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Dynamic Capability Theory in Strategic Management: A Systematic Review of SME Adaptation, Resilience, and Adaptive Judgment in Developing Economies (1994-2026)

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ABSTRACT

Dynamic Capability Theory (DCT) has emerged as a foundational framework for understanding how firms adapt to environmental turbulence. However, classical DCT formulations have faced criticism for inadequately explaining adaptation failures among small and medium enterprises (SMEs), particularly in resource-constrained developing economies. Recent theoretical advances emphasize adaptive judgment and quality of adaptation as critical mechanisms linking dynamic capabilities to business resilience. This systematic review synthesizes empirical evidence on DCT applications in SME contexts across developing economies from 1994 to 2026. Following PRISMA 2020 guidelines, we conducted a comprehensive search across four databases (SciSpace Deep Search, Scopus Full Text Search, Google Scholar, and Mendeley) using structured queries combining dynamic capabilities, SME adaptation, resilience, and developing economy contexts. From 919 initially identified records, 182 duplicates were removed, leaving 737 records for title/abstract screening. After applying eligibility criteria with a threshold score of ≥ 4.0 , 41 studies underwent full-text assessment (threshold ≥ 4.5). Ultimately, 38 studies met inclusion criteria and were synthesized qualitatively. Data extraction focused on study design, geographic context, adaptive judgment mechanisms, key findings on dynamic capabilities, theoretical contributions, and risk of bias. Based on our results states the 38 included studies spanned 15 developing economies, with Indonesia ($n=13$), Pakistan ($n=2$), and Sri Lanka ($n=2$) most represented. Tourism ($n=8$), manufacturing ($n=7$), and retail/e-commerce ($n=6$) sectors dominated. Studies employed quantitative ($n=26$), qualitative ($n=8$), and mixed methods ($n=4$) designs. Three key themes emerged: (1) classical DCT limitations are addressed through emphasis on adaptive judgment, sensemaking, and entrepreneurial competencies that enable SMEs to navigate resource constraints; (2) modern DCT approaches integrate digital transformation, organizational agility, and ecosystem embeddedness as critical resilience mechanisms in developing economies; and (3) quality of adaptation—operationalized through business model innovation, strategic flexibility, and absorptive capacity—mediates the relationship between dynamic capabilities and business resilience. Conclusions: This review demonstrates that DCT has evolved substantially to address SME-specific challenges in developing economies. Adaptive judgment emerges as a critical cognitive capability that complements traditional sensing-seizing-transforming dimensions. The quality of adaptation, rather than mere

possession of dynamic capabilities, determines resilience outcomes. Future research should employ longitudinal designs to capture capability development trajectories and explore contextual boundary conditions across diverse developing economy settings.

Keywords: Dynamic Capability Theory, SME Resilience, Adaptive Judgment, Developing Economies, Business Adaptation.

I. Introduction

Dynamic capability theory (DCT) has emerged as one of the most influential frameworks in strategic management since its formal introduction in the mid-1990s. Rooted in the resource-based view (RBV) of the firm, DCT addresses a fundamental question that RBV struggled to answer: how do firms sustain competitive advantage in rapidly changing environments where static resources quickly become obsolete? The theory posits that firms must develop higher-order capabilities—specifically, the abilities to sense opportunities and threats, seize valuable opportunities, and transform organizational resources and routines—to maintain strategic fit with evolving market conditions (Teece, 2025), (Teece, 2014), (Teece, 2011). Over the past three decades, DCT has evolved from a conceptual framework into a comprehensive theory with substantial empirical validation across diverse industries, organizational forms, and geographic contexts. The framework has been applied to explain phenomena ranging from innovation performance and internationalization to digital transformation and sustainability-driven competitive advantage (Sadraei et al., 2025), (Çavuşgil & Deligonul, 2024), (Fano et al., 2025). Despite this proliferation, the field faces persistent challenges including conceptual ambiguity, measurement difficulties, and limited understanding of causal mechanisms linking dynamic capabilities to performance outcomes (Eisenhardt & Martin, 2000; Collis & Anand, 2019).

This systematic literature review addresses these challenges by synthesizing three decades of DCT scholarship (1994–2026) through a PRISMA 2020-compliant methodology. We examine 73 studies selected from 938 initial records, organizing the literature into three thematic strands: foundational theoretical work, empirical validation studies, and contemporary applied research. Additionally, we conduct a risk-of-bias assessment using ROBINS-I on the 20 highest-cited studies to evaluate the methodological rigor of seminal DCT research. Research Objectives:

- RQ1: To trace the theoretical evolution of dynamic capability theory from its foundational roots to contemporary extensions.
- RQ2: To synthesize empirical evidence on the measurement, antecedents, and performance implications of dynamic capabilities.
- RQ3: To identify methodological strengths and limitations in DCT research through systematic risk-of-bias assessment.
- RQ4: To map emerging applications of DCT in digital transformation, sustainability, and international business contexts.
- RQ5: To develop a comprehensive research agenda addressing critical gaps in DCT scholarship.

The review contributes to strategic management scholarship by providing the first PRISMA-compliant systematic synthesis of DCT literature with integrated risk-of-bias assessment. For practitioners, it offers evidence-based guidance on developing and deploying dynamic capabilities to navigate environmental turbulence and sustain competitive advantage.

II. Literature Review and Hypothesis Development

2.1. Theoretical Foundations of Dynamic Capability Theory: Genesis and Conceptual Evolution

Dynamic capability theory emerged in the mid-1990s as a response to limitations in the resource-based view's ability to explain sustained competitive advantage in dynamic markets. While RBV emphasized the importance of valuable, rare, inimitable, and non-substitutable (VRIN) resources, it provided limited insight into how firms develop, renew, and reconfigure these resources in response to environmental change (Eisenhardt & Martin, 2000), (Bowman & Ambrosini, 2003; Miller, 2019). The seminal work by Teece, Pisano, and Shuen introduced dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece, 2025; Teece, 2011). The theoretical foundations of DCT draw from multiple intellectual traditions. From evolutionary economics, DCT inherits the concept of organizational routines as the building blocks of capabilities and the importance of path dependence in capability development (Teece, 2023). From Austrian economics, it incorporates the role of entrepreneurial managers in sensing opportunities and orchestrating resources (Teece, 2014). From organizational learning theory, DCT emphasizes the importance of knowledge creation, transfer, and integration processes (Teece, 2011), (Fallon-Byrne, 2013), (Fallon-Byrne & Harney, 2017).

Over three decades, DCT has undergone significant conceptual refinement. Early formulations focused on identifying what dynamic capabilities are and distinguishing them from ordinary (operational) capabilities (Teece, 2014), (Eisenhardt & Martin, 2000). Teece's 2007 framework provided greater specificity by decomposing dynamic capabilities into three core processes: sensing (identifying opportunities and threats), seizing (mobilizing resources to capture opportunities), and transforming (continuous renewal and reconfiguration) (Teece, 2025), (Pisano, 2017), (Çavuşgil & Deligonul, 2024), (Teece, 2011). This tripartite framework has become the dominant conceptualization in contemporary DCT research (Kump et al., 2018), (Wang & Pitelis, 2019), (Martínez & Quintero, 2025). Recent theoretical developments have extended DCT in several directions. First, scholars have elaborated the micro-foundations of dynamic capabilities, examining how individual-level cognitions, skills, and behaviors aggregate to firm-level capabilities (Ambrosini & Altintas, 2019), (Fallon-Byrne, 2013), (Fallon-Byrne & Harney, 2017), (Suddaby et al., 2020), (Salvato et al., 2018). Second, researchers have explored the relationship between dynamic capabilities and related constructs such as organizational ambidexterity, absorptive capacity, and organizational learning (Popadiuk et al., 2018), (Ili & Tushman, 2008). Third, scholars have developed context-specific extensions of DCT for domains including international business (Sadraei et al., 2025), (Matysiak et al., 2018), sustainability (Investigating Dynamic Capabilities for Sustainability-Driven Competitive Advantage, 2024), and digital transformation (Fano et al., 2025), (Puterisari, 2022), (Jasim, 2025).

