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Organizational Adaptation to Digital Transformation: Reviewing Strategic, Cultural, and Structural Responses in Technology-Driven Business Environments

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Abstract

Digital transformation has emerged as a pervasive force reshaping how organizations operate, compete, and create value in technology-driven environments. This conceptual research agenda article synthesizes the evolution of scholarly inquiry into organizational adaptation to digital transformation, with particular emphasis on strategic reconfiguration, cultural shifts, and structural redesign. Drawing on a curated set of peer-reviewed publications, the analysis traces major theoretical milestones—from early recognition of digital disruption as a trigger for strategic responses to multidisciplinary frameworks distinguishing digitization, digitalization, and full-scale transformation. Scholarship has progressively shifted from technology adoption to holistic organizational change, highlighting the interplay among dynamic capabilities, leadership roles, and business model innovation as critical mechanisms for adaptation. Emerging phenomena such as digitally enabled agility, platform-based ecosystems, AI-augmented decision-making, and cultural ambidexterity are examined as they challenge traditional organizational paradigms. A conceptual roadmap is proposed to visualize the interconnected evolution of strategic, cultural, and structural mechanisms and their linkages to unresolved theoretical tensions. The article identifies persistent gaps, including the under-theorized role of contextual contingencies in adaptation processes and the long-term sustainability of cultural transformations. By proposing a forward-looking agenda, this work aims to guide future research toward more integrated, multilevel, and process-oriented understandings of how organizations can thrive amid continuous technological upheaval. Ultimately, successful adaptation requires not merely implementing digital tools but orchestrating profound shifts across strategy, culture, and structure to foster resilience and innovation in volatile digital economies.

Keywords Digital transformation, Dynamic capabilities, Organizational adaptation, Strategic renewal, Cultural change, Organizational agility

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Introduction

The accelerating pace of digital technologies has compelled organizations across industries to confront fundamental questions about survival and competitiveness. Digital transformation is no longer an optional initiative but a strategic imperative that disrupts established business

models, value chains, and organizational routines [1, 2]. Between 2017 and 2022, academic research proliferated to capture this phenomenon, shifting focus from isolated technology implementations to the broader organizational adaptation required for sustained performance in technology-driven environments.

Early contributions framed digital transformation as a process wherein digital technologies trigger disruptions that necessitate strategic responses from incumbent firms [1]. This perspective underscored that adaptation extends far beyond the mere adoption of new tools; it involves reconfiguring resources, processes, and mindsets to harness digital opportunities while mitigating inherent risks. Subsequent multidisciplinary reflections expanded this view by delineating three progressive stages—digitization (converting analog to digital formats), digitalization (leveraging digital technologies to enhance processes), and digital transformation (fundamentally altering business models and value creation logics) [2]. These stages highlight the escalating complexity of organizational change as firms move from operational efficiency gains toward strategic reinvention.

Scholarly attention during this period increasingly emphasized the triadic interplay of strategy, culture, and structure. Strategic adaptation involves developing digital business strategies that align technology initiatives with market opportunities and competitive positioning [3, 4]. Cultural transformation addresses the human and behavioral dimensions, requiring organizations to cultivate agility, experimentation, and digital mindsets amid resistance to change [5, 6]. Structural responses, meanwhile, encompass redesigning hierarchies, governance mechanisms, and cross-functional collaboration to support faster decision-making and innovation [7, 8].

Leadership and governance have surfaced as pivotal enablers, with chief digital officers and senior executives playing instrumental roles in orchestrating transformation efforts by bridging technical capabilities with organizational realities [9, 10]. Dynamic capabilities theory has provided a robust lens for understanding how firms sense digital opportunities, seize them through resource reconfiguration, and transform their operations for sustained advantage [5, 8, 11]. In parallel, research on digital innovation management has shown that organizations must reinvent their innovation processes in digital contexts, moving toward more open, collaborative, and ecosystem-oriented approaches [12].

Yet, despite these advances, the literature reveals uneven progress. While strategic and capability-based perspectives have matured, cultural and structural dimensions often remain undertheorized, particularly in terms of their interdependencies and long-term outcomes. Incumbent

firms, in particular, face unique challenges in balancing legacy structures with the demands of digital agility [6, 7]. At the same time, small and medium-sized enterprises (SMEs) encounter distinct resource constraints yet demonstrate remarkable adaptability when leveraging external ecosystems [13, 14].

The remainder of the article proceeds as follows. The next section traces the evolution of research, highlighting shifts in focus and theoretical contributions.

