“Dynamic capabilities as mechanisms for sustainability and innovation: A systematic literature review”

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DYNAMIC CAPABILITIES AS MECHANISMS FOR SUSTAINABILITY AND INNOVATION: A SYSTEMATIC LITERATURE REVIEW

Abstract

Contemporary organizations face mounting pressure to adapt beyond the imperatives of market competition, navigating demands that span digital disruption, sustainability transitions, and systemic institutional change. Despite the centrality of dynamic capabilities as an explanatory framework in strategic management, the literature has predominantly examined them through the lens of competitive advantage, leaving broader organizational and societal applications underexplored. This study addresses that gap by examining how the dynamic capabilities framework is theorized and applied in contexts beyond firm-level competitive advantage. A systematic literature review combined with bibliometric analysis was conducted using Scopus, covering peer-reviewed publications from 1995 to 2025. Three search strings, dynamic capabilities and technology, dynamic capabilities and ambidexterity, and dynamic capabilities and sustainability, yielded 750 articles after applying inclusion, exclusion, and quality criteria. VOSviewer was used for keyword co-occurrence mapping and cluster visualization, while qualitative thematic coding was conducted in MAXQDA to deepen interpretation. The analysis identified four structurally interconnected clusters: innovation, digital transformation, technology, and sustainability. The findings suggest that innovation is frequently treated in the literature as a key enactment mechanism of dynamic capabilities, with 691 co-occurrences and 215 overlapping coded segments. Sustainability represented the largest and most rapidly expanding domain, with 352 filtered articles, while technology functioned as an enabling layer rather than a capability in itself. These findings demonstrate that dynamic capabilities are undergoing a substantive reorientation, from performance-centric mechanisms toward integrative governance processes for navigating socio-technical complexity. Organizations should embed dynamic capabilities in innovation routines, digitally supported sensing processes, and sustainability-aligned strategic priorities.

Keywords dynamic capabilities, bibliometrics, sustainability, ambidexterity, VOSviewer, MAXQDA

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INTRODUCTION

Contemporary organizations operate in an environment marked by rapid technological disruption, escalating sustainability demands, and persistent geopolitical and economic uncertainty. In this volatile landscape, firms must continuously adapt their resource bases, innovate business models, and respond to multifaceted stakeholder expectations far beyond traditional market competition. These pressures have intensified interest in dynamic capabilities, the processes through which organizations sense opportunities and threats, seize them, and reconfigure internal and external competencies to maintain relevance and create value in turbulent conditions (Teece et al., 1997; Teece, 2007).

Despite the centrality of dynamic capabilities as an explanatory framework in strategic management, the field has predominantly examined

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them through the lens of competitive advantage and firm-level performance. Existing systematic reviews of dynamic capabilities have largely retained a competitive advantage and firm performance orientation. Gremme and Wohlgemuth (2017) re-evaluated dynamic capability literature through a systematic literature review focused on identifying discrepancies in theory and their implications for firm performance, without extending to sustainability, technology, or ambidexterity as independent thematic domains. Shiferaw and Kero (2024) similarly examined dynamic capabilities practices from a conceptual standpoint, focusing on theoretical description rather than bibliometric mapping of the field's intellectual structure. Neither review employed VOSviewer-based co-occurrence analysis to visualize thematic clusters across multiple extensions of the framework simultaneously. This study advances that body of work by conducting a PRISMA 2020-compliant systematic literature review with bibliometric analysis across three underexplored extensions: technology, ambidexterity, and sustainability, providing the first integrated mapping of how dynamic capabilities function beyond competitive advantage as a primary organizing logic.

1. LITERATURE REVIEW

The dynamic capabilities framework has emerged as one of the most influential theoretical lenses in strategic management, shaping how scholars and practitioners understand organizational adaptation in environments defined by uncertainty, disruption, and complexity. Since its foundational articulation in the late 1990s, the framework has been substantially elaborated, debated, and applied across an expanding range of organizational contexts. What began as a firm-level explanation for sustained competitive advantage has progressively been extended to address broader challenges including digital transformation, sustainability transitions, and ecosystem governance. Tracing this evolution requires an examination of the framework's theoretical foundations, its connections to adjacent constructs, and the domains into which it has increasingly been applied.

The theoretical core of dynamic capabilities rests on the distinction between ordinary and dynamic capabilities. Ordinary capabilities enable operational efficiency within existing business models. In contrast, dynamic capabilities enable organizations to sense opportunities and threats, seize them through strategic action, and transform resource configurations in response to environmental change (Teece et al., 1997; Teece, 2007). This sensing-seizing-transforming framework reflects a fundamentally processual understanding of competitive survival, one that is concerned not with static resource endowments but with the organizational routines through which those resources are continuously renewed. Barreto (2010) synthesized prior conceptualizations to identify four interrelated dimensions of dynamic capabilities: the propensity to sense opportunities and threats, the capacity to make timely decisions, the ability to innovate, and the capacity to change the resource base. This multi-dimensional framing clarified that dynamic capabilities are neither uniform nor easily observable, a recognition that has shaped subsequent empirical and theoretical work (Loureiro et al., 2021).

A central tension in the literature concerns the relationship between dynamic capabilities and competitive advantage. The original formulation by Teece et al. (1997) positioned dynamic capabilities as the primary source of sustained competitive advantage in high-velocity environments. However, subsequent scholarship has questioned whether this relationship is direct or mediated, and whether competitive advantage remains the most appropriate outcome variable. Pezeshkan et al. (2016) provided empirical evidence that the dynamic capabilities–performance relationship is positive but operates through intermediate mechanisms, suggesting that innovation and resource reconfiguration serve as the processes through which capability deployment translates into outcomes. This insight opened the door to examining dynamic capabilities not merely as drivers of competitive positioning but as enablers of broader forms of value creation.

The connection between dynamic capabilities and innovation has been particularly well established in the literature. Innovation is not simply an outcome of dynamic capabilities but the pri-

mary arena in which sensing, seizing, and transforming become empirically visible. Warner and Wäger (2018) demonstrated that firms navigating digital transformation enact dynamic capabilities through ongoing strategic renewal processes embedded in innovation activity, with successful firms treating renewal as a continuous organizational process rather than an episodic response to disruption. Stoeber and Kanbach (2025) extended this insight by showing that open innovation enhances dynamic capabilities by expanding the sensing range of organizations and distributing the risk of transformation across ecosystem partners. The implication is that innovation increasingly operates at the intersection of internal capability development and external knowledge exchange, making ecosystem participation a structural feature of dynamic capability enactment rather than a peripheral option.

The relationship between dynamic capabilities and ambidexterity has similarly attracted sustained scholarly attention. Tushman and O'Reilly (1996) introduced ambidexterity as the organizational ability to manage competing strategic logics simultaneously, balancing the exploitation of existing competencies with the exploration of new opportunities. O'Reilly and Tushman (2008) subsequently argued that ambidexterity itself constitutes a dynamic capability, positioning it as the meta-level process through which firms resolve the innovator's dilemma. Farzaneh et al. (2022) refined this relationship empirically, demonstrating that intellectual capital and innovation orientation function as boundary conditions that determine whether ambidexterity and dynamic capabilities reinforce one another. Dean (2021) contributed a micro-foundational perspective by showing how leadership behaviors at the team level foster the ambidextrous routines that underpin dynamic capability enactment. Veiga et al. (2023) further demonstrated that combining ambidexterity with digital capabilities enhances both innovation and resilience, particularly in cross-national contexts. Collectively, this body of work positions ambidexterity as a structural mechanism through which dynamic capabilities are operationalized at multiple levels of the organization.