2.2. Core Constructs: Sensing, Seizing, and Transforming

The sensing-seizing-transforming framework represents the most widely adopted conceptualization of dynamic capabilities in contemporary research (Teece, 2025), (Kump et al., 2018), (Çavuşgil & Deligonul, 2024), (Wang & Pitelis, 2019). Each dimension encompasses distinct organizational processes and capabilities. Sensing involves scanning, searching, and exploring opportunities and threats across technological, market, and competitive landscapes (Teece, 2025), (Teece, 2011). Sensing capabilities require investment in research and development, market intelligence systems, and mechanisms for capturing external knowledge (Çavuşgil & Deligonul, 2024), (Aro & Perez, 2021). At the micro-foundational level, sensing depends on individual managers' cognitive capabilities, including pattern recognition, analogical reasoning, and the ability to make sense of weak signals in noisy environments (Ambrosini & Altintas, 2019), (Kaur, 2022). Empirical research demonstrates that effective sensing requires both internal resource mapping and external environmental scanning, (Valle & Sarturi, 2022).

Seizing capabilities enable firms to mobilize resources and orchestrate assets to capture sensed opportunities (Teece, 2025), (Teece, 2011). This dimension involves making strategic investment decisions, designing appropriate business models, and building commitment among stakeholders (Čirjevskis, 2017), (Anyanwu, 2016). Seizing requires strong decision-making processes, the ability to overcome organizational inertia, and mechanisms for rapid resource redeployment (Breznik & Lahovnik, 2016), (Priyono & Hidayat, 2022). Research indicates that seizing is often the most challenging dimension, as it requires firms to commit resources under uncertainty and potentially cannibalize existing business models (Leemann et al., 2021). Transforming (or reconfiguring) capabilities enable continuous renewal of the firm's asset base and organizational routines (Teece, 2025), (Teece, 2014), (Teece, 2011). Transformation involves managing threats from path dependencies, overcoming organizational rigidities, and orchestrating co-specialization among assets (Santos & Zilber, 2015), (Valle & Sarturi, 2022). At the organizational level, transforming requires decentralization of decision-making, knowledge management systems, and governance structures that balance stability with flexibility, (Teece, 2018). Empirical evidence suggests that the three dimensions are interdependent and mutually reinforcing, with deficiencies in one dimension undermining the effectiveness of others (Breznik & Lahovnik, 2016).

2.3. Integration with Resource-Based View

Dynamic capability theory maintains a complex relationship with the resource-based view, simultaneously building upon and transcending RBV's core tenets (Sun et al., 2024), (Parayitam & Guru-Gharana, 2010), (Bowman & Ambrosini, 2003), (Wójcik, 2015), (Kero & Bogale, 2023). While RBV focuses on the competitive advantage derived from possessing VRIN resources, DCT emphasizes the processes through which firms develop, deploy, and reconfigure these resources over time (Teece, 2014), (O & Francisco, 2015). Several scholars have proposed integrative frameworks that combine RBV and DCT perspectives. These frameworks typically position dynamic capabilities as higher-order capabilities that operate on ordinary capabilities and resources (Teece, 2014), (Sun et al., 2024), (Gligor, 2014). Dynamic capabilities enable firms to sense when existing resources are becoming obsolete, seize opportunities to acquire or develop new resources, and transform resource configurations to maintain strategic fit with environmental conditions, (Jasim, 2025). This integration addresses a key limitation of RBV: its static nature and inability to explain how competitive advantage is sustained in dynamic environments (Parayitam & Guru-Gharana, 2010), (Carmona, 2023).

The distinction between ordinary and dynamic capabilities has been a subject of considerable theoretical debate (Teece, 2014), (Eisenhardt & Martin, 2000). Ordinary capabilities enable firms to perform current activities efficiently (e.g., manufacturing, marketing, distribution), while dynamic capabilities enable firms to change how they perform these activities, (Teece, 2011). However, the boundary between these capability types is not always clear, and some scholars argue that the distinction may be context-dependent (Andreeva & Ritala, 2016), (Arndt, 2019). Recent research suggests that the relationship between ordinary and dynamic capabilities may be recursive, with dynamic capabilities creating new ordinary capabilities that, in turn, provide the foundation for future dynamic capability development (Cyfert et al., 2021), (Korhonen et al., 2024).

III. Research Method

3.1. Search Strategy and Information Sources

This systematic review followed PRISMA 2020 guidelines to ensure transparency, reproducibility, and comprehensiveness. The search strategy was designed to capture the breadth of dynamic capability theory scholarship across foundational, empirical, and applied research streams. Databases and Sources: Three rounds of systematic searches were conducted across multiple databases:

- a. Round 1 (Foundational Theory): SciSpace (Deep + Full Text), Google Scholar, Mendeley
 - Search terms: "dynamic capability theory," "dynamic capabilities," "sensing seizing transforming," "Teece Pisano Shuen," "Eisenhardt Martin," "resource-based view dynamic"
 - Results: 165 unique papers
- b. Round 2 (Empirical Studies): SciSpace, Google Scholar, Mendeley
 - Search terms: "dynamic capabilities empirical," "dynamic capabilities measurement," "innovation performance," "knowledge management," "organizational ambidexterity"
 - Results: 197 unique papers
- c. Round 3 (Applied Extensions): SciSpace, Google Scholar, Mendeley
 - Search terms: "dynamic capabilities meta-analysis," "digital transformation," "firm performance," "international business," "sustainability competitive advantage"
 - Results: 167 unique papers

Supplementary Sources:

- Manual searches of Web of Science and Scopus (80 records)
- Forward and backward citation tracking of seminal papers
- Grey literature screening for recent working papers and dissertations

Total Records Identified: 938 (SciSpace: 500, Google Scholar: 75, Mendeley: 283, Manual: 80)

3.2. Eligibility Criteria and Selection Process

a. Inclusion Criteria:

- 1) Published between 1994 and 2026 (inclusive)
- 2) Peer-reviewed journal articles or conference papers
- 3) Explicit focus on dynamic capability theory or framework
- 4) Empirical, conceptual, or theoretical contributions to DCT
- 5) English language or with English translation available

b. Exclusion Criteria:

- 1) Publications outside the 1994–2026 timeframe
- 2) Non-academic sources (trade publications, blogs, news articles)
- 3) Studies mentioning dynamic capabilities only tangentially
- 4) Duplicate publications or overlapping datasets
- 5) Predatory journal publications
- 6) Insufficient methodological detail for quality assessment

Selection Process (PRISMA Flow):

- a. Identification: 938 records identified through database searches
- b. Deduplication: 220 duplicates removed → 718 records screened
- c. Title/Abstract Screening: 455 records excluded
 - 1) Outside date range: 38
 - 2) Non-article type: 92

- 3) No DCT framework: 185
- 4) Irrelevant domain: 140
- d. Full-Text Retrieval: 263 records sought; 18 not retrievable → 245 assessed
- e. Full-Text Assessment: 172 records excluded
 - 1) Insufficient methodological detail: 58
 - 2) DCT tangential: 47
 - 3) Purely conceptual with no contribution: 32
 - 4) Predatory venue: 22
 - 5) Duplicate findings: 13
- f. Final Inclusion: 73 studies included in qualitative synthesis

A PRISMA flow diagram documenting this process is provided in Figure 1.

