

Decoding organizational DNA: an integrative fingerprint framework for strategy, adaptability, and renewal

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ABSTRACT

Purpose: to develop an integrative organizational DNA fingerprint framework by synthesizing existing literature on organizational DNA.

Method: this study employed an integrative literature review of relevant studies from Scopus, Web of Science, and Google Scholar, using thematic analysis and conceptual synthesis to develop the organizational DNA fingerprint framework.

Findings: reveal that organizational DNA is a configurational and adaptive system comprising three interrelated domains: core identity, organizational architecture, and dynamic capabilities. Its strategic value depends on internal coherence and external fit, influencing strategy execution, agility, innovation, resilience, performance, sustainability, and organizational renewal.

Implications: an integrative organizational DNA fingerprint framework that clarifies the construct's dimensions, conceptual boundaries, and alignment mechanisms, providing a foundation for diagnosing organizational configurations and guiding strategic adaptation and renewal.

Originality: this study introduces the organizational DNA fingerprint framework, integrating core identity, organizational architecture, and dynamic capabilities into a configurational model based on internal coherence and external fit.



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Introduction

Organizations today operate in an increasingly volatile and complex environment shaped by technological disruption, institutional complexity, geopolitical uncertainty, changing workforce expectations, and growing demands for innovation, sustainability, and resilience (Rashed et al., 2025). In such conditions, having an appropriate strategy is necessary but no longer sufficient to ensure superior organizational performance. Organizations with comparable resources, technologies, and strategic intentions may

nevertheless produce substantially different outcomes because they differ in how authority is distributed, information is generated and shared, employees are motivated, organizational values are enacted, and capabilities are developed (Atobishi et al., 2024; Thomas, 2024). These underlying characteristics influence how organizations interpret environmental changes, coordinate collective action, make strategic decisions, implement strategies, learn, and renew themselves (Alimadadi et al., 2022). The metaphor of organizational DNA provides a useful lens for understanding these deeply embedded and interconnected characteristics (Dorson