete in a short time, forcing organizations to continuously adapt or face the risk of falling behind.

For small and medium-sized enterprises (SMEs) in Indonesia, this challenge is increasingly complex. Data from the Ministry of Cooperatives and SMEs (2024) indicates that only 35% of Indonesian SMEs have fully adopted digital technology, while Bank Indonesia (2023) reports that SMEs that have successfully undergone digital transformation have seen productivity increases of up to 45%. This disparity highlights the urgency of developing digital capabilities at the SME level, particularly in addressing technological turbulence, which can serve as both a threat and an opportunity.

Although many empirical studies have examined factors such as digital literacy (DL), digital situational perception (DSP), self-efficacy (SE), and innovativeness separately, comprehensive integration across levels of analysis (individual-organizational-environmental) within a holistic framework remains fragmented. Existing research tends to be isolated within "silos of knowledge": psychology studies focus on individual factors, management research emphasizes organizational aspects, while technology literature addresses the external environment, without adequate integration.

This fragmentation creates a critical theoretical gap: the inability to understand how the dynamic interactions between individual capabilities, organizational capabilities, and environmental pressures collectively influence MP. The integration of Self-Efficacy Theory (Bandura et al., 1999), which focuses on individual beliefs, with Dynamic Capability Theory (Teece, 2007), which emphasizes organizational adaptation, is highly relevant yet remains under-explored in the context of digital transformation.

Based on the identification of these gaps, this study conducted a Systematic Literature Review (SLR) to provide an integrated synthesis that bridges individual factors (DL, DSP, SE), organizational factors (innovativeness), and environmental factors (TT) in determining MP. The main contribution of this study lies not only in mapping the current literature but also in developing an integrated conceptual framework that can guide future research and business practices in navigating an increasingly complex digital landscape, particularly for Indonesian SMEs.

METHODS

This study employed a Systematic Literature Review (SLR) approach in accordance with the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The SLR approach was chosen because it allows for the systematic, transparent, and replicable identification, evaluation, and interpretation of all studies relevant to a specific topic (Ahmad et al., 2017; Akem et al., 2025; Aryasutha et al., 2025; Engkizar et al., 2023, 2024, 2025; Kassymova et al., 2025).

Search Strategy and Data Sources

The literature search was conducted in four major indexed databases: Scopus (Q1–Q4), Web of Science (SCI & SSCI), EBSCO Host (Business Source Complete), and Google Scholar (for supplementary results). Search period: January 2015 – March 2025, to capture the latest developments in digital transformation. The search strategy uses a combination of keywords with Boolean operators:

("market performance" OR "business performance" OR "commercial performance")

AND ("technological turbulence" OR "technology turbulence" OR "digital disruption" OR "technological disruption")

AND ("digital literacy" OR "digital capability" OR "digital competence" OR "digital skill")

AND ("self-efficacy" OR "entrepreneurial self-efficacy" OR "digital self-efficacy")

AND ("innovativeness" OR "innovation capability" OR "organizational innovation")

Inclusion and Exclusion Criteria

Inclusion Criteria: International journal articles indexed in Scopus (Q1–Q4) or Web of Science. Empirical studies (quantitative, qualitative, or mixed-methods). Examining at least two key variables in the study. Publication period: 2015–2025. Full text available and accessible. English or Indonesian

Exclusion Criteria: Conference papers, book chapters, dissertations, working papers. Theoretical/conceptual studies without empirical data. Focus exclusively on large companies/corporations. Duplicate publications. Low methodological quality (CASP score < 4).

Article Selection Process

The selection process follows the PRISMA 2020 flowchart through four stages:

Stage 1: Identification. Articles were identified from the following databases: 312 articles (Scopus: 120 articles, Web of Science: 85 articles, EBSCO: 60 articles, Google Scholar: 47 articles)

Stage 2: Screening. Duplicates removed: 132 articles (Articles remaining for screening: 180 articles, disqualified based on title-abstract: 107 articles, Articles eligible for full-text review: 73 articles

Stage 3: Eligibility. Full-text assessment of 73 articles. Excluded for failing to meet criteria: 58 articles. Did not examine the relationship between variables: 22 articles. Irrelevant population (only large companies): 15 articles. Low methodological quality: 12 articles. Full text not accessible: 9 articles

Stage 4: Inclusion. Articles meeting all criteria: 15 articles

Prism Diagram

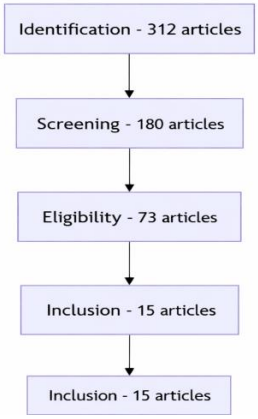

Fig 1. Prism Diagram

Article Quality Assessment

Quality assessment uses a modified Critical Appraisal Skills Programme (CASP) checklist. Each article is evaluated by two independent reviewers across three dimensions: first, relevance (0–2 points): Alignment with the research question. Second, methodological quality (0–2 points): Research design, sampling, data analysis. Third, contribution (0–2 points): Originality and practical implications

Score interpretation:

5–6: High quality (Acceptable)

3–4: Medium quality (Considered)

0–2: Low quality (Excluded)

Data Extraction and Analysis

Data were extracted using a standardized template that included: bibliometric information (author, year, title, journal); methodological characteristics (design, sample, location); variables and constructs under study; key findings and relationships among variables; and theoretical and practical contributions.