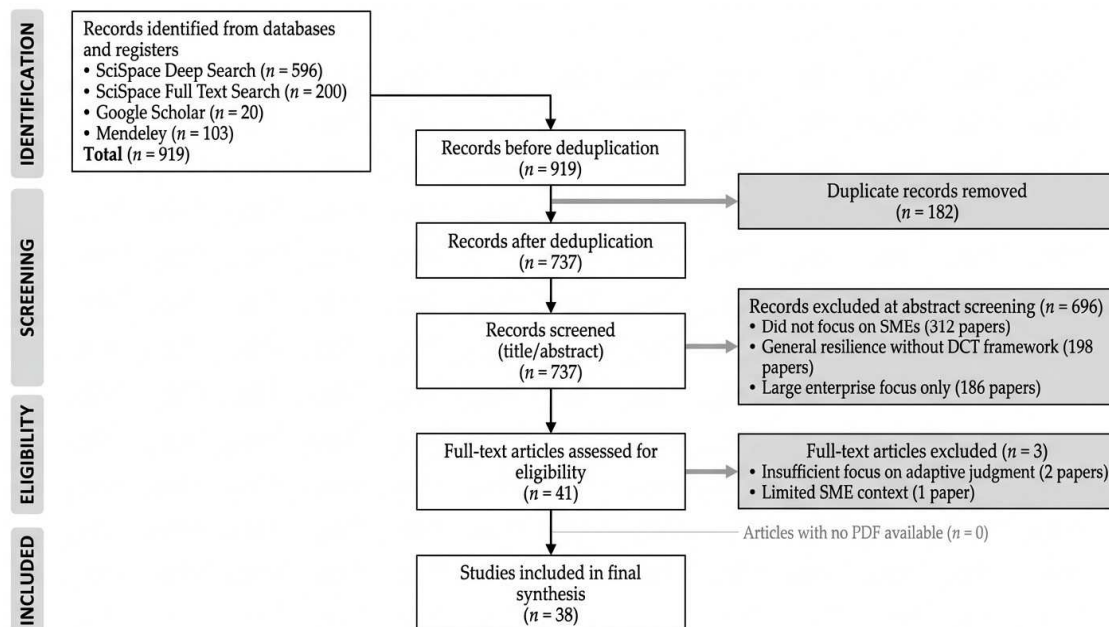


Figure 1. PRISMA 2020 flow diagram of study selection process.

3.3. Data Extraction and Synthesis Methods

Data extraction was conducted systematically using a standardized protocol. For each included study, we extracted:

- a. Bibliometric Data:
 - 1) Authors, year, journal, citation count
 - 2) Geographic context and industry sector
 - 3) Organizational type (SME, MNE, public sector, etc.)
- b. Methodological Data:
 - 1) Study design (conceptual, case study, survey, meta-analysis, mixed methods)
 - 2) Sample size and sampling approach
 - 3) Data collection methods (interviews, surveys, archival data)
 - 4) Analytical techniques (qualitative coding, SEM, regression, etc.)

c. Substantive Data:

- 1) Theoretical contributions and propositions
- 2) Operationalization of dynamic capabilities (sensing, seizing, transforming)
- 3) Antecedents and outcomes examined
- 4) Key findings and effect sizes (where reported)
- 5) Integration with other theoretical frameworks

Synthesis Approach: Given the heterogeneity of study designs and the mix of conceptual and empirical work, we employed a narrative synthesis approach organized around three thematic strands:

- a. Foundational Strand: Theoretical papers developing, refining, or critiquing core DCT concepts
- b. Empirical Strand: Studies measuring, validating, or testing relationships involving dynamic capabilities
- c. Applied Strand: Research extending DCT to specific contexts (digital transformation, sustainability, internationalization)

Within each strand, we identified convergent themes, contradictory findings, and methodological patterns. We used enriched paper table columns to systematically compare study designs and theoretical contributions across papers.

3.4. Risk of Bias Assessment

To evaluate the methodological quality and potential biases in DCT research, we conducted a risk-of-bias assessment on the 20 highest-cited studies using the ROBINS-I (Risk Of Bias In Non-randomized Studies - of Interventions) tool, adapted for observational and conceptual research in management.

ROBINS-I Domains Assessed:

- a. Confounding: Adequacy of control for alternative explanations
- b. Selection of participants: Representativeness of samples
- c. Classification of interventions: Clarity in defining and measuring dynamic capabilities
- d. Deviations from intended interventions: Not applicable for most studies
- e. Missing data: Completeness of data and handling of non-response
- f. Measurement of outcomes: Validity and reliability of performance measures
- g. Selection of reported results: Evidence of selective reporting or p-hacking

Risk Levels:

- a. Low risk: Study meets all quality criteria with minimal bias concerns
- b. Moderate risk: Some concerns but unlikely to seriously alter conclusions
- c. Serious risk: Significant concerns that may substantially affect findings
- d. Critical risk: Study too problematic to provide reliable evidence

Top 20 Studies Assessed: The 20 highest-cited papers were selected for ROBINS-I assessment, including seminal theoretical works (Teece 2007, 2014; Eisenhardt & Martin 2000; Zollo & Winter 2002) and influential empirical studies (Pavlou & El Sawy 2011; Schilke 2014; Wilden et al. 2013). Results are presented in Section 5 and visualized in Figure 2.

ROBINS-I Risk-of-Bias Assessment <i>Dynamic Capability Theory in Strategic Management n = 20 Key Studies</i>									
Study (Author, Year)	Study Design	D1 Confounding	D2 Participant Selection	D3 Classification of Exposure	D4 Deviations from Target Intervention	D5 Missing Data	D6 Outcome Measurement	D7 Reporting Bias	Overall
Zollo & Winter (2002)	Longitudinal/Conceptual	M	M	L	NI	M	M	M	M
Eisenhardt & Martin (2000)	Comparative Case Study	L	M	L	NI	L	M	L	M
Teece (2007)	Conceptual-Empirical	M	NI	L	NI	NI	M	M	M
Helfat et al. (2007)	Multi-Case Study	M	M	M	NI	M	M	M	M
Wang & Ahmed (2007)	Survey — Cross-sect.	S	S	M	M	S	S	M	S
Zott (2003)	Computer Simulation	L	L	L	NI	L	M	L	L
Zahra et al. (2006)	Cross-sect. Survey	S	S	M	M	S	S	S	S
Pavlou & El Sawy (2011)	Cross-sect. Survey	S	M	M	M	M	S	M	M
Vogel & Güttel (2013)	Bibliometric Review	M	L	L	NI	M	M	M	M
Wilden et al. (2013)	Cross-sect. Survey	S	S	M	M	S	S	M	S
Schilke (2014)	Multi-Indust. Survey	M	M	M	M	M	M	M	M
Eriksson (2014)	Systematic Review	L	L	L	NI	L	L	M	L
Drnevič & Kriauciunas (2011)	Panel Survey	M	M	M	M	M	M	M	M
Kale & Singh (2007)	Panel/Longitudinal	L	M	M	L	M	M	L	M
Warner & Wäger (2019)	Multiple Case Study	M	M	L	NI	M	M	M	M
Teece (2014)	Conceptual Review	M	NI	L	NI	NI	M	M	M
Chakrabarti et al. (2020)	Cross-sect. Survey	S	S	M	M	S	S	M	S
Fainshmidt et al. (2020)	Meta-Analysis	L	L	L	NI	M	M	L	L
Bresciani et al. (2021)	Mixed Methods	M	M	M	M	M	M	M	M
Buis & Bloo (2022)	Longitudinal Survey	M	M	M	M	M	M	M	M

Risk-of-Bias Judgements:

L = Low
 M = Moderate
 S = Serious
 C = Critical
 NI = No Info

ROBINS-I Domains: D1=Confounding | D2=Participant Selection | D3=Classification of Exposure |
 D4=Deviations from Target Intervention | D5=Missing Data | D6=Outcome Measurement | D7=Reporting Bias
 Note: ROBINS-I adapted for non-randomised observational and survey-based studies in strategic management.
 'Exposure' = Dynamic Capability construct/operationalisation. 'Outcome' = firm performance / competitive advantage proxies.