Evolution of Research on Organizational Adaptation to Digital Transformation

Research on organizational adaptation to digital transformation between 2017 and 2022 exhibits a clear trajectory from fragmented explorations of technology adoption toward more integrative, multilevel understandings of organizational change. Initial studies in the period built upon foundational concepts of digital disruption, positioning transformation as a strategic response to technological shifts that threaten existing competencies [1, 12]. Vial's comprehensive review synthesized 282 works to articulate digital transformation as a process involving disruptions that prompt organizations to reconfigure value creation paths, thereby laying a conceptual cornerstone for subsequent inquiry [1].

A pivotal milestone occurred with multidisciplinary syntheses that clarified definitional boundaries and marked the beginning of the transformation journey. Verhoef and colleagues offered a reflective framework that distinguishes digitization, digitalization, and digital transformation, and delineates growth strategies and organizational implications across strategy, marketing, and operations [2]. This work underscored that true transformation entails not incremental improvements but fundamental alterations to business models and value appropriation mechanisms. Complementary contributions from strategy and information systems scholars reinforced the need for dynamic capabilities to enable sensing, seizing, and reconfiguring in response to digital opportunities [5, 8, 11]. Warner and Wäger, for instance, conceptualized transformation as an ongoing process of strategic renewal, wherein firms continuously build capabilities to navigate volatility [5].

As the literature matured, attention broadened to include cultural and structural dimensions. Studies highlighted that

successful adaptation requires alignment between digital initiatives and organizational culture, with leadership acting as a catalyst for fostering experimentation and reducing inertia [6, 9]. Svahn and colleagues illustrated how incumbent firms like Volvo Cars managed competing concerns during digital innovation by balancing exploration and exploitation [6]. Structural adaptation received growing emphasis, with research documenting shifts toward flatter hierarchies, platform-based designs, and agile organizational forms to accommodate faster innovation cycles [7, 8].

Theoretical integration advanced through the application of established lenses such as dynamic capabilities and business model innovation to digital contexts. Teece's extension of dynamic capabilities to business models provided a foundation for understanding how firms realign resources in digital economies [15]. Empirical and conceptual work on SMEs revealed capability-building processes under resource constraints, often relying on external innovation ecosystems [13]. In larger organizations, the role of chief digital officers emerged as critical for bridging strategy and execution [9].

By the later years of the focal period, reviews and syntheses began consolidating insights while exposing gaps. Hanelt and colleagues offered a systematic overview of digital transformation's implications for strategy and organizational change, identifying pathways for future theorizing [3]. Gong and Ribiere proposed a unified definition to reduce conceptual fragmentation [16], while Nadkarni and Prügl synthesized opportunities for research across multiple levels [17]. Emerging themes included the platformization of business models [2], the integration of artificial intelligence into decision processes, and the cultivation of organizational agility as a meta-capability [5, 8, 12].

Throughout this evolution, a consistent finding is the interdependence of strategic, cultural, and structural responses. Isolated focus on any single dimension tends to yield suboptimal outcomes; holistic adaptation demands simultaneous orchestration [1, 2, 5]. However, the literature also reveals limitations: much work remains descriptive rather than process-oriented, with limited attention to temporal dynamics, contextual contingencies (e.g., industry, firm size, institutional environments), and potential dark sides such as increased inequality or ethical dilemmas in AI-driven settings. Moreover, while dynamic capabilities provide explanatory power, their micro-foundations in digital

contexts—particularly the role of individual and collective learning—require deeper elaboration [5, 11].

This evolutionary trajectory sets the stage for analyzing emerging phenomena and proposing integrative frameworks. The period 2017–2022 thus represents a formative phase in which foundational building blocks were established, yet significant theoretical and practical challenges persist, inviting more nuanced, longitudinal, and cross-level investigations.

Navigating adaptive tensions: Emerging organizational dynamics in digital transformation

Contemporary digital business environments are characterized by rapid technological convergence, ecosystem interdependence, and heightened volatility, giving rise to several emergent phenomena that reshape organizational adaptation. Digital transformation leadership has evolved from technical oversight to strategic orchestration, with leaders required to navigate ambidexterity—balancing exploitation of existing assets with exploration of novel digital opportunities [7, 9]. Cultural adaptation manifests as the cultivation of digital mindsets that embrace experimentation, psychological safety, and continuous learning, countering legacy cultures rooted in stability and hierarchy [5, 6].

Platform-based business models represent another salient dynamic, enabling organizations to shift from linear value chains to networked ecosystems where value co-creation with partners and customers becomes central [2, 15, 18]. These models demand structural flexibility, including modular architectures and permeable boundaries that facilitate rapid scaling and innovation. AI-driven decision environments further intensify adaptation pressures by augmenting human judgment with predictive analytics and automation, yet they introduce challenges related to transparency, accountability, and skill reconfiguration [12, 16]. Digitally enabled organizational agility emerges as a synthesizing capability, allowing firms to sense environmental shifts, mobilize resources swiftly, and reconfigure operations in real time [5, 8, 14].