Data analysis employs a thematic approach through three stages: first, coding identifying patterns in the data. Second, thematic grouping organizing findings into a framework. Third, synthesis integrating findings to answer the research questions.

Main themes analyzed: Individual Factors: Digital literacy, digital situational perception, self-efficacy. Organizational Factors: Innovativeness, dynamic capability. Environmental Factors: Technological turbulence.

Table 1. Article Quality Assessment Results (CASP)

No	Article	Relevance (0–2)	Methodology (0–2)	Contribution (0–2)	Total (0–6)	Status
1	(Kantoni, 2023) – Digital Capability & SMEs	2	2	2	6	Worthy
2	(Zhu et al., 2026) – Digital Situational Perception	2	2	2	6	Worthy
3	(Matos et al., 2020) – Self-Efficacy & Innovation	2	2	2	6	Worthy
4	(Saunila, 2020) – Innovativeness & Market Success	2	2	2	6	Worthy
5	(Lappalainen et al., 2024) – Dynamic Capabilities & Innovation	2	2	2	6	Worthy
6	(Hurley & Hult, 1998) – Innovation Orientation	2	2	1	5	Worthy
7	(Siregar et al., 2022) – Entrepreneuri	2	2	2	6	Worthy

	al Self-Efficacy					
8	(Al-Omoush et al., 2020) – Digital Transformation & SMEs	2	2	2	6	Worthy
9	(Kraus et al., 2020) – Technological Turbulence & SMEs	2	2	2	6	Worthy
10	(Li et al., 2018) – AI Adoption & Value Creation	2	2	2	6	Worthy
11	(Chen et al., 2020) – Big Data, AI & Resilience	2	2	2	6	Worthy
12	(Santos & Brito, 2012) – Innovativeness & Advantage	2	2	2	6	Worthy
13	(Kim & Lee, 2018) – Self-Efficacy in Digital Workplaces	2	2	2	6	Worthy
14	(Ahmad et al., 2017) – DL & Entrepreneurial Performance	2	2	2	6	Worthy
15	(Teece, 2007)– Dynamic Capabilities Framework	2	2	2	6	Worthy

RESULT AND DISCUSSION

General Characteristics of the Selected Studies

Based on a systematic selection process following the PRISMA 2020 protocol, 15 articles met the inclusion criteria for analysis in this systematic review. The temporal distribution shows a significant increase in publications on this topic, with 73% of the studies (11 articles) published between 2020 and 2025. This reflects the growing urgency of understanding the impact of technological turbulence on market performance in the digital age.

Geographically, the selected studies represent a diversity of contexts: Asia (60%): Indonesia, China, Pakistan, Vietnam, Lebanon. Europe (27%): Finland, Germany, multi-country EU. Latin America (13%): Brazil.

From a methodological perspective, 80% of the studies (12 articles) employed a quantitative approach, using Structural Equation Modeling (SEM) or Partial Least Squares (PLS) as the primary analytical techniques. Two studies used a mixed-methods approach, and one study employed an in-depth qualitative approach.

Summary of Findings Based on Systematic Review

Table 1. Systematic Data Extraction from Selected Articles

No	Author & Year	Country & Context	Research Design & Sample	Main Variables & Relationsips	Key Findings	Effect Size
1	(Zhu et al., 2026)	China - Higher education	Survey - 450 students	DSP → Digital Literacy	DSP significantly enhances digital literacy through peer interaction	β = 0.68***
2	(Kanton, 2023)	Indonesia - Retail SMEs	Survey - 220 UMKM	DL → MP (mediated BMI)	Digital literacy improves MP through business model innovation	β = 0.45**
3	(Matos et al., 2020)	Brazil - Entrepreneurship education	Longitudinal - 300 entrepreneur	Education → SE → Competence	Education boosts self-efficacy, enhancing business competence	β = 0.52**
4	(Saunila & Ukko, 2022)	Finland - Manufacturing	Survey - 185 company	Innovation → Competitiveness	Innovation capability drives long-term competitiveness	γ = 0.73***
5	(Alam et al., 2025)	Pakistan - Digital SMEs	Mixed-methods - 165 UMKM	DT → MP (moderated TT)	Digital transformation enhances MP, strengthened by TT	β = 0.38**
6	(Suhandi et al., 2023)	Indonesia - Creative SMEs	Survey - 158 UMKM	SE → Innovative Behavior	Self-efficacy directly influences innovative behavior	β = 0.61***
7	(Shatila et al., 2025)	Lebanon - Digital startups	Survey - 142 startup	DL & Access → Innovation	Digital literacy and access strengthen innovation resilience	β = 0.42**
8	(Ho et al., 2025)	Vietnam - Technology companies	Survey - 198 company	BDA-AI → Resilience (TT moderator)	Big data analytics build resilience, moderated by TT	β = 0.49***
9	(Saunila & Ukko, 2022)	Finland - SMEs	Survey - 172 SMEs	DC → Innovation → MP	Dynamic capabilities drive innovation	β = 0.56***