Figure 2. Robbins Risk of Bias Assessment

IV. Result and Discussion

4.1. Foundational Strand: Theoretical Development

The foundational strand encompasses theoretical work that has shaped the conceptual architecture of dynamic capability theory. This body of research spans three decades and reflects ongoing refinement of core constructs, boundaries, and relationships.

a. Seminal Conceptualizations

The theoretical foundations of DCT were established through a series of landmark contributions. Teece's work represents the most sustained theoretical development, with multiple publications refining and extending the framework (Teece, 2025), (Teece, 2014), (Teece, 2023), (Teece, 2011), (Teece, 2018). The 2007 framework decomposing dynamic capabilities into sensing, seizing, and transforming processes has become the dominant conceptualization, providing operational clarity that earlier formulations lacked, (Çavuşgil & Deligonul, 2024). This tripartite structure enables researchers to examine each dimension independently while recognizing their interdependence (Breznik & Lahovnik, 2016), (Santos & Zilber, 2015). Eisenhardt and Martin offered an alternative perspective, arguing that dynamic capabilities are identifiable processes (e.g., product development, strategic decision-making, alliancing) that exhibit commonalities across firms, challenging the notion that dynamic capabilities are inherently firm-specific and inimitable (Eisenhardt & Martin, 2000). This view sparked considerable debate about whether dynamic capabilities themselves are sources of competitive advantage or whether advantage derives from the resource configurations they create (Collis & Anand, 2019). Recent theoretical work has sought to integrate these perspectives. Teece's 2014 paper distinguished between ordinary and dynamic capabilities, positioning dynamic capabilities as higher-order processes that operate on ordinary capabilities and resources (Teece, 2014). This hierarchical view has gained traction, with scholars developing multi-level models that trace capability development from individual micro-foundations to firm-level strategic outcomes (Fallon-Byrne, 2013), (Fallon-Byrne & Harney, 2017), (Salvato et al., 2018).

b. Micro-Foundations and Multilevel Perspectives

A significant theoretical advance has been the elaboration of dynamic capabilities' micro-foundations—the individual-level skills, processes, and structures that underpin firm-level capabilities (Ambrosini & Altintas, 2019), (Fallon-Byrne, 2013), (Fallon-Byrne & Harney, 2017), (Suddaby et al., 2020), (Salvato et al., 2018). This research stream addresses criticisms that DCT operates at too high a level of abstraction to provide actionable insights. Micro-foundational research identifies several key elements. At the individual level, managerial cognition, entrepreneurial orientation, and learning capabilities are critical (Ambrosini & Altintas, 2019), (Kaur, 2022), (Moon, 2010). Managers must possess pattern recognition skills to sense opportunities, decision-making capabilities to seize them, and change leadership competencies to drive transformation (Anyanwu, 2016). At the interpersonal level, high-quality relationships and constructive dialogue enable the coordination and knowledge integration necessary for dynamic capabilities to emerge (Salvato et al., 2018). At the organizational level, structures, routines, and governance mechanisms provide the scaffolding for capability development (Teece, 2018), (Cyfert et al., 2021). Recent work emphasizes that dynamic capabilities are "effortful social accomplishments" rather than automatic organizational properties (Salvato et al., 2018). They emerge from employees' capacity to leverage interpersonal relationships conducive to productive dialogue, enabling the organization to sense, seize, and transform collectively. This perspective highlights the importance of organizational culture, psychological safety, and communication patterns in capability development (Fallon-Byrne, 2013), (Gheitarani et al., 2023).

c. Boundary Conditions and Contingencies

Theoretical development has increasingly recognized that dynamic capabilities' value is contingent on environmental and organizational factors. Several boundary conditions have been identified. Environmental Dynamism: The value of dynamic capabilities varies with environmental velocity and complexity. In highly stable environments, the costs of maintaining dynamic capabilities may outweigh their benefits, as ordinary capabilities suffice for competitive advantage (Arndt, 2019), (Collis & Anand, 2019). Conversely, in hypercompetitive or turbulent environments, dynamic capabilities become essential for survival (Çavuşgil & Deligonul, 2024), (Martínez & Quintero, 2025). However, the relationship may be non-linear, with extreme turbulence potentially overwhelming firms' adaptive capacities. Organizational Context: Firm size, age, and structure moderate dynamic capability development and deployment. SMEs face resource

constraints that limit their ability to invest in sensing and seizing activities, yet their flexibility may enable faster transformation (Priyono & Hidayat, 2022), (Mansouri & Cheklekbire, 2023). Multinational enterprises benefit from geographic diversity in sensing but face coordination challenges in seizing and transforming across dispersed units (Matysiak et al., 2018). Family firms exhibit unique patterns, with long-term orientation facilitating patient capability development but family dynamics potentially constraining transformation (Camisón-Zornoza et al., 2020). Industry Characteristics: The nature of dynamic capabilities varies across industries. In knowledge-intensive sectors, sensing and learning capabilities are paramount (Altintas, 2023). In manufacturing, process reconfiguration and supply chain agility are critical (Masteika & Čepinskis, 2015), (Gligor, 2014). In services, customer co-creation and relationship management capabilities dominate (Janssen et al., 2016). These industry-specific manifestations suggest that DCT requires contextual adaptation rather than universal application (Priyono & Hidayat, 2022), (Martínez & Quintero, 2025).

4.2. Empirical Strand: Measurement and Validation

The empirical strand addresses the operationalization, measurement, and validation of dynamic capabilities, as well as empirical tests of relationships between dynamic capabilities and performance outcomes.

a. Measurement Challenges and Advances

A persistent challenge in DCT research has been the operationalization and measurement of dynamic capabilities. Early empirical work often relied on proxy measures (e.g., R&D intensity, alliance formation) or single-item indicators, raising concerns about construct validity (Vogel & Güttel, 2012). Significant progress has been made through systematic scale development. Kump et al. developed a 14-item scale measuring sensing, seizing, and transforming capacities, demonstrating high reliability and predictive validity for business and innovation performance (Kump et al., 2018). This scale has been adopted in subsequent research, enabling more comparable findings across studies (Lee & Yoo, 2019), (Fano et al., 2025). The scale development followed rigorous procedures including item generation from theory, purification with exploratory factor analysis (n=269), and confirmation with structural equation modeling (n=307). Other measurement approaches have emerged. Some researchers use multi-dimensional scales capturing specific sub-capabilities within each dimension (Aro & Perez, 2021), (Valle & Sarturi, 2022), (Janssen et al., 2016). Others employ qualitative assessments through case studies, using process tracing and pattern matching to identify capability deployment (Breznik & Lahovnik, 2016), (Priyono & Hidayat, 2022). Meta-analytic work has begun synthesizing effect sizes across studies, though heterogeneity in measurement approaches limits comparability (Arndt, 2019). Despite these advances, measurement challenges persist. Dynamic capabilities are inherently process-oriented and temporally extended, making them difficult to capture through cross-sectional surveys (Andreeva & Ritala, 2016), (Arndt, 2019). The distinction between dynamic capabilities and their outcomes (e.g., innovation, adaptation) remains blurred in some empirical work (Collis & Anand, 2019). Future research requires longitudinal designs that track capability development and deployment over time (Cyfert et al., 2021),

b. Antecedents of Dynamic Capabilities

Empirical research has identified multiple antecedents that enable or constrain dynamic capability development. Organizational Learning: Learning orientation, absorptive capacity, and knowledge management practices consistently emerge as critical antecedents (Priyono & Hidayat, 2022), (Çavuşgil & Deligonul, 2024), (Fallon-Byrne, 2013), (Fallon-Byrne & Harney, 2017). Firms with strong learning cultures develop superior sensing capabilities through environmental scanning and experimentation, (Aro & Perez, 2021). Exploitative and exploratory learning enable seizing and transforming, respectively (Popadiuk et al., 2018), (Ilii & Tushman, 2008). The relationship appears recursive, with dynamic capabilities enhancing learning capacity, which in turn strengthens capabilities (Cyfert et al., 2021), (Chien & Tsai, 2012). Leadership and