To synthesize these dynamics and their interrelationships, **Figure 1** presents a conceptual roadmap of organizational adaptation to digital transformation.

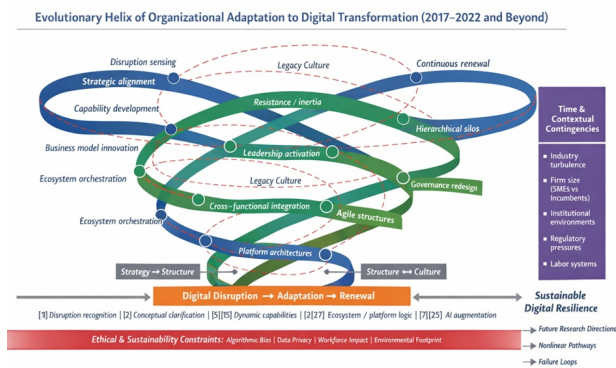


Figure 1. Conceptual roadmap of organizational adaptation to digital transformation

The roadmap is depicted as a dynamic, three-layered helix evolving (horizontal axis: 2017–2022 evolution extending into future trajectories). The central axis represents the core process of digital disruption and adaptation. Three intertwined spirals illustrate the strategic, cultural, and structural transformation mechanisms:

- **Strategic layer (outer spiral):** Begins with disruption sensing [1] and progresses through capability development [5, 11], business model reconfiguration [2, 15], and ecosystem orchestration [18]. Arrows connect to performance outcomes and feedback loops for continuous renewal.
- **Cultural layer (middle spiral):** Originates in inertia and resistance, evolving via leadership interventions [9], mindset shifts, and ambidexterity practices [6] toward a digital-first culture that supports agility. Dotted lines indicate tensions with legacy elements.
- **Structural layer (inner spiral):** Depicts movement from hierarchical silos to agile, platform-enabled designs [7, 8], with nodes representing governance mechanisms and cross-functional integration.

This integrative visualization clarifies how strategic, cultural, and structural responses co-evolve and mutually reinforce one another in technology-driven settings. It also surfaces inherent tensions—such as the paradox of stability versus flexibility—that organizations must manage. By mapping these relationships, the roadmap provides a foundation for addressing the theoretical gaps that persist in the literature and for guiding empirical and conceptual advancements.

Unresolved Theoretical Tensions: Persistent Challenges in Theorizing Organizational Adaptation

While the 2017–2022 literature has advanced understanding of strategic, cultural, and structural responses to digital transformation, several foundational theoretical tensions remain unresolved. A primary challenge lies in the fragmentation between levels of analysis. Most studies operate either at the organizational level, emphasizing dynamic capabilities and business model innovation [5, 8, 15], or at the individual or leadership level, focusing on chief digital officers and change agents [7, 9]. Few integrate micro-macro linkages, leaving open questions about how individual behaviors and team processes aggregate into firm-level adaptation outcomes. This multilevel disconnect hinders comprehensive theorizing of emergence in digital contexts.

A second tension concerns the temporal dynamics of adaptation. Although scholars acknowledge transformation as an ongoing, iterative process rather than a discrete project [1, 5], most contributions remain cross-sectional or retrospective, offering only limited insight into how it unfolds over time. Much of the literature identifies the components of adaptation—such as leadership commitment, digital capability building, organizational redesign, and cultural alignment—but pays considerably less attention to the temporal ordering through which these components emerge, interact, and consolidate. As a result, the field still lacks a sufficiently nuanced understanding of when particular interventions become consequential, how early transformation decisions shape later trajectories, and why some firms sustain momentum while others experience fragmentation or reversal. Longitudinal mechanisms—such as how initial strategic choices constrain or enable subsequent cultural shifts, or how structural redesigns feed back into capability development—are underexplored. The literature lacks robust process theories that capture the sequencing, pacing, and path dependencies inherent in digital transformation journeys [2, 4]. In particular, insufficient attention has been paid to the possibility that digital transformation may proceed through non-linear episodes characterized by acceleration, stagnation, recalibration, and institutionalization rather than through smooth evolutionary progression. Without stronger temporal theorization, existing models risk presenting

adaptation as more coherent and manageable than it is in practice.