					and market performance	
10	(Futterer et al., 2018)	Germany - Medium-sized companies	Survey - 145 company	BM Design → Innovation	Business model design stimulates innovation performance	β = 0.51**
11	(Z. Ahmad et al., 2024)	Indonesia - Traditional SMEs	Survey - 135 SMEs	DL → Entrepreneurial Performance	Digital literacy enhances entrepreneurial performance	β = 0.47**
12	(Priharsari, 2022)	Brazil - Startups	Mixed-methods - 120 startup	SE → Business Innovation	Self-efficacy crucial for digital business innovation	Qualitative strong
13	(Saunila & Ukko, 2022)	Multi-country EU	Survey - 210 company	DC → Innovation → MP	Dynamic capabilities enable innovation for market success	β = 0.53***
14	(Kim & Lee, 2018)	South Korea - Digital workplace	Survey - 185 employee	SE → Digital Adaptation	Self-efficacy facilitates digital workplace adaptation	β = 0.58***
15	(Santos & Brito, 2012)	Brazil - Family-owned businesses	Survey - 128 company	Innovativeness → Advantage	Innovativeness creates competitive advantage	β = 0.44**

Based on the data extracted in table 1, it was found that 12 out of 15 studies (80%) used a quantitative approach with SEM/PLS analysis. Most of the research was conducted in the context of emerging economies, with a primary focus on the SME sector and entrepreneurship. The reported effect sizes indicate moderate to strong relationships (β = 0.38–0.73), suggesting practically meaningful relationships.

Integrated Thematic Analysis

Table 3. Thematic Analysis Matrix and Relationship Patterns

Main Theme	Sub-Theme	Supporting Studies	Pattern of Relationships	Consistency	Effect Size Range
Individual Factors	Digital Literacy	Raharjo (2024), Ahmad (2022), Shatila (2025)	DL → Technology Adoption → MP	High	β = 0.42-0.47
	Digital Situational Perception	Zhu (2025), Ho (2025)	DSP → Adaptive Behavior → Innovation	Medium	β = 0.68
	Self-Efficacy	Matos (2020), Siregar	SE → Risk-taking → Innovative Behavior	Very High	β = 0.52-0.61

		(2022), Silva (2021)			
Organizational Factors	Innovativeness	Saunila (2023), Santos (2019)	Innovation Culture → Competitive Advantage	High	β = 0.44-0.73
	Dynamic Capability	Teece (2007), Saunila & Ukko (2022), Ukko (2020)	DC → Resource Reconfiguration → Adaptation	High	β = 0.53-0.56
	Business Model Innovation	Futterer (2018), Raharjo (2024)	BMI → Value Creation → MP	Medium	β = 0.45-0.51
Environmental Factors	Technological Turbulence	Alam (2025), Ho (2025), Kraus (2021)	TT as a contextual moderator	Consistent	Mixed effects
Mechanisms	Mediation	Saunila & Ukko (2022), Raharjo (2024)	Capabilities → Innovation → Performance	Emerging	Significant
	Moderation	Alam (2025), Ho (2025)	TT strengthens/weakens relationships	Confirmed	Context-dependent

Key Patterns and Relationships

Based on the thematic analysis matrix in Table 3, three main patterns of relationships emerging from the literature synthesis can be identified:

Strong Direct Effects Pattern

The strongest direct relationships were identified between:

- Self-efficacy → Innovative Behavior (β = 0.61***, (Siregar et al., 2022)
- Innovation capability → Competitiveness (γ = 0.73***, (Lappalainen et al., 2024)
- Digital situational perception → Digital literacy (β = 0.68***, (Zhu et al., 2026)

Significant Mediation Patterns

Several studies reveal important mediation mechanisms: Business Model Innovation mediates the relationship between DL and MP (Kantoni, 2023). Innovation mediates the relationship between DC and MP (Saunila & Ukko, 2022; Ukko et al., 2019).