The application of dynamic capabilities to digital transformation represents one of the most rapidly developing areas of the field. Ellström et al. (2022) identified six micro-foundational routines through which dynamic capabilities are enacted in digitally intensive organizations, including digital sensing, platform deployment, and infrastructure alignment. Zhang et al. (2025) demonstrated that digital transformation positively influences organizational resilience through innovation capability and agile response, reinforcing the view that digital investments generate adaptive value only when embedded in broader capability development processes. Pang et al. (2025) showed that specific configurations of dynamic capabilities drive business model innovation, with digital infrastructure serving as an enabling condition rather than a sufficient cause. Jabri and Lahrech (2025) further illustrated that strategic orientations mediate the relationship between adaptive marketing capabilities and ambidexterity in digital services firms, underscoring the importance of strategic intent in translating digital investment into capability development. Heikinheimo (2025) extended the framework to multi-sided platform contexts, demonstrating that dynamic capabilities foster agility, flexibility, and resilience in platform-mediated environments. Taken together, this stream of research positions digital transformation not as a technological event but as an ongoing capability-building process through which organizations continuously renew their sensing, seizing, and transforming routines.

The extension of dynamic capabilities into sustainability contexts represents the most expansive frontier of the field. Amui et al. (2017) proposed that sustainability itself should be conceptualized as a dynamic organizational capability, arguing that the ability to continuously integrate environmental and social objectives into strategic decision-making constitutes a form of organizational adaptability. Dangelico et al. (2017) examined green product innovation in manufacturing firms. They found that sustainability-oriented dynamic capabilities shape both product development processes and competitive positioning, indicating that sustainability and performance need not be treated as competing objectives. Hermundsdottir et al. (2024) demonstrated that energy transition

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among fossil fuel companies requires specific dynamic capabilities for sensing regulatory and technological shifts, seizing emerging opportunities in renewable markets, and transforming organizational structures and business models accordingly. Neri et al. (2023) examined how digital-enabled dynamic capabilities support circular economy transitions, finding that digitalization enhances the sensing and transforming dimensions of capability deployment in sustainability-oriented firms. Castiaux (2012) identified that developing dynamic capabilities to meet sustainable development challenges requires organizations to integrate social and environmental logics into their core innovation processes rather than treating them as supplementary concerns. Bari et al. (2022) further demonstrated that dynamic capabilities provide a roadmap for achieving corporate sustainability while sustaining competitive advantage, positioning the two objectives as complementary rather than contradictory. Del Rio et al. (2016) examined the drivers of eco-innovation. They found that regulatory pressure, market demand, and technological opportunity interact with organizational capabilities to shape sustainability-oriented innovation outcomes, reinforcing the view that sensing processes must incorporate environmental and institutional signals alongside market information.

The governance and ecosystem dimensions of dynamic capabilities have also received growing attention. Linde et al. (2021) developed a capability-based framework for smart city innovation initiatives, demonstrating that ecosystem orchestration requires dynamic capabilities that extend beyond individual firm boundaries to coordinate resources, knowledge, and transformation processes across multiple actors. Fan and Liu (2024) examined how relational capital in emerging economies enables dynamic capability formation under conditions of institutional change, illustrating that capability development is shaped not only by internal organizational processes but also by the quality and structure of external relationships. Wong and Ngai (2021) found that economic, organizational, and environmental capabilities interact to produce sustainability competence in the fashion industry, suggesting that multi-dimensional capability configurations are necessary for systemic value creation. Schlosser et al. (2023) demonstrated that ambidextrous strategic leadership combined with digital technology adoption positively influences the creation of shared value, positioning dynamic capabilities as a bridge between organizational adaptability and broader societal impact. Shiferaw and Kero (2024), in a systematic literature review of dynamic capabilities, viewed practices across business firms and identified persistent gaps in how sensing and transforming routines are operationalized in empirical research, particularly within complex organizational environments. Gremme and Wohlgemuth (2017) reviewed the theoretical and practical dimensions of dynamic capabilities, noting that the gap between conceptual sophistication and managerial application remains a central challenge for the field.

Prior systematic reviews of dynamic capabilities provide important but bounded contributions that this study seeks to extend. Gremme and Wohlgemuth (2017) conducted a systematic literature review focused on re-evaluating the theoretical and practical dimensions of dynamic capabilities, identifying discrepancies in how the construct is defined and applied. Their central finding was that a generalized, contingency-based version of dynamic capability theory compromises predictive precision and limits practical application. Critically, their review retained an exclusive focus on firm performance as the primary outcome variable and did not extend to technology adoption, ambidexterity, or sustainability as distinct thematic streams. No bibliometric mapping was employed, and the review covered a relatively narrow sample of seminal papers rather than a systematic large-scale dataset.

Shiferaw and Kero (2024) more recently reviewed dynamic capabilities view practices from a conceptual standpoint, covering literature published between 2019 and 2023. Their study examined how firms apply the dynamic capabilities view across strategic management contexts and concluded that studies remain scattered across countries without a unifying theoretical synthesis. However, the review was explicitly conceptual rather than bibliometric,

did not employ VOSviewer or co-occurrence mapping, and focused on general firm-level practices without distinguishing between the technology, ambidexterity, and sustainability extensions of the framework.

Taken together, these reviews confirm that the dynamic capabilities literature lacks an integrated bibliometric mapping across multiple thematic extensions simultaneously. Neither study examined how dynamic capabilities function beyond competitive advantage as an organizing logic, nor did either employ a combined systematic literature review and bibliometric methodology to visualize the intellectual structure of the field across 750 articles spanning three decades.

The literature reviewed here reveals a field that has progressively expanded its theoretical scope and empirical reach. What began as a framework for explaining competitive advantage at the firm level has evolved into a multi-domain lens for understanding how organizations navigate digital disruption, sustainability transitions, and ecosystem complexity. Innovation emerges consistently as the primary mechanism through which dynamic capabilities are enacted. At the same time, digital transformation and sustainability represent the two most significant domains into which the framework has been extended. Nevertheless, the intellectual structure of this expanding literature, including the dominant thematic clusters, the relative centrality of its core constructs, and the evolving conceptualization of dynamic capabilities beyond competitive advantage, has not been systematically mapped.

The purpose of this study is to examine how the dynamic capabilities framework is theorized and applied in contexts beyond firm-level competitive advantage, using systematic literature review and bibliometric analysis to identify the intellectual structure, dominant clusters, and evolving thematic patterns within the field from 1995 to 2025.

RQ1: What are the primary thematic clusters in the literature on dynamic capabilities beyond competitive advantage?

RQ2: How are dynamic capabilities conceptualized in contexts other than competitive advantage?

RQ3: How can dynamic capabilities be translated into actionable practices to encourage broader practitioner adoption?

2. METHOD

This review was conducted in accordance with the PRISMA 2020 guidelines (Page et al., 2021), consistent with prior systematic reviews in the field (Dhingra et al., 2024). The study adopts a deductive research approach, grounded in established theoretical frameworks on dynamic capabilities (Saunders et al., 2024, p. 53).