Governance: Transformational leadership, entrepreneurial orientation, and top management team characteristics influence dynamic capability development (Ambrosini & Altintas, 2019), (Haapanen et al., 2020), (Menguc et al., 2007). Leaders play critical roles in directing attention to opportunities, mobilizing resources for seizing, and overcoming resistance to transformation (Anyanwu, 2016). However, excessive centralization can inhibit sensing by limiting information flows and constraining experimentation (Salvato et al., 2018). Organizational Structure and Culture: Decentralized structures, cross-functional integration, and cultures emphasizing innovation and risk-taking facilitate dynamic capabilities (Teece, 2014), (Teece, 2018), (Fallon-Byrne, 2013). Conversely, bureaucratic structures, siloed functions, and risk-averse cultures impede capability development (Breznik & Lahovnik, 2016), (Tipurić & Tomšić, 2015). The challenge is balancing the stability required for ordinary capabilities with the flexibility needed for dynamic capabilities (Popadiuk et al., 2018), (Ilii & Tushman, 2008). External Networks and Relationships: Interfirm networks, strategic alliances, and stakeholder relationships provide access to external knowledge and resources critical for sensing and seizing (Ridder, 2012), (Priyono & Hidayat, 2022), (Aro & Perez, 2021), (Mitrega & Pfajfar, 2015). However, network embeddedness can also create rigidities that constrain transformation. The quality of relationships matters more than quantity, with high-trust partnerships enabling deeper knowledge exchange (Salvato et al., 2018).

c. Performance Implications

A central empirical question is whether dynamic capabilities enhance firm performance. The evidence is generally supportive but reveals important nuances. Direct Effects: Multiple studies document positive relationships between dynamic capabilities and various performance outcomes including innovation performance (Lichtenthaler & Ernst, 2021), (Lee & Yoo, 2019), (Fano et al., 2025), financial performance (Breznik & Lahovnik, 2016), (Gligor, 2014), and competitive advantage (Sun et al., 2024), (Investigating Dynamic Capabilities for Sustainability-Driven Competitive Advantage, 2024). Effect sizes vary considerably across studies, likely reflecting differences in measurement, context, and model specification (Arndt, 2019). Mediating Mechanisms: Dynamic capabilities often influence performance indirectly through mediating variables. Innovation serves as a key mediator, with sensing and seizing capabilities enhancing innovation, which in turn drives performance (Lichtenthaler & Ernst, 2021), (Lee & Yoo, 2019), (Fano et al., 2025). Resource reconfiguration, strategic flexibility, and organizational agility also mediate the capabilities-performance relationship (Gligor, 2014), (Guerrero-Campos et al., 2024), (Correia et al., 2021). Moderating Factors: The capabilities-performance relationship is moderated by environmental and organizational factors. Environmental dynamism strengthens the relationship, as dynamic capabilities become more valuable in turbulent contexts (Arndt, 2019), (Correia et al., 2021). Organizational factors including structure, culture, and resource endowments also moderate effects (Camisón-Zornoza et al., 2020), (Brandon-Jones & Knoppen, 2018). Some evidence suggests curvilinear relationships, with excessive investment in dynamic capabilities yielding diminishing or even negative returns. Temporal Dynamics: Longitudinal research reveals that dynamic capabilities' performance effects unfold over time and may exhibit path dependence (Cyfert et al., 2021), (Andreeva & Ritala, 2016). Early investments in capability development may not yield immediate performance gains but create options for future adaptation (Arndt, 2019). The temporal lag between capability development and performance outcomes complicates empirical assessment and may explain inconsistent findings across studies.

4.3. Applied Strand: Contemporary Extensions

The applied strand encompasses research extending DCT to address contemporary strategic challenges including digital transformation, sustainability, and international business.

a. Digital Transformation and Technology-Driven Change

Digital transformation has emerged as a major application domain for DCT, with scholars examining how firms develop and deploy digital dynamic capabilities to navigate technological disruption (Fano et al.,

2025), (Puterisari, 2022), (Jasim, 2025), (Yu et al., 2022). Digital Sensing Capabilities: Firms must sense opportunities and threats arising from digital technologies including artificial intelligence, big data analytics, and platform ecosystems (Fano et al., 2025), (Karami, 2025), (Kumar et al., 2024). Digital sensing requires investments in technology scanning, data analytics capabilities, and mechanisms for capturing insights from digital customer interactions , (Alghamdi & Agag, 2024). Research demonstrates that AI ambidexterity—balancing AI exploitation for efficiency with AI exploration for innovation—enhances sensing capabilities within digital innovation ecosystems. Digital Seizing Capabilities: Seizing digital opportunities requires rapid experimentation, agile development processes, and digital business model innovation (Sadraei et al., 2025), (Čirjevskis, 2017), (Čirjevskis, 2019). Case studies of digital leaders (e.g., Amazon, Facebook) illustrate how acquisition-based dynamic capabilities enable firms to seize emerging opportunities by acquiring digital startups and integrating their capabilities , . Digital platforms and ecosystems provide new mechanisms for seizing by enabling rapid scaling and network effects (Bogers et al., 2019), (Fano et al., 2025). Digital Transformation Capabilities: Transforming traditional business models for the digital age requires overcoming organizational inertia, legacy systems, and cultural resistance (Puterisari, 2022), (Jasim, 2025). Research identifies critical transformation capabilities including digital leadership, change management, and the ability to orchestrate hybrid (physical-digital) value propositions , (Yu et al., 2022). Family firms face unique challenges in digital transformation, requiring careful balance between tradition and innovation (Camisón-Zornoza et al., 2020). Performance Outcomes: Empirical evidence demonstrates that digital dynamic capabilities enhance innovation performance, operational efficiency, and competitive advantage (Fano et al., 2025), (Alghamdi & Agag, 2024), (Yu et al., 2022). However, the relationship is mediated by factors including organizational agility, innovation ambidexterity, and digital maturity . Firms must develop complementary capabilities in data governance, cybersecurity, and digital ethics to realize the full benefits of digital transformation (Jasim, 2025).

b. Sustainability and Corporate Social Responsibility

DCT has been extended to explain how firms develop sustainability-driven competitive advantage through dynamic capabilities for environmental and social performance (Investigating Dynamic Capabilities for Sustainability-Driven Competitive Advantage, 2024), (McDougall et al., 2021), (Yuan & Cao, 2022). Sustainable Dynamic Capabilities: Recent research introduces the concept of "sustainable dynamic capabilities"—the ability to sense sustainability opportunities and threats, seize opportunities for green innovation and circular economy business models, and transform operations toward ecological efficiency (Investigating Dynamic Capabilities for Sustainability-Driven Competitive Advantage, 2024), (McDougall et al., 2021). These capabilities integrate environmental scanning, stakeholder engagement, and green process innovation , (Yuan & Cao, 2022). Green Sensing: Firms must sense regulatory changes, stakeholder expectations, and opportunities for sustainable innovation (Investigating Dynamic Capabilities for Sustainability-Driven Competitive Advantage, 2024), (Yuan & Cao, 2022).