Contextual contingencies represent a third unresolved area. While early work recognized industry differences [6], later studies rarely examine how institutional environments, regulatory pressures, or geopolitical factors moderate adaptation pathways. This omission is significant because digital transformation does not occur in an institutional vacuum; rather, it is embedded within broader political, economic, and normative systems that shape both the opportunities and constraints facing organizations. For instance, the roles of national innovation systems and varying labor market institutions in shaping cultural receptivity to digital change remain theoretically underdeveloped [3, 17]. Firms operating in highly coordinated economies may encounter different patterns of stakeholder negotiation, workforce participation, and technology legitimacy than firms in liberal market contexts. Yet, such differences are seldom integrated into mainstream transformation frameworks. Similarly, regulatory environments concerning data governance, privacy, competition, and AI deployment may substantially alter the strategic room for maneuver available to firms, influencing not only implementation choices but also the cultural narratives through which transformation is justified internally. Firm-size asymmetries are acknowledged—SMEs often leverage ecosystems for agility [13, 14] while incumbents struggle with legacy inertia [6, 7]—yet integrative frameworks that theorize these differences systematically are scarce. In particular, the literature would benefit from stronger comparative theorization explaining how resource constraints, governance complexity, installed routines, and ecosystem dependence combine differently across organizational forms. Without such contextual sensitivity, prevailing accounts risk overgeneralizing findings derived from a narrow subset of firms and institutional settings.

Ethical and sustainability dimensions constitute an emerging but undertheorized tension. As organizations embed AI-driven decision systems and platform architectures, questions arise concerning algorithmic bias, data privacy, workforce displacement, and the environmental footprint of digital infrastructures [12, 16]. Yet these issues are often treated as secondary implementation concerns rather than as central dimensions of strategic adaptation itself. Current dynamic capability models [5, 11] largely overlook these “dark sides,” treating adaptation primarily through a performance lens rather than

a responsible innovation perspective. This creates a theoretical imbalance in which firms are conceptualized as adapting successfully when they improve speed, efficiency, or responsiveness, even if heightened surveillance, exclusionary algorithmic outcomes, intensified labor precarity, or unsustainable resource consumption accompany such gains. A more comprehensive theory of digital adaptation should therefore incorporate normative and societal criteria alongside economic ones, recognizing that transformation outcomes cannot be assessed solely in terms of competitive advantage. Ethical foresight, governance accountability, and sustainability-oriented capability building may need to be theorized not as peripheral safeguards but as constitutive elements of adaptive capacity in digitally mediated environments.

Finally, the interplay between strategic, cultural, and structural mechanisms, while frequently asserted, lacks precise causal articulation. Scholars note mutual reinforcement [1, 2, 5], yet mechanisms of coevolution—such as how cultural ambidexterity enables structural modularity or how platform structures reshape strategic intent—remain conceptually vague. Existing studies often imply interdependence among these domains, but they rarely specify the directionality, intensity, or boundary conditions of such relationships. For example, it remains unclear whether strategic reorientation typically precedes cultural change, whether structural redesign can catalyze new managerial cognition, or whether cultural openness functions as a precondition for both. Likewise, there is insufficient explanation of how feedback loops operate across levels: how executive strategic narratives influence team-level experimentation, how local structural innovations scale into enterprise-wide capabilities, or how digitally enabled coordination structures gradually redefine strategic priorities. This gap limits the development of configurational theories that could explain equifinal pathways to successful adaptation. In the absence of more explicit causal modeling, the literature struggles to explain why organizations facing similar technological pressures often arrive at markedly different transformation outcomes. Advancing the field will therefore require frameworks that move beyond generic claims of alignment and instead theorize the patterned combinations, recursive interactions, and contingent sequences through which strategic, cultural, and structural elements jointly produce adaptive success or failure. **Table 1** conceptualizes digital transformation as a temporally structured process characterized by distinct phases, sequencing dynamics, and path-dependent constraints shaping adaptation outcomes.

Table 1. Process architecture of organizational adaptation: sequencing, pacing, and path dependencies in digital transformation

Phase	Dominant mechanism	Key activities	Temporal logic
Initiation	Strategic sensing	Environmental scanning and disruption recognition	Trigger
Mobilization	Leadership and cultural activation	Vision framing and change narratives	Resonance
Reconfiguration	Structural redesign	Governance changes, agile teams, and integration	Iterative cycles
Capability Building	Dynamic capabilities	Learning and resource reallocation	Cumulative
Scaling	Ecosystem orchestration	Platform integration and partnerships	Accelerated expansion
Stabilization	Cultural institutionalization	Norm embedding and routines	Gradual consolidation
Renewal	Continuous adaptation	Feedback loops, recalibration	Normative cycles

Addressing these tensions requires moving beyond descriptive syntheses toward more dialectical, processual, and configurational theorizing that embraces complexity, temporality, and normative considerations in technology-driven business environments.