A systematic literature review (SLR) design was employed, combining bibliometric analysis to identify structural patterns and thematic clusters within the literature, followed by qualitative thematic analysis to interpret and contextualize these patterns. This integrative approach enables macro-level mapping of the intellectual structure of the field alongside micro-level examination of conceptual relationships, thereby strengthening analytical rigor, supporting a comprehensive understanding of the evolution of dynamic capabilities research, and facilitating the identification of theoretical and empirical gaps (Shiferaw & Kero, 2024).

Data were collected from the Scopus database, selected for its extensive coverage of peer-reviewed academic publications and suitability for systematic reviews (Kitchenham et al., 2009). The review process adhered to PRISMA 2020 guidelines (Page et al., 2021), with identification, screening, and inclusion stages documented in the PRISMA flow diagram (Figure 1) for transparency and replicability.

The search strategy utilized Boolean logic to combine search terms systematically (Saunders et al., 2024, p. 98). The final search strings, "Dynamic Capabilities AND Technology," "Dynamic Capabilities AND Ambidexterity," and "Dynamic Capabilities AND Sustainability," were designed to capture literature addressing dynamic capa-

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bilities beyond competitive advantage and to identify emerging thematic intersections. Additional keywords ("Competitive Advantage" and "Social Impact") ensured conceptual alignment. To ensure transparency and replicability, the Boolean search strings applied in Scopus are documented below. All searches were conducted in January 2025 using the Scopus advanced search interface with the TITLE-ABS-KEY field operator, restricting retrieval to title, abstract, and keyword fields.

Search String 1: TITLE-ABS-KEY("dynamic capabilities" AND technology)

Search String 2: TITLE-ABS-KEY("dynamic capabilities" AND ambidexterity)

Search String 3: TITLE-ABS-KEY("dynamic capabilities" AND sustainability)

The following filters were applied consistently across all three strings: publication year 1995–2025; language restricted to English; document types limited to articles and reviews; open-access documents only; subject areas limited to Business, Management and Accounting, Social Sciences, and Environmental Science. The article counts reported in Table 1, reflect the Scopus database as indexed in January 2025. Researchers replicating these searches at a later date should expect higher retrieval counts due to ongoing database growth and indexing updates.

Prior to applying inclusion and exclusion criteria, records retrieved across the three search strings were merged and checked for duplicate entries within Scopus. Because the three domains, technology, ambidexterity, and sustainability, conceptually overlap in parts of the literature, some duplication across strings was expected. A title-based check identified 20 duplicate records between string 1 ("dynamic capabilities" AND technology") and string 2 ("dynamic capabilities" AND ambidexterity). No duplicates were identified involving string 3 ("dynamic capabilities" AND sustainability). These 20 duplicate records were removed to ensure each article was counted once in the final dataset (Page et al., 2021).

Inclusion, exclusion, and quality criteria were applied directly in Scopus for consistency. Studies published before 1995 were excluded to align with the foundational development of the dynamic capabilities framework. Non-English publications were excluded for linguistic consistency. Only open-access studies were retained to ensure full-text accessibility for in-depth analysis, a limitation that may exclude relevant paywalled contributions and should be considered when interpreting findings.

Inclusion criteria required alignment of titles, abstracts, and keywords with the search strings, and publication in business, management, social sciences, or environmental sciences domains. A quality criterion required studies to clearly state their research design, enhancing methodological transparency and dataset robustness.

Bibliometric analysis was conducted using VOSviewer to examine keyword co-occurrence patterns and identify thematic clusters (Van Eck & Waltman, 2010; Bashar et al., 2024). This enabled visualization of the field's intellectual structure and facilitated identification of dominant research streams and conceptual linkages, providing a structural foundation for subsequent qualitative interpretation. VOSviewer was configured using the following parameters: analysis type set to co-occurrence; unit of analysis set to author keywords; counting method set to full counting to capture total co-occurrence frequencies across the dataset. The minimum number of occurrences threshold was set to 3, filtering out low-frequency terms and retaining only mainstream themes represented across multiple studies. Bibliographic data were imported directly from the Scopus-exported .bib files. Network visualization displays keywords as nodes, with node size reflecting occurrence frequency and connecting lines representing co-occurrence relationships between terms. Cluster identification was performed using VOS viewer's built-in clustering algorithm, producing the thematic clusters reported in the Results section. The resulting network visualization, overlay visualization, and full co-occurrence map are presented as Figures 2, 3, and 4, respectively, illustrating keyword clustering across the three thematic domains of technology, ambidexterity, and sustainability.

Qualitative thematic coding was conducted in MAXQDA using a deductive coding framework derived from the three search domains and the

theoretical foundations of the dynamic capabilities framework. Four primary codes were applied: dynamic capabilities, innovation, sustainability, and technology. Articles were imported as PDF documents and coded at the segment level, with each coded segment representing a thematically relevant passage. The coding process yielded 1,908 coded segments in total across the dataset: dynamic capabilities (691), innovation (603), sustainability (357), and technology (257). Co-occurrence analysis measured pairwise overlap between codes, with results reflecting the number of passages in which two codes were applied simultaneously rather than individual code frequencies. This analysis was conducted using the MAXQDA code relations browser and co-occurrence model, with results presented in Table 2 and Figure 5. The dual approach, combining individual code frequency counts with structural pairwise overlap analysis, provided convergent evidence for the thematic clusters identified through VOSviewer bibliometric mapping, strengthening the robustness and interpretive validity of the findings. MAXQDA supports structured import of bibliographic data, literature organization, and systematic coding, enhancing transparency and rigor (VERBI Software, 2022; Kuckartz & Rädiker, 2019). Through iterative coding and cross-theme analysis, nuanced relationships between dynamic capabilities and broader organizational objectives were identified, enabling deeper examination of conceptualizations of dynamic capabilities beyond traditional market competitiveness (Gremme & Wohlgemuth, 2017).

Thematic analysis deepened interpretation of the bibliometric findings by identifying recurring themes and patterns across the dataset (Saunders et al., 2024, p. 664). Themes were derived from the Scopus-indexed articles retrieved via the defined search strings.

3. RESULTS

This study employed three targeted search strings to examine dynamic capabilities across the domains of technology, ambidexterity, and sustainability. The resulting datasets reveal variation in thematic emphasis and relative maturity across these research streams. Table 1 shows the total number of records identified for each search string before applying inclusion, exclusion, and quality criteria.

Table 1. Results of the three search strings

Search term	Number of articles before criteria
Dynamic Capabilities AND Technology	407
Dynamic Capabilities AND Ambidexterity	130
Dynamic Capabilities AND Sustainability	470
Total	1007

The search string "Dynamic Capabilities AND Technology" yielded 302 articles after applying inclusion criteria, indicating a substantial body of work connecting dynamic capabilities with technological transformation. The search string "Dynamic Capabilities AND Ambidexterity" resulted in 96 articles, reflecting a more concentrated and specialized stream of inquiry. The search string "Dynamic Capabilities AND Sustainability" produced 352 articles, representing the largest dataset and signaling the rapid expansion of sustainability-oriented research.