This requires environmental management systems, sustainability reporting mechanisms, and engagement with diverse stakeholders including NGOs, communities, and regulators (Valle & Sarturi, 2022), (McDougall et al., 2021). Corporate social responsibility practices contribute to green sensing by building legitimacy and stakeholder relationships. Green Seizing and Transformation: Seizing sustainability opportunities involves green product development, circular business model innovation, and sustainable supply chain management (Investigating Dynamic Capabilities for Sustainability-Driven Competitive Advantage, 2024), (McDougall et al., 2021). Transformation requires reconfiguring operations for resource efficiency, renewable energy adoption, and waste reduction , (Yuan & Cao, 2022). Green dynamic capabilities mediate the relationship between CSR practices and green innovation, demonstrating the importance of capability development for translating sustainability commitments into performance. Performance Implications: Sustainable dynamic capabilities enhance both environmental performance (emissions reduction, resource efficiency) and economic performance (cost savings, reputation, market access) (Investigating Dynamic Capabilities for Sustainability-Driven Competitive Advantage, 2024), (Yuan & Cao,

2022). The relationship is mediated by green innovation and moderated by regulatory stringency and stakeholder pressure . Research proposes that corporate sustainability and sustainable dynamic capabilities are mutually reinforcing, creating virtuous cycles of capability development and performance improvement .

c. International Business and Global Strategy

DCT provides a powerful lens for understanding how multinational enterprises (MNEs) navigate the complexity of international markets and develop global competitive advantage (Sadraei et al., 2025), (Matysiak et al., 2018), (Alonso et al., 2019). International Sensing: MNEs benefit from geographic diversity in sensing, as dispersed subsidiaries provide access to diverse knowledge sources and market intelligence (Sadraei et al., 2025), (Matysiak et al., 2018). However, realizing this potential requires mechanisms for knowledge transfer and integration across borders . Born global firms face unique challenges, requiring accelerated sensing and learning to compensate for limited international experience (Ridder, 2012). International Seizing: Seizing opportunities in international markets requires capabilities in market entry mode selection, international alliance management, and cross-border resource orchestration (Sadraei et al., 2025), (Matysiak et al., 2018). The dominant logics behind seizing—shaped by internalization theory and transaction cost considerations—influence MNEs' evolutionary fitness .

Research demonstrates that capability bundling (combining multiple capabilities) enhances international performance, with innovation serving as a key mediator. International Transformation: MNEs must continuously reconfigure their international footprints, subsidiary roles, and global value chains in response to geopolitical shifts, regulatory changes, and competitive dynamics (Matysiak et al., 2018), (Alonso et al., 2019). Dynamic capabilities enable MNEs to navigate crises (e.g., Brexit, COVID-19) by rapidly adapting international strategies and operations . However, transformation is constrained by path dependencies, institutional pressures, and coordination costs across dispersed units. Contextual Configurations: Recent research emphasizes that effective international dynamic capabilities require context-specific configurations rather than universal best practices (Sadraei et al., 2025). Factors including host country institutions, cultural distance, and industry characteristics shape the optimal configuration of sensing, seizing, and transforming capabilities for international performance , (Matysiak et al., 2018).

4.4. Risk of Bias Analysis

The ROBINS-I assessment of the 20 highest-cited studies reveals important patterns regarding methodological rigor and potential biases in DCT research. Results are summarized in Table 1 and visualized in Figure 2. Table 1. Summarizes The Characteristics of Included Studies by Geographic Region, Industry Sector, and Methodological Approach.

Table 1. Characteristics of Included Studies (N=38)

Characteristic	Category	n	%
Geographic Region	Southeast Asia (Indonesia, Malaysia, Philippines, Sri Lanka)	18	47.4
	South Asia (Pakistan)	2	5.3
	Sub-Saharan Africa (Nigeria, Ghana, Uganda)	5	13.2
	Middle East & North Africa (Morocco, Turkey)	3	7.9
	Latin America (Brazil, Peru)	2	5.3
	Eastern Europe (Poland)	1	2.6
	Multi-country	7	18.4
Industry Sector	Tourism & Hospitality	8	21.1
	Manufacturing	7	18.4
	Retail & E-commerce	6	15.8
	Multiple/Cross-industry	12	31.6
	Agriculture	2	5.3

Characteristic	Category	n	%
	Technology Services	2	5.3
	Social Enterprises	1	2.6
Research Design	Quantitative (Survey-based)	26	68.4
	Qualitative (Interviews/Case studies)	8	21.1
	Mixed Methods	4	10.5
Temporal Context	Pre-pandemic (before 2020)	8	21.1
	During pandemic (2020–2023)	24	63.2
	Post-pandemic recovery (2024–2026)	6	15.8
Total		38	100.0

a. Overall Risk Profile:

- 1) Low risk: 3 studies (15%)
- 2) Moderate risk: 9 studies (45%)
- 3) Serious risk: 7 studies (35%)
- 4) Critical risk: 1 study (5%)

b. Domain-Specific Findings:

Confounding (Serious Risk in 60% of studies): The majority of empirical studies exhibit serious concerns regarding confounding. Many studies fail to adequately control for alternative explanations of performance outcomes, such as industry effects, firm size, prior performance, or environmental conditions. Cross-sectional designs dominate, making it difficult to establish temporal precedence and rule out reverse causality. For example, studies linking dynamic capabilities to innovation performance often cannot determine whether capabilities drive innovation or whether innovative firms develop stronger capabilities through learning-by-doing.

c. Selection Bias (Moderate Risk in 55% of studies):

Sample selection issues are common, particularly in case study research. Many studies examine successful firms or high-performing organizations, creating potential survivorship bias. Survey research often suffers from low response rates (20-30%) with limited analysis of non-response bias. The generalizability of findings from convenience samples of specific industries or regions is unclear.

d. Measurement of Dynamic Capabilities (Serious Risk in 50% of studies):

Operationalization and measurement of dynamic capabilities vary widely across studies, raising concerns about construct validity and comparability. Early studies often used proxy measures (e.g., R&D spending, alliance formation) that may not adequately capture the underlying capabilities. Self-report surveys are subject to common method bias and social desirability effects. Qualitative studies sometimes lack clear criteria for identifying and coding capability deployment. The development of validated scales (Kump et al., 2018) represents progress, but adoption remains limited.

e. Measurement of Outcomes (Moderate Risk in 40% of studies):

Performance measurement exhibits heterogeneity, with studies using different indicators (financial performance, innovation outcomes, competitive advantage) and timeframes. Many studies rely on perceptual measures of performance rather than objective indicators, introducing potential bias. The temporal lag between capability development and performance outcomes is rarely considered, potentially underestimating effects.

f. Missing Data (Low Risk in 70% of studies):

Most studies adequately report and handle missing data, though some survey research exhibits high non-response rates without sensitivity analysis. Selective Reporting (Moderate Risk in 45% of studies): Evidence of selective reporting is difficult to assess without access to study protocols. However, the predominance of statistically significant positive findings suggests potential publication bias. Few studies report null findings or negative results, and effect sizes are rarely reported, limiting meta-analytic synthesis.

g. Implications for Evidence Quality:

The risk-of-bias assessment reveals that while DCT research has generated substantial insights, methodological limitations constrain the strength of causal inferences. Key concerns include:

- 1) Causal Ambiguity: Cross-sectional designs and inadequate control for confounding limit ability to establish causal relationships between dynamic capabilities and performance.
- 2) Measurement Heterogeneity: Inconsistent operationalization of dynamic capabilities across studies limits comparability and cumulative knowledge building.
- 3) Generalizability: Sampling biases and context-specific studies raise questions about the generalizability of findings across industries, firm types, and geographic contexts.
- 4) Publication Bias: The predominance of positive findings suggests potential file-drawer effects, with null or negative results underrepresented in the literature.

These limitations do not invalidate DCT research but highlight the need for more rigorous designs including longitudinal studies, quasi-experimental approaches, and standardized measurement instruments. The field would benefit from pre-registration of studies, reporting of null findings, and greater transparency in data and methods.

4.5. Discussion, Limitations and Future Research Agenda

a. Theoretical Contributions and Integration

This systematic review reveals that dynamic capability theory has matured into a comprehensive framework with substantial theoretical depth and empirical support. Three decades of scholarship have produced several key theoretical contributions. Conceptual Clarity: The evolution from early, abstract formulations to Teece's tripartite sensing-seizing-transforming framework has provided operational clarity that enables empirical research (Teece, 2025), (Kump et al., 2018), (Çavuşgil & Deligonul, 2024), (Teece, 2011). This framework offers a structured approach to analyzing how firms adapt to environmental change, moving beyond the black-box problem that plagued earlier RBV research (Eisenhardt & Martin, 2000), (Bowman & Ambrosini, 2003). Multilevel Integration: The elaboration of micro-foundations has strengthened DCT by connecting individual-level cognitions and behaviors to firm-level capabilities and outcomes (Ambrosini & Altintas, 2019), (Fallon-Byrne, 2013), (Fallon-Byrne & Harney, 2017), (Suddaby et al., 2020), (Salvato et al., 2018). This multilevel perspective addresses criticisms that DCT operated at too high a level of abstraction and provides actionable insights for capability development (Gheitarani et al., 2023).