Charting the Horizon: A Structured Research Agenda for Organizational Adaptation to Digital Transformation

To advance the field beyond current limitations, the following 12 research questions are proposed. Each targets a specific unresolved tension while offering pathways for theoretical and empirical progress.

Research question 1: How do individual-level digital leadership behaviors and team processes aggregate to influence firm-level strategic renewal and cultural transformation over time? This question is important because it addresses the persistent micro-macro gap, enabling the development of multilevel theories of adaptation.

Research question 2: What are the temporal sequences and pacing mechanisms through which strategic initiatives trigger cultural shifts and structural redesigns during digital transformation? Understanding process dynamics is critical for moving from static capability models to dynamic, path-dependent explanations of adaptation success and failure.

Research question 3: How do institutional and regulatory contexts moderate the relationships between dynamic capabilities, organizational culture, and structural agility in different national or sectoral settings? This addresses the under-theorized role of context, essential for generalizable yet nuanced theories of digital transformation.

Research question 4: In what ways do platform-based ecosystems reshape the boundaries of the firm and alter traditional notions of organizational identity and control? Given the rise of ecosystem orchestration [2, 18], this question is vital for updating theories of firm boundaries in digital economies.

Research question 5: How can organizations develop responsible dynamic capabilities that simultaneously pursue performance gains and mitigate ethical risks associated with AI-driven decision environments? This question integrates the emerging “dark side” of digital transformation and promotes responsible innovation perspectives.

Research question 6: What configurational combinations of strategic, cultural, and structural elements lead to equifinal pathways of successful adaptation across different firm sizes and industries? Configurational theorizing would resolve the observed interdependence while accounting for contextual asymmetries.

Research question 7: How does the introduction of AI-augmented decision-making influence power distribution, sensemaking, and learning processes within organizations undergoing digital transformation? This explores the micro-foundations of agility in AI contexts, bridging technology and organizational behavior literatures.

Research question 8: What role do digital transformation capabilities play in enabling or constraining long-term organizational resilience in the face of successive technological disruptions? Longitudinal capability development is key to understanding sustained adaptation rather than one-off change initiatives.

Research question 9: How do cultural ambidexterity mechanisms interact with structural modularity to facilitate or hinder innovation speed in platform-oriented organizations? This targets the coevolution of culture and structure, a central yet underexamined interplay.

Research question 10: In what ways can SMEs leverage external innovation ecosystems to compensate for internal resource constraints while maintaining strategic coherence during digital transformation? Addressing SME-specific pathways is crucial for inclusive theories that extend beyond large incumbent firms.

Research question 11: What are the feedback loops and vicious cycles that explain why some digital transformation initiatives result in increased organizational inertia rather than agility? Understanding failure mechanisms would enrich process theories and provide practical insights for avoiding common pitfalls.

Research question 12: How can organizations reconcile the tension between global digital standardization and local cultural adaptation in multinational transformation efforts? This question examines the dynamics of globalization versus localization, increasingly relevant in interconnected digital markets.

These questions collectively emphasize multilevel integration, process orientation, contextual sensitivity, and ethical responsibility—directions that can elevate the field toward more robust and actionable theory.

Sustaining Digital Resilience: Concluding Reflections on

Organizational Adaptation

The reviewed body of work from 2017 to 2022 demonstrates significant progress in conceptualizing strategic renewal, cultural evolution, and structural reconfiguration as interdependent responses to technological disruption. The proposed conceptual roadmap synthesizes these mechanisms into a coherent evolutionary helix, highlighting their cyclical reinforcement and pointing toward sustainable digital resilience as the outcome.

Nevertheless, the journey remains incomplete. Persistent theoretical tensions—around multilevel integration, temporal processes, contextual contingencies, ethical considerations, and configurational dynamics—underscore the need for fresh theoretical development. The structured research agenda presented here offers concrete pathways to address these gaps through targeted, high-impact inquiries.

Ultimately, thriving in technology-driven business environments demands more than technology implementation; it requires orchestrating profound, synchronized transformations across strategy, culture, and structure. Organizations that master this orchestration will not merely survive digital disruption but will shape the future contours of value creation. Scholars, in turn, are called upon to embrace complexity, longitudinal designs, and cross-disciplinary perspectives to produce knowledge that is both theoretically rich and practically relevant. As digital technologies continue to evolve at an unprecedented pace, the adaptive capacity of organizations—and the theories that explain it—will determine competitive and societal outcomes for decades to come.

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