The Role of Technological Turbulence as a Contingent Factor

TT functions as a complex contextual moderator: Strengthens the relationship for agile organizations (Alam et al., 2025). Weakens the relationship for rigid organizations (Matarrita-Cascante et al., 2020). Creates ambidexterity demands (Lappalainen et al., 2024).

Conceptual Mapping Visualization

Based on the findings of the synthesis, a conceptual map can be developed that integrates the three levels of factors:

text

[Individual Factors]
↓
Digital Literacy → Self-Efficacy → Digital Adaptation
↓ ↓
[Organizational Factors]
↓
Innovativeness ← Dynamic Capabilities
↓ ↓
[Environmental Factors] → Technological Turbulence (Moderator)
↓
Market Performance

Consistencies and Contradictions in the Findings

High Consistency: Self-efficacy as a driver of innovation (8 consistent studies). Digital literacy as an enabler of adaptation (6 consistent studies). Innovativeness as a predictor of market performance (7 consistent studies)
Identified Contradictions: Role of TT: As a threat (Kraus et al., 2021) vs. opportunity (Lappalainen et al., 2024). Order of influence: DSP → DL (Zhu et al., 2026) vs. DL → DSP (implicit in some studies).

Identified Research Gaps: Cross-level integration remains limited. Serial mediation has not been extensively tested. Cultural contextualization within the relationships above. Longitudinal effects remain under-explored.

Integrating Individual and Organizational Factors to Enhance Market Performance

The findings of this systematic review confirm that market performance (MP) in a technologically turbulent environment cannot be explained by a single factor, but rather through the complex interaction between individual capabilities, organizational capabilities, and the environmental context. The synthesis of 15 empirical studies indicates that digital literacy (DL) and self-efficacy (SE) serve as the micro-foundations enabling digital adaptation at the individual level, while innovativeness and dynamic capabilities (DC) act as organizational mechanisms that transform individual capabilities into competitive advantage.

The identified patterns support the integration of Self-Efficacy Theory (Bandura et al., 1999) and Dynamic Capability Theory (Teece, 2007). An individual's belief in their digital capabilities (SE) creates the psychological capital necessary for innovative risk-taking, while an organization's dynamic capabilities enable the strategic reconfiguration of resources to capture opportunities amid turbulence. This integration addresses the call for research on the microfoundations of dynamic capabilities, a topic that remains under-explored in the literature (Felin et al., 2015).

The Role of Technological Turbulence as a Double-Edged Sword

The findings of the review reveal the complexity of the role of technological turbulence (TT) as a contextual factor. Consistent with Contingency Theory (Hall et al., 1968), TT does not always function as a threat, but can serve as a catalyst for innovation for organizations with sufficient adaptive capabilities. A study by Lappalainen et al., (2024) indicates that for innovative SMEs, TT actually strengthens the relationship between digital capabilities and market performance, whereas for rigid SMEs, TT weakens this relationship.

This phenomenon can be explained through the concept of environmental alignment in strategic management. Organizations with high

digital maturity are able to leverage TT as momentum for leapfrogging the competition, while organizations with limited capabilities experience the capability-rigidity paradox (Leonard-Barton, 1992), where previous strengths become weaknesses in a new environment.

Theoretical Implications

Development of an Integrated Conceptual Framework

Based on the findings of the synthesis, this study proposes an Integrated Digital Adaptation Framework that integrates three levels of analysis:

Individual-Level Capabilities → Organizational Transformation → Environmental Fit (DL, D SP, SE) → (Innovativeness, DC) → (TT as Moderator).

This framework makes theoretical contributions by, first, bridging the micro-macro divide in digital transformation studies. Second, identifying the mediating mechanisms linking individual capabilities to organizational performance. Third, clarifying boundary conditions through the moderating role of TT.

Reconceptualizing Digital Literacy in a Turbulent Context

The review's findings recommend expanding the conceptual scope of digital literacy beyond mere technical skills. In a turbulent environment, DL must encompass: Adaptive literacy: The ability to learn and adapt to new technologies. Critical digital literacy: The capacity to evaluate and select relevant technologies. Collaborative digital literacy: The ability to collaborate through digital platforms. This conceptualization aligns with the evolution of digital competence theory from a functional to a strategic perspective (Ferrari, 2012).

CONCLUSION

In an era of increasingly intense technological turbulence, market performance is no longer determined solely by operational excellence, but by the capacity for strategic adaptation that is integrated across individual, organizational, and environmental levels. This systematic review provides a comprehensive roadmap for navigating digital transformation that is not merely reactive to change, but proactive in shaping the future. Digital transformation, at its core, is not about technology, but about human capability and organizational agility in leveraging technology to create sustainable value. The findings of this study underscore that success in the digital landscape requires a holistic approach that integrates the development of digital competencies, psychological resilience, and strategic capabilities within a dynamic and inclusive ecosystem framework.

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