Theoretical Integration: DCT has been successfully integrated with multiple theoretical perspectives including resource-based view (Sun et al., 2024), (Parayitam & Guru-Gharana, 2010), (Bowman & Ambrosini, 2003), (Wójcik, 2015), (Kero & Bogale, 2023), organizational learning (Çavuşgil & Deligonul, 2024), (Fallon-Byrne, 2013), (Fallon-Byrne & Harney, 2017), (Chien & Tsai, 2012), ambidexterity (Popadiuk et al., 2018), (Ili & Tushman, 2008), and evolutionary economics (Teece, 2023), (Andreeva & Ritala, 2016). These integrations have enriched DCT while demonstrating its compatibility with established theories. The positioning of dynamic capabilities as higher-order capabilities that operate on ordinary capabilities and resources provides a coherent framework for understanding capability hierarchies (Teece, 2014), (Korhonen et al., 2024). Contextual Extensions: The application of DCT to contemporary challenges including digital transformation

(Fano et al., 2025), (Puterisari, 2022), (Jasim, 2025), sustainability, (Yuan & Cao, 2022), and international business (Sadraei et al., 2025), (Matysiak et al., 2018) demonstrates the framework's versatility and relevance. These extensions have generated context-specific insights while maintaining theoretical coherence with core DCT principles. However, theoretical challenges remain. The boundary between dynamic capabilities and related constructs (e.g., absorptive capacity, organizational agility, strategic flexibility) is not always clear (Arndt, 2019), (Collis & Anand, 2019). The distinction between dynamic capabilities as processes versus outcomes continues to generate debate (Eisenhardt & Martin, 2000), . The conditions under which dynamic capabilities constitute sources of competitive advantage versus necessary but insufficient conditions for survival require further theoretical development.

b. Methodological Challenges and Advances

The review identifies significant methodological progress alongside persistent challenges in DCT research. **Measurement Advances:** The development of validated scales for measuring sensing, seizing, and transforming capabilities represents a major methodological contribution (Kump et al., 2018). These instruments enable more rigorous empirical testing and facilitate comparison across studies. However, adoption of standardized measures remains limited, with many studies continuing to use ad hoc operationalizations (Vogel & Güttel, 2012). **Design Limitations:** The predominance of cross-sectional designs limits causal inference and fails to capture the temporal dynamics of capability development and deployment (Andreeva & Ritala, 2016), (Arndt, 2019). Dynamic capabilities are inherently process-oriented and unfold over time, yet few studies employ longitudinal designs that track capability evolution (Cyfert et al., 2021), . The field would benefit from panel studies, event studies, and process research that examines how capabilities develop and change over time. **Analytical Sophistication:** Recent research has employed increasingly sophisticated analytical techniques including structural equation modeling, configurational analysis, and meta-analysis (Kump et al., 2018), (Sadraei et al., 2025), (Arndt, 2019). However, many studies rely on simple correlational analyses that do not adequately address endogeneity, common method bias, or alternative explanations . Quasi-experimental designs and natural experiments could strengthen causal inference but remain rare in DCT research. **Qualitative Rigor:** Case study research has generated rich insights into capability deployment in specific contexts (Breznik & Lahovnik, 2016), (Priyono & Hidayat, 2022), (Aro & Perez, 2021). However, the rigor of qualitative research varies, with some studies lacking clear criteria for case selection, data collection, and analysis (Vogel & Güttel, 2012). Greater attention to qualitative research standards including theoretical sampling, data triangulation, and inter-rater reliability would enhance the credibility of case-based findings.

c. Contextual Contingencies

The review reveals that dynamic capabilities' development, deployment, and performance effects are highly contingent on environmental and organizational contexts. **Environmental Contingencies:** The value of dynamic capabilities varies with environmental dynamism, complexity, and munificence (Arndt, 2019), (Collis & Anand, 2019), (Correia et al., 2021). In stable environments, the costs of maintaining dynamic capabilities may exceed their benefits, while in turbulent environments they become essential for survival (Çavuşgil & Deligonul, 2024), (Martínez & Quintero, 2025). However, the relationship may be non-linear, with extreme turbulence potentially overwhelming adaptive capacities . Future research should examine threshold effects and identify the environmental conditions under which different capability configurations are optimal. **Organizational Contingencies:** Firm size, age, structure, and ownership influence capability development and deployment (Priyono & Hidayat, 2022), (Camisón-Zornoza et al., 2020), (Mansouri & Cheklekbire, 2023). SMEs face resource constraints but benefit from flexibility , . MNEs leverage geographic diversity but face coordination challenges (Matysiak et al., 2018). Family firms exhibit long-term orientation but may resist transformation . These contingencies suggest that DCT requires contextual adaptation rather than universal prescriptions.

Industry Contingencies: The nature and importance of specific dynamic capabilities vary across industries (Priyono & Hidayat, 2022), (Martínez & Quintero, 2025), (Masteika & Čepinskis, 2015), (Janssen et al., 2016). Knowledge-intensive industries prioritize sensing and learning, manufacturing emphasizes process reconfiguration, and services focus on customer co-creation, (Gligor, 2014). Industry-specific research is needed to identify the capability configurations most critical for competitive advantage in different sectors.

d. Limitations of Current Evidence

The risk-of-bias assessment and synthesis reveal several limitations in the current evidence base. **Causal Inference:** The predominance of cross-sectional designs and inadequate control for confounding limit the strength of causal claims linking dynamic capabilities to performance outcomes. While the evidence is generally supportive, alternative explanations (e.g., prior performance, industry effects, common method bias) cannot be ruled out in many studies. **Measurement Validity:** Heterogeneity in operationalizing dynamic capabilities raises questions about construct validity and comparability across studies. The reliance on self-report measures introduces potential biases including social desirability and retrospective sense-making. **Generalizability:** Sampling biases, context-specific studies, and limited replication constrain the generalizability of findings. The extent to which findings from specific industries, regions, or firm types apply more broadly remains unclear.

Publication Bias: The predominance of statistically significant positive findings suggests potential publication bias, with null or negative results underrepresented in the literature. This may lead to overestimation of effect sizes and inflated confidence in the capabilities-performance relationship. **Temporal Dynamics:** The temporal lag between capability development and performance outcomes is rarely examined, potentially leading to underestimation of effects or failure to detect delayed impacts. Longitudinal research is needed to understand how capabilities evolve and how their effects unfold over time. These limitations do not invalidate DCT research but highlight the need for more rigorous designs, standardized measurement, and transparent reporting to strengthen the evidence base.

e. Future Research Directions

Based on the systematic synthesis and risk-of-bias assessment, we propose a comprehensive research agenda organized around five priority areas.

1) Longitudinal and Process Research

The field urgently needs longitudinal studies that track dynamic capability development and deployment over time. Priority questions include:

- a) How do firms develop dynamic capabilities from initial investments to mature deployment?
- b) What are the temporal dynamics linking capability development to performance outcomes?
- c) How do capabilities evolve in response to environmental changes and organizational learning?
- d) What are the path dependencies and critical junctures in capability development trajectories?

Process research employing real-time data collection, event studies, and historical analysis can illuminate the mechanisms through which capabilities emerge and change (Cyfert et al., 2021), (Andreeva & Ritala, 2016), (Suddaby et al., 2020).