The classification scheme followed established systematic review procedures (Saunders et al., 2024), organizing studies by national context, theoretical focus, methodology, sector, and capability dimensions. The reported numbers reflect the application of filters directly within Scopus, including publication year (post-1995), language (English), open-access status, and subject areas. Table 1 reports the raw, unfiltered search counts. Following the initial search, a title-based duplicate check was conducted across the three strings. Twenty duplicate records were identified between search string 1 and search string 2 and removed prior to screening.

The study selection process is illustrated in the PRISMA 2020 flow diagram (Figure 1), which maps the number of records identified, duplicates removed, screened, and included at each stage of the review. The diagram provides transparency into the filtering decisions made and ensures alignment with current best practices for systematic reviews. Kahale et al. (2021) have proposed adaptations of PRISMA flow diagrams for living systematic reviews, while Rethlefsen and Page (2022) discussed common challenges in applying PRISMA 2020 and PRISMA-S guidelines. This ap-

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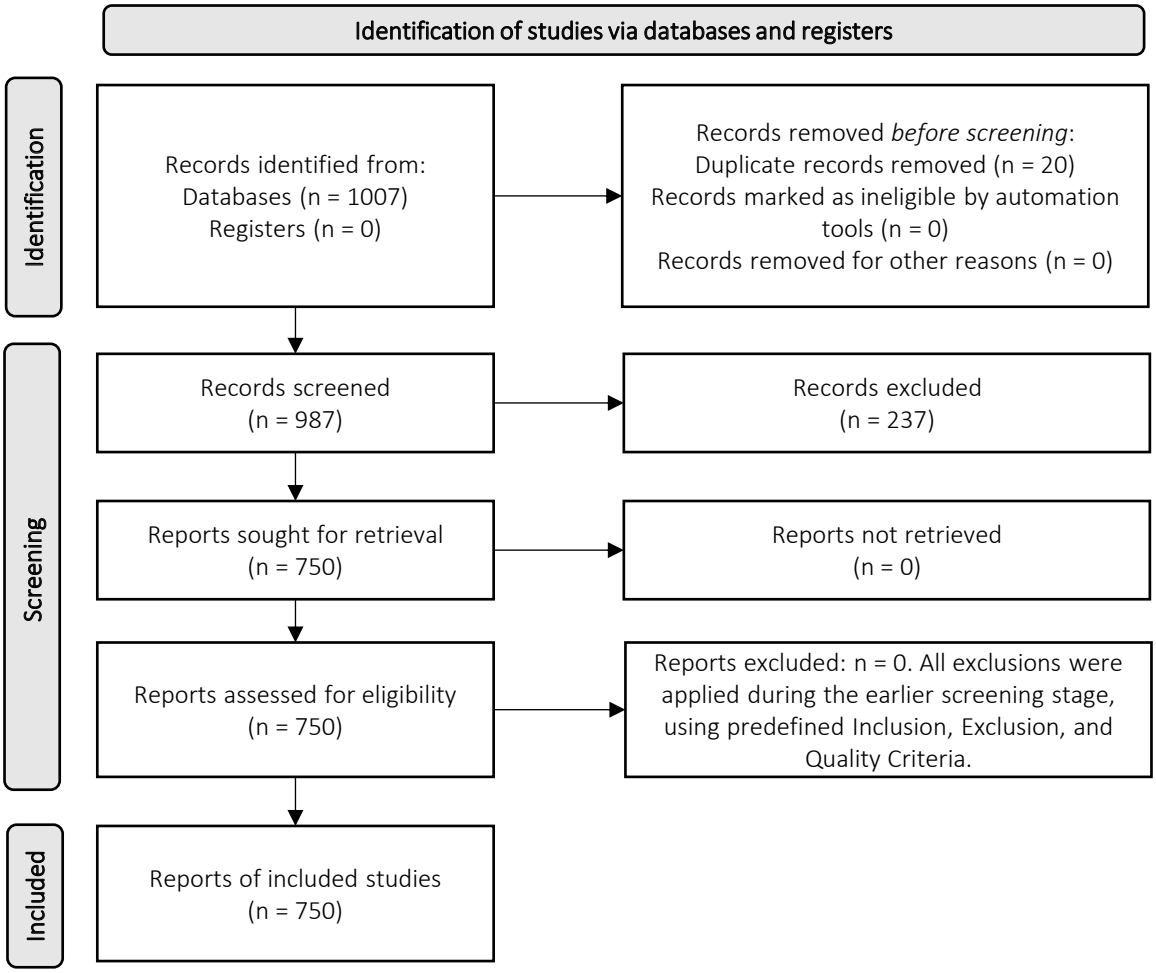

Figure 1. PRISMA flow diagram

proach follows these standards to present a clear and reproducible account of the evidence selection process. A total of 1007 studies were identified, and upon checking for duplicates, 20 were removed. That left 987 studies proceeding to the screening stage, with a total of 237 removed. Table 2 shows the number of removed records by search string.

Table 2. Results of search strings after criteria applied

Search term	Number of articles before criteria	Number of articles after criteria
Dynamic Capabilities AND Technology	407	302
Dynamic Capabilities AND Ambidexterity	130	96
Dynamic Capabilities AND Sustainability	470	352
Total	1007	750

Once the process was completed and the final number of articles qualified for further analysis, the bibliometric mapping stage began.

Bibliometric mapping identified technology as the most densely connected cluster in the co-occurrence network, with digital transformation, innovation, and technology adoption emerging as the highest-frequency co-occurring keywords. The following synthesis interprets these clusters thematically based on the studies retrieved in this stream. The technology-focused stream (302 articles) underscores the centrality of digital transformation within contemporary dynamic capabilities research. This body of literature highlights digital transformation, technological agility, and AI-enabled reconfiguration as mechanisms through which firms renew resource bases and sustain adaptability (Schilke, 2025; Teece, 2007). Ellström et al. (2022) identify six micro-foundational routines, such as digital sensing and infra-

structure alignment, that operationalize dynamic capabilities in digitally intensive contexts. Pang et al. (2025) further demonstrate how firms leverage dynamic capabilities to navigate technological disruption, reinforcing the view that continuous renewal of tangible and intangible resources is necessary in volatile environments (Patrício et al., 2019).

The ambidexterity cluster produced a tighter co-occurrence network centered on exploration, exploitation, and digitization as primary connecting nodes. The thematic interpretation draws on the 96 articles retrieved in this stream. The ambidexterity stream (96 articles) reflects a more focused inquiry into how organizations balance exploration and exploitation. Farzaneh et al. (2022) conceptualize structural ambidexterity as a capability enabling firms to reconcile competing strategic logics. Veiga et al. (2023) show that ambidexterity combined with digital capabilities enhances innovation and resilience, particularly in pre-2020 cross-national contexts. Dean (2021) contributes a micro-foundational perspective by illustrating how leadership fosters ambidextrous behaviors at the team level. Although comparatively smaller in volume, this stream offers important insights into the internal balancing mechanisms that underpin dynamic capability enactment.

Sustainability emerged as the largest node in the full co-occurrence network, co-occurring most frequently with dynamic capabilities, innovation, and sustainable development. The analysis synthesizes thematic patterns identified across the 352 articles in this stream. The sustainability stream (352 articles) represents the most expansive and rapidly developing domain. Here, dynamic capabilities are framed as mechanisms enabling sustainable innovation, circular economy transitions, and responses to climate-related challenges. The integration of sustainability into dynamic capabilities research signals a conceptual broadening of the framework from competitive positioning toward systemic transformation. The volume and diversity of this literature suggest both theoretical maturation and increasing practical relevance.