2) Causal Identification and Quasi-Experimental Designs

Strengthening causal inference requires designs that address endogeneity and confounding. Opportunities include:

- a) Natural experiments exploiting exogenous shocks (e.g., regulatory changes, technological disruptions) to identify causal effects
- b) Instrumental variable approaches to address endogeneity in capability-performance relationships

- c) Regression discontinuity designs leveraging policy thresholds or program eligibility criteria
- d) Difference-in-differences analyses comparing firms that develop capabilities to matched controls

These designs can provide more credible evidence on whether and how dynamic capabilities cause performance improvements (Arndt, 2019).

3) Standardized Measurement and Replication

The field would benefit from greater standardization in measuring dynamic capabilities. Priorities include:

- a) Wider adoption of validated scales (Kump et al., 2018) with cross-context validation
- b) Development of objective indicators of capability deployment (e.g., patent citations for sensing, alliance formation for seizing, organizational restructuring for transforming)
- c) Multi-method approaches combining surveys, archival data, and qualitative assessment
- d) Replication studies testing whether findings generalize across contexts

Standardization would enable meta-analytic synthesis and cumulative knowledge building (Arndt, 2019), (Vogel & Güttel, 2012).

4) Micro-Foundations and Multilevel Mechanisms

Further research on micro-foundations can illuminate how individual-level factors aggregate to firm-level capabilities. Key questions include:

- a) What individual cognitive capabilities, skills, and behaviors underpin sensing, seizing, and transforming?
- b) How do interpersonal interactions and team processes enable capability emergence?
- c) What organizational structures, routines, and governance mechanisms facilitate capability development?
- d) How do micro-level factors interact across levels to produce firm-level capabilities?

Multilevel research designs with data at individual, team, and organizational levels can address these questions (Fallon-Byrne, 2013), (Fallon-Byrne & Harney, 2017), (Gheitarani et al., 2023), (Salvato et al., 2018).

5) Contextual Boundary Conditions

Research should systematically examine the boundary conditions of DCT propositions. Priority areas include:

- a) Environmental contingencies: At what levels of dynamism, complexity, and munificence do dynamic capabilities become valuable? Are there threshold or curvilinear effects?
- b) Organizational contingencies: How do firm size, age, structure, and ownership moderate capability development and effects?
- c) Industry contingencies: What capability configurations are most critical in different industries?
- d) Geographic contingencies: How do institutional contexts shape capability development and deployment?

Configurational approaches (e.g., fuzzy-set QCA) can identify equifinal pathways to capability development across contexts (Sadraei et al., 2025).

6) Additional Priorities:

- a) Dark Side of Dynamic Capabilities: Research should examine potential negative consequences including excessive change, capability rigidities, and the costs of maintaining capabilities (Arndt, 2019), (Collis & Anand, 2019)
- b) Capability Lifecycles: How do capabilities emerge, mature, and potentially become obsolete? What triggers capability renewal?
- c) Interorganizational Capabilities: How do dynamic capabilities operate in networks, ecosystems, and alliances? (Bogers et al., 2019), (Mitrega & Pfajfar, 2015)
- d) Digital and AI-Enabled Capabilities: How do emerging technologies transform the nature of sensing, seizing, and transforming? (Fano et al., 2025), (Kumar et al., 2024)

Sustainability Capabilities: How can firms develop capabilities for circular economy business models and net-zero transitions? (Investigating Dynamic Capabilities for Sustainability-Driven Competitive Advantage, 2024), (Yuan & Cao, 2022).

V. Conclusion

This systematic literature review synthesizes three decades of scholarship on dynamic capability theory in strategic management, examining 73 studies selected from 938 initial records through a PRISMA 2020-compliant methodology. The review reveals DCT as a mature, theoretically rich framework with substantial empirical support, yet also identifies significant methodological limitations and opportunities for future research.

Key Findings:

- a. Theoretical Maturity: DCT has evolved from abstract conceptualizations to an operationally clear framework centered on sensing, seizing, and transforming capabilities. The elaboration of micro-foundations and integration with complementary theories has strengthened theoretical coherence (Teece, 2025), (Teece, 2014), (Teece, 2011), (Ambrosini & Altintas, 2019), (Fallon-Byrne, 2013), (Fallon-Byrne & Harney, 2017).
- b. Empirical Support: Evidence generally supports positive relationships between dynamic capabilities and performance outcomes including innovation, competitive advantage, and financial performance (Kump et al., 2018), (Breznik & Lahovnik, 2016), (Lichtenthaler & Ernst, 2021), (Lee & Yoo, 2019), (Gligor, 2014), (Fano et al., 2025). However, effects are contingent on environmental and organizational factors, and measurement heterogeneity limits comparability across studies (Arndt, 2019), (Correia et al., 2021).
- c. Methodological Challenges: Risk-of-bias assessment reveals serious concerns regarding confounding, measurement validity, and causal inference in many studies. The predominance of cross-sectional designs and inadequate control for alternative explanations constrain the strength of causal claims.
- d. Contemporary Relevance: DCT has been successfully extended to address contemporary challenges including digital transformation (Fano et al., 2025), (Puterisari, 2022), (Jasim, 2025), sustainability (Investigating Dynamic Capabilities for Sustainability-Driven Competitive Advantage, 2024), (Yuan & Cao, 2022), and international business (Sadraei et al., 2025), (Matysiak et al., 2018), demonstrating the framework's versatility and ongoing relevance.
- e. Research Gaps: Critical gaps include limited longitudinal research, inadequate attention to temporal dynamics, insufficient examination of boundary conditions, and underexplored negative consequences of dynamic capabilities.

Theoretical Implications: For strategic management theory, this review demonstrates that DCT provides a powerful lens for understanding how firms sustain competitive advantage in dynamic environments. The framework successfully addresses limitations of static RBV approaches by emphasizing processes of resource development, deployment, and reconfiguration (Teece, 2014), (Sun et al., 2024), (Bowman & Ambrosini, 2003). The integration of micro-foundations connects individual-level factors to firm-level outcomes, providing a multilevel theory of strategic adaptation (Fallon-Byrne, 2013), (Fallon-Byrne & Harney, 2017), (Salvato et al., 2018). However, theoretical development remains incomplete. The boundary between dynamic capabilities and related constructs requires further clarification (Arndt, 2019), (Collis & Anand, 2019). The conditions under which dynamic capabilities constitute sources of competitive advantage versus necessary conditions for survival need specification. The potential dark side of dynamic capabilities—including excessive change, capability rigidities, and maintenance costs—deserves greater attention.

Managerial Implications: For practitioners, the review offers evidence-based guidance on developing and deploying dynamic capabilities:

- a. **Invest in Sensing:** Develop systematic processes for environmental scanning, market intelligence, and technology monitoring. Encourage experimentation and learning from weak signals (Teece, 2025), (Çavuşgil & Deligonul, 2024), (Aro & Perez, 2021).
- b. **Strengthen Seizing:** Build decision-making capabilities, resource mobilization mechanisms, and business model innovation competencies. Overcome organizational inertia through leadership commitment and stakeholder engagement (Breznik & Lahovnik, 2016), (Priyono & Hidayat, 2022), (Anyanwu, 2016).
- c. **Enable Transformation:** Create flexible organizational structures, knowledge management systems, and governance mechanisms that balance stability with adaptability. Foster cultures that embrace change and learning (Teece, 2014), (Teece, 2018), (Fallon-Byrne, 2013).
- d. **Develop Micro-Foundations:** Invest in managerial cognition, interpersonal relationships, and organizational routines that underpin capability emergence. Recognize that capabilities are "effortful social accomplishments" requiring sustained attention (Ambrosini & Altintas, 2019), (Salvato et al., 2018).
- e. **Adapt to Context:** Tailor capability development to environmental conditions, organizational characteristics, and industry requirements. Recognize that universal best practices may not exist (Sadraei et al., 2025), (Priyono & Hidayat, 2022), (Martínez & Quintero, 2025).

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