The varying number of articles retrieved across the three search strings highlights distinct levels of research emphasis and maturity in these domains. The extensive focus on sustainability and technology indicates well-established areas of inquiry where dynamic capabilities are recognized

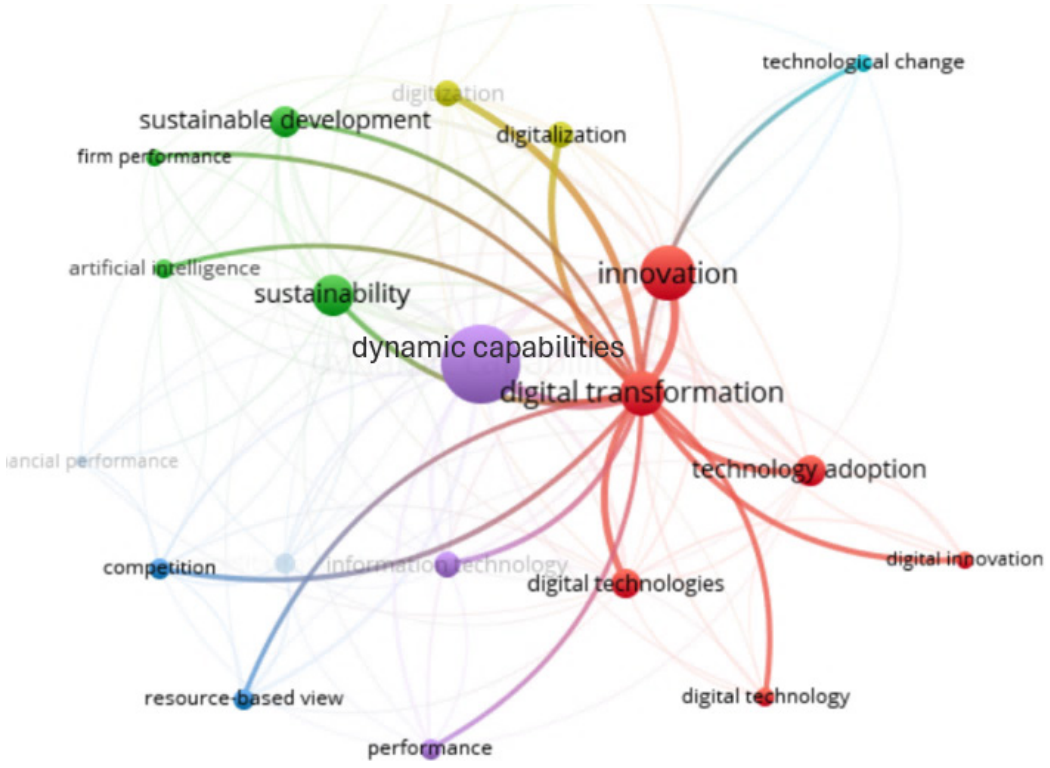

Figure 2. Cluster visualization

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as essential enablers of organizational success. On the contrary, the more limited body of ambidexterity points to an underexplored but critical area for future investigation, particularly regarding the operationalization of dynamic capabilities to manage strategic tensions.

These findings not only illuminate thematic gaps in literature but also align with this study's overarching aim to extend the scope of dynamic capabilities research beyond competitive advantage. By addressing these gaps, future studies can contribute to advancing theoretical frameworks and providing actionable insights for organizations seeking to integrate dynamic capabilities into diverse and complex strategic contexts.

The bibliometric mapping using VOSviewer reveals structurally interconnected clusters that extend dynamic capabilities beyond their original competitive advantage framing. Three dominant themes recur across the datasets: innovation, digital transformation, and sustainability.

The bibliometric analysis included the search strings "Dynamic Capabilities AND Technology," "Dynamic Capabilities AND Ambidexterity," and "Dynamic Capabilities AND Sustainability," explaining interconnected thematic clusters that extend beyond the conventional understanding of dynamic capabilities as solely a source of competitive advantage.

Across these domains, three dominant and recurrent themes emerge: innovation, digital transformation, and sustainability (Figure 2), each providing distinct yet interrelated perspectives on the conceptualization and operationalization of dynamic capabilities. While innovation has historically been pivotal in discussions of dynamic capabilities, its appearance within these clusters frequently pertains to how organizations adapt to technological advancements and cultivate sustainable practices.

Innovation consistently arises as a pivotal cluster across all three search strings, highlighting its fundamental significance within the dynamic capabilities framework (Figure 3). The analysis indicates that innovation is not merely an organizational outcome but a dynamic and iterative process, propelled by the continual restructuring of resources and competencies. Warner and Wäger (2018) demonstrate that dynamic capabilities bol-

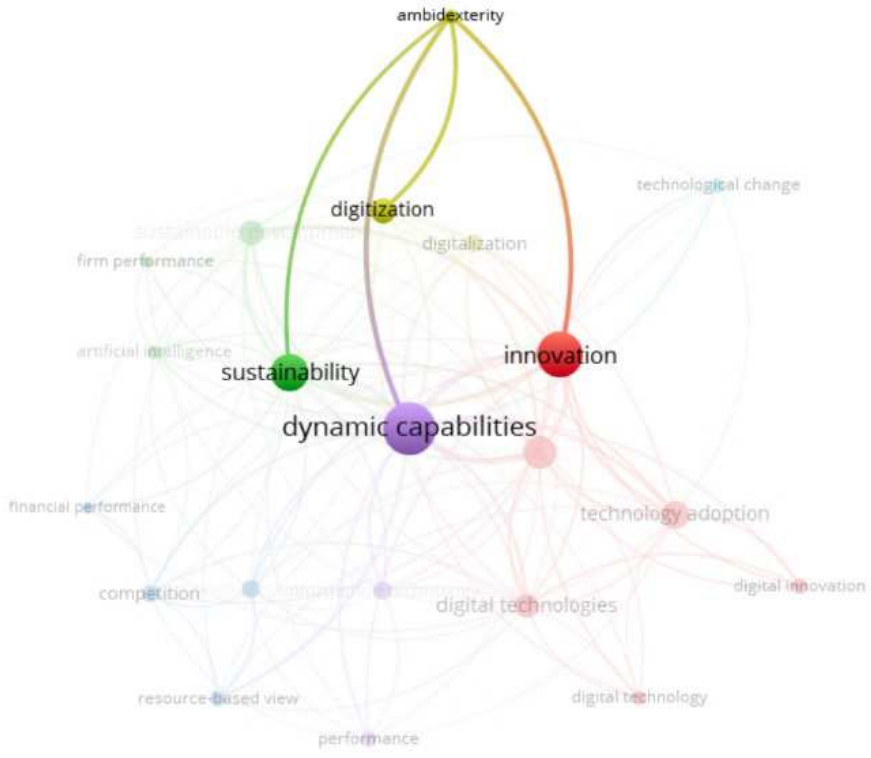

Figure 3. Innovation cluster and its ties with ambidexterity

ster strategic renewal by integrating innovation into transformation initiatives, enabling organizational adaptation and evolution.

In the context of ambidexterity, Farzaneh et al. (2022) illustrate that innovation capabilities foster both exploratory and exploitative activities, thereby augmenting adaptability within intricate and rapidly evolving environments. Similarly, Dangelico et al. (2017) emphasize innovation's role in simultaneously propelling competitiveness and addressing broader systemic challenges, such as sustainability. These findings underscore the crucial role of innovation as a mechanism through which dynamic capabilities extend beyond conventional competitive advantages to address multifaceted organizational and societal objectives.

Digital transformation has surfaced as a significant and interconnected theme across all three search strings, underscoring its pivotal function in the enactment of dynamic capabilities (Zhang et al., 2025). The data indicate that digital transformation encompasses more than the adoption of novel technologies; it necessitates a comprehensive restructuring of organizational frameworks, processes, and strategies. Warner and Wäger (2018) demonstrate that dynamic capabilities empower organizations to navigate digitally intensive environments, fostering adaptability and ongoing renewal. Jafari-Sadeghi et al. (2021) further establish that digital transformation enhances an organization's capacity to concurrently explore and exploit opportunities, a defining characteristic of ambidexterity. Digital transformation therefore acts as a catalyst for the integration of dynamic capabilities across multiple domains, cultivating the ambidextrous capabilities essential for navigating complex market dynamics (O'Reilly & Tushman, 2008; Jabri & Lahrech, 2025).

Sustainability has emerged as a key domain of dynamic capability application, as reflected in the bibliometric clusters (Figure 4). Moving beyond conventional competitive objectives, which primarily emphasize economic outcomes, sustainability necessitates a comprehensive and adaptive organizational response. Bocken and Geradts (2020) highlight the organizational changes required to integrate sustainability into core strategies, with dynamic capabilities facilitating this transformation (Hermundsdottir et al., 2024). This involves a continuous process of sensing emerging opportunities, seizing them through strategic action, and

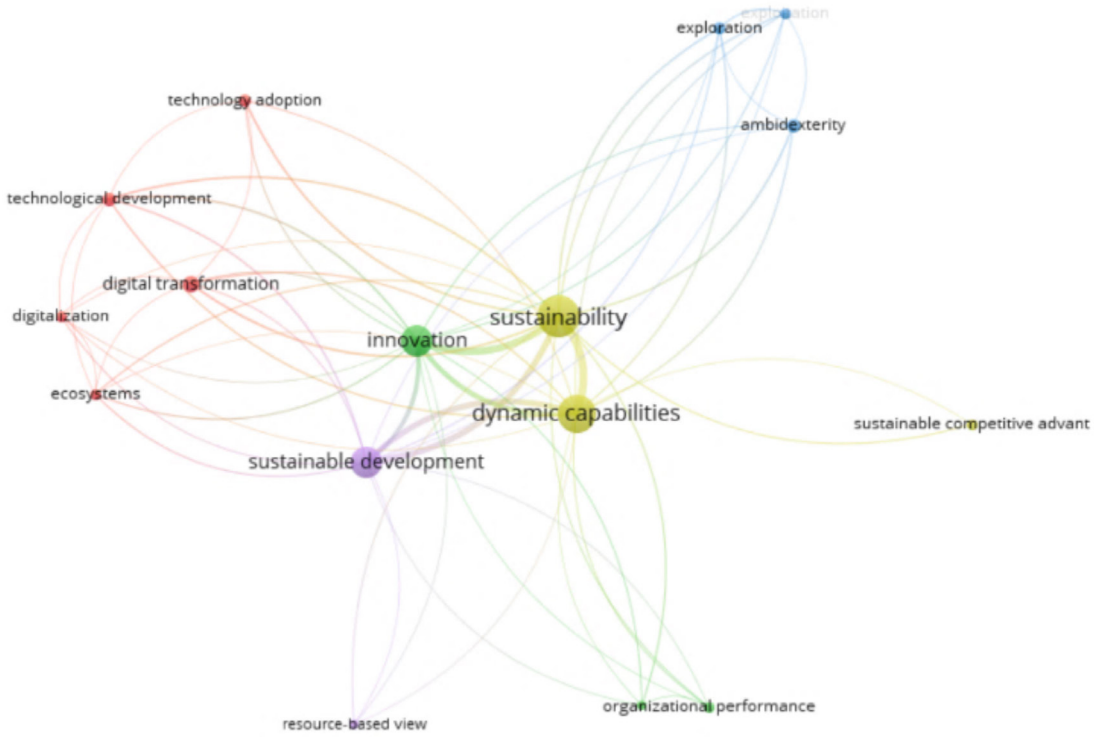

Figure 4. Sustainability cluster

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reconfiguring the organization's business model and resource base to support sustainable practices (Warner & Wäger, 2018).

The strong and continued links between sustainability, innovation, and digital transformation demonstrate how dynamic capabilities enable a comprehensive strategy for tackling environmental and societal challenges. Dangelico et al. (2017) identify innovation as a crucial means for achieving sustainability goals, while Neri et al. (2023) show how data-driven capabilities improve sustainability outcomes. Collectively, these findings position dynamic capabilities as essential for enabling sustainable practices, extending their significance far beyond traditional competitive advantages. This analysis indicates that dynamic capabilities are developing beyond their initial conceptualization, providing a flexible framework for addressing current organizational challenges. The bibliometric findings offer a basis for further theoretical development and practical investigation, especially in understanding how these interconnected clusters will shape the future of dynamic capabilities research.

The thematic analysis, conducted using MAXQDA, aims to explore how qualitative insights can complement the bibliometric findings. This approach deepens the understanding of thematic relationships among dynamic capabilities, innovation, sustainability, and technology. Both the code relations browser (Table 2) and the code co-occurrence model (Figure 5) reveal significant overlaps, thereby validating the clusters identified through VOSviewer.

The visualization presented in Figure 5 illustrates the intensity and structural configuration of thematic co-occurrences within the dataset. Most notably, dynamic capabilities and innovation co-occurred 691 times. This figure reflects the total number of coded segments in which both codes were simultaneously applied, capturing direct intersections as well as repeated co-mentions across multiple studies. The magnitude of this overlap indicates not merely frequent association, but a deeply embedded conceptual linkage within the literature.

The strength of this co-occurrence suggests that innovation is consistently positioned in the literature as a central enactment mechanism of dynamic capabilities. Rather than appearing as an adjacent construct, innovation emerges as a dominant arena through which sensing, seizing, and trans-

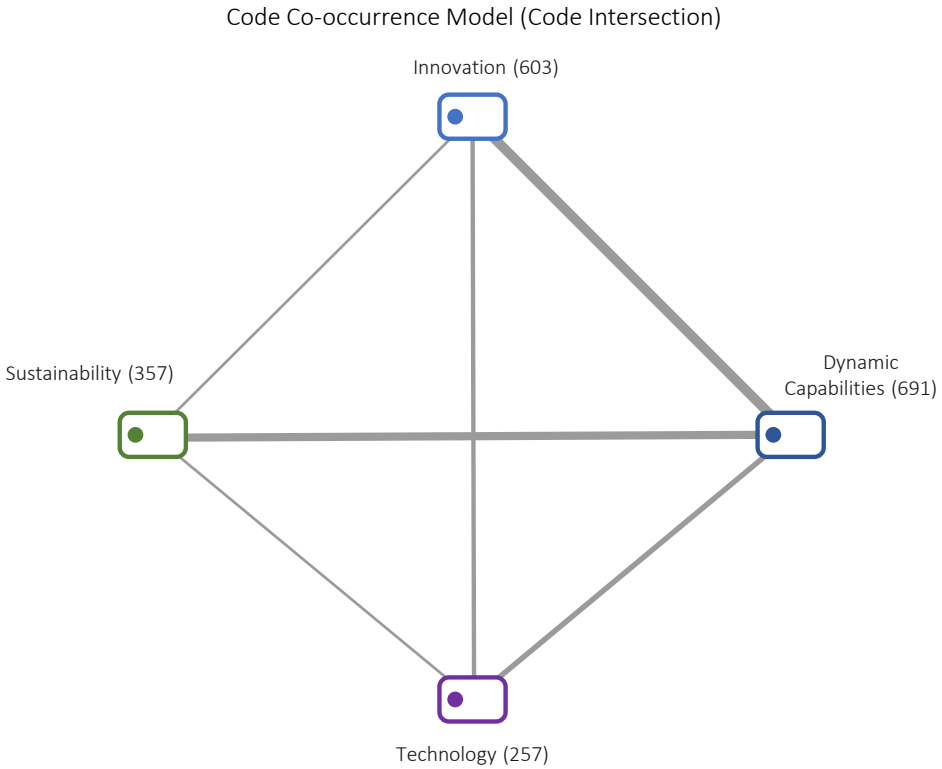

Figure 5. Code co-occurrence model (code intersection)

Table 3. Code relations browser

Code System	Dynamic Capabilities	Technology	Sustainability	Innovation
Dynamic Capabilities		56	113	215
Technology	56		34	110
Sustainability	113	34		135
Innovation	215	110	135	

forming processes are theorized and observed. This pattern aligns closely with the bibliometric clusters, which position innovation at the core of adaptability and organizational renewal.

Similarly, innovation and sustainability co-occurred 357 times, reflecting a substantial degree of thematic interdependence. This pattern suggests that sustainability-oriented transformation is most commonly articulated through innovation processes, including business model reconfiguration, green product development, and systemic redesign. Sustainability, therefore, is rarely framed as an isolated objective; instead, it is operationalized through innovation-driven capability deployment.

Table 3 presents the code relations browser results, which apply a more conservative measurement by counting strictly overlapping coded segments. While these counts are lower, for example, 215 overlaps between dynamic capabilities and innovation, they remain analytically significant. The consistency between the high-frequency co-occurrence model and the more restrictive overlap counts strengthens the robustness of the findings, indicating that the observed thematic linkages are not artifacts of coding density but reflect substantive conceptual convergence.

Technology exhibits moderate but consistent co-occurrence patterns, including 110 overlaps with innovation and 56 with dynamic capabilities. This positioning suggests that technology functions primarily as an enabling infrastructure rather than as a core conceptual driver. It facilitates and amplifies dynamic capability processes, particularly through digital sensing, platform deployment, and data-driven transformation, but is seldom framed as an autonomous capability in its own right. This interpretation is consistent with the bibliometric analysis, which situates technology as a catalytic layer that enhances, rather than defines, dynamic capability development.

Collectively, these co-occurrence patterns provide convergent quantitative and qualitative evidence that the field is structured around a layered configuration in which innovation operationalizes dynamic capabilities, sustainability provides directional orientation, and technology functions as an enabling mechanism.

4. DISCUSSION

The combined bibliometric and thematic analyses offer empirical responses to the three research questions.

RQ1: What are the primary thematic clusters in the literature on dynamic capabilities beyond competitive advantage?

The bibliometric analysis identified four dominant and structurally interconnected clusters: innovation, digital transformation, technology, and sustainability. However, the contribution of these findings lies not merely in identifying recurring themes, but in clarifying their relative centrality and functional roles within the intellectual architecture of the field.

Innovation emerges as the most central node within the co-occurrence network and demonstrates the strongest intersections in the thematic coding (691 co-occurrences and 215 overlapping coded segments). This prominence indicates that innovation functions as the principal operational manifestation of dynamic capabilities. Rather than appearing as a parallel research stream, innovation represents the primary arena in which sensing, seizing, and transforming processes become visible. Across the dataset, dynamic capabilities are enacted through business model renewal, green product development, digital service innovation, and strategic recombination of resources.

Digital transformation and technology constitute a secondary but structurally significant enabling

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layer. Although strongly connected to innovation (110 co-occurrences) and moderately linked to dynamic capabilities (56 overlaps), these domains exhibit lower centrality within the overall network, indicating that technology operates as an infrastructural and catalytic mechanism rather than a dynamic capability in itself. Sustainability represents the most rapidly expanding domain of application, with 352 filtered articles identified in the dataset. Its substantial co-occurrence with innovation (135 overlaps) suggests that sustainability is primarily addressed through innovation-driven reconfiguration of products, processes, and business models, signaling a shift in the field from competitive positioning toward systemic adaptation and societal value creation.

RQ2: How are dynamic capabilities conceptualized in contexts other than competitive advantage?

The thematic analysis reveals a discernible conceptual evolution in the way dynamic capabilities are framed within the literature. While early formulations emphasized firm performance and competitive advantage, the current body of work increasingly situates dynamic capabilities within a systemic and value-integrative logic, conceptualized as mechanisms for sustainable innovation, enablers of organizational resilience, drivers of digital adaptability, and vehicles for ecosystem orchestration. Sustainability is rarely treated as an exogenous constraint; instead, it is integrated directly into sensing and seizing activities, embedded within the cognitive and strategic routines that underpin dynamic capability deployment. Ambidexterity further emerges as a structural balancing mechanism, enabling firms to reconcile short-term efficiency with long-term sustainability and economic performance with societal value creation. Taken together, these findings indicate that dynamic capabilities are no longer conceptualized solely as instruments of competitive superiority but as integrative governance processes that enable organizations to adapt responsibly across economic, technological, and environmental domains.

RQ3: How can dynamic capabilities be translated into actionable practices to encourage broader practitioner adoption?

The findings indicate that dynamic capabilities become actionable when translated into structured organizational routines, supported by digital infrastructures, aligned with sustainability objectives, and extended into collaborative ecosystems. Innovation-oriented reconfiguration routines, including cross-functional teams, experimentation platforms, and recurring strategic renewal cycles, constitute the primary operational pathway. Digital infrastructure accelerates enactment by enhancing sensing and seizing capacities, transforming dynamic capabilities from episodic strategic responses into continuous, data-enabled adaptation mechanisms. Sustainability becomes consequential when embedded into capital allocation decisions and business model design rather than treated as a compliance obligation. Finally, ecosystem partnerships expand sensing breadth and distribute transformation risk, reflecting the increasingly collective rather than firm-centric nature of dynamic capability development (Teece, 2020).

Situating these findings within the broader literature reveals both convergence with and departure from prior work on dynamic capabilities. Earlier empirical assessments, notably Pezeshkan et al. (2016), established a positive relationship between dynamic capabilities and firm performance, yet the mediating mechanism through which this relationship operates remained underspecified in their analysis. The present study's thematic co-occurrence data, with 215 overlapping coded segments between dynamic capabilities and innovation, clarified that mechanism directly: innovation is frequently treated in the literature as the primary process through which dynamic capabilities generate value, shifting the analytical emphasis from performance outcomes to the reconfiguration processes that produce them. Rather than contradicting prior performance-oriented findings, this positions innovation as the missing intermediate step that connects capability deployment to the outcomes earlier studies measured.

This centrality of innovation is broadly consistent with Warner and Wäger's (2018) longitudinal examination of digital transformation in incumbent firms, which identified ongoing strategic renewal as the principal expression of dynamic capabilities in practice. Where their analysis re-

mained anchored in competitive repositioning as the driver of renewal, the present bibliometric and thematic evidence demonstrates that innovation increasingly serves sustainability-oriented and digitally enabled transformation goals that extend well beyond market competition. The underlying processual logic holds; what has changed is the strategic context in which that renewal is directed.

Amui et al. (2017) proposed that sustainability should be conceptualized as a dynamic organizational capability in its own right. The present findings suggest a more integrated relationship than this framing implies. Sustainability's co-occurrence with innovation (135 overlapping coded segments) and its structural position within the bibliometric clusters indicate that it functions less as an independent capability and more as a directional orientation that reshapes the priorities of sensing, seizing, and transforming activities, operating as the strategic context within which those capabilities are deployed rather than as a discrete construct alongside them.

Ellström et al. (2022) identified micro-foundational routines, including digital sensing and infrastructure alignment, as the operational expressions of dynamic capabilities in digitally intensive environments. The present study corroborates this enabling function while adding a structural qualifier: technology's overlap with dynamic capabilities (56 coded segments) is considerably lower than innovation's (215), indicating that digital infrastructure amplifies capability enactment without substituting for the organizational routines and managerial judgment that Teece (2007) identified as their essential micro-foundations.

Farzaneh et al. (2022) demonstrated empirically that dynamic capabilities and innovation ambidexterity reinforce one another, with intellectual capital and innovation orientation as key boundary conditions. The present study corroborates this nexus while extending it into sustainability and ecosystem contexts that prior firm-level ambidexterity research has not systematically examined. The ambidexterity literature within this dataset increasingly frames the exploration-exploitation balance as a mechanism for reconciling economic performance with broader societal value creation. This reorientation suggests the construct is undergoing a domain expansion parallel to dynamic capabilities more broadly.

Taken together, these comparisons indicate that prior dynamic capability research established the core theoretical architecture and validated its performance relevance at the firm level. The present study builds on that foundation by demonstrating that the field has undergone a substantive reorientation toward sustainability transition, digital ecosystem participation, and institutional complexity, contextualizing prior findings within a broader strategic environment rather than displacing them. This study contributes to dynamic capability theory in four principal ways. First, it extends the domain of dynamic capabilities beyond competitive advantage to encompass sustainability transitions and digital ecosystem participation. Second, the findings suggest that innovation is best conceptualized as the central driver of dynamic capability deployment rather than as a downstream outcome. Third, it positions sustainability not as an external constraint but as an embedded strategic objective that reshapes sensing priorities, investment decisions, and transformation pathways. Fourth, it offers a methodological contribution by combining bibliometric mapping with qualitative co-occurrence analysis, providing a replicable design for future strategic management research.

This study encountered three primary limitations. First, the exclusive use of Scopus-indexed open-access articles may omit relevant contributions from non-indexed journals or paywalled sources. Second, the absence of primary data limits contextual depth; future research incorporating organizational case studies could provide more granular insight into how dynamic capabilities are enacted in practice. Third, the mechanisms through which digital technologies specifically enable sustainability-oriented reconfiguration remain under-theorized, representing a productive avenue for future empirical investigation. Multi-level analyses integrating firm, network, and institutional perspectives would further advance understanding of how sensing, seizing, and transforming processes unfold in sustainability transitions.

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CONCLUSION

This study examined how the dynamic capabilities framework is theorized and applied in contexts beyond firm-level competitive advantage, using systematic literature review and bibliometric analysis to identify the intellectual structure, dominant thematic clusters, and evolving patterns within the field from 1995 to 2025.

The findings suggest that dynamic capabilities are evolving from performance-enhancing mechanisms toward integrative governance processes that enable organizations to navigate socio-technical complexity. The findings suggest that innovation is frequently treated in the literature as a key enactment mechanism of dynamic capabilities, while sustainability functions as a directional orientation that increasingly shapes strategic intent. Digital transformation and technological infrastructures operate as enabling layers that amplify sensing, seizing, and transforming activities. Together, these domains reveal a reconfiguration of the dynamic capability framework toward systemic value creation rather than purely competitive positioning.

Importantly, the study demonstrates that dynamic capabilities are being conceptualized not merely as tools for outperforming rivals, but as mechanisms for aligning economic objectives with environmental and societal imperatives. This reframing expands the analytical scope of dynamic capability theory from firm-level advantage to responsible adaptation within turbulent institutional environments. In doing so, the research contributes to an emerging strand of scholarship that situates strategy within broader sustainability transitions and ecosystem dynamics.

The results also highlight that operationalizing dynamic capabilities requires their embedding in innovation routines, digitally supported sensing processes, sustainability-aligned decision systems, and collaborative ecosystem structures. Dynamic capabilities become consequential when institutionalized as repeatable organizational practices rather than remaining abstract theoretical constructs.

Future research should further develop multi-level perspectives that examine how dynamic capabilities operate not only within firms but across ecosystems and regional innovation systems. Greater attention to cultural, institutional, and technological boundary conditions would refine our understanding of how sensing, seizing, and transforming processes unfold in sustainability transitions. By broadening the unit of analysis and deepening empirical investigation into digital and environmental transformations, scholars can continue to advance dynamic capability theory toward a more integrative and responsibility-oriented framework.

In sum, this study positions dynamic capabilities as a strategic architecture for adaptive renewal in an era defined by digital disruption, environmental urgency, and institutional complexity. Moving beyond competitive advantage, dynamic capabilities increasingly represent a framework for how organizations sustain relevance, legitimacy, and long-term value creation in rapidly evolving socio-economic systems.

AUTHOR CONTRIBUTIONS

Conceptualization: Kristian Pultz Schlosser.
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Methodology: Kristian Pultz Schlosser.
Project administration: Kristian Pultz Schlosser.
Resources: Kristian Pultz Schlosser.
Visualization: Kristian Pultz Schlosser.
Writing – original draft: Kristian Pultz Schlosser.
Writing – review & editing: Kristian Pultz Schlosser.

ETHICS STATEMENT

This study is based exclusively on previously published literature and does not involve human participants or primary data collection. Therefore, ethical approval from an institutional review board was not required.

All sources have been appropriately cited to ensure academic integrity and to avoid plagiarism. The review was conducted in accordance with established standards of transparency and rigor in literature-based research.

No confidential or personal data were used in this study. The author declares no conflicts of interest and no external funding was received for this research.

DECLARATION OF GENERATIVE AI IN THE WRITING PROCESS

In preparing this manuscript, the author used ChatGPT (OpenAI) to assist with language refinement. All content was critically reviewed, edited, and validated by the author, who takes full responsibility for the final version of the manuscript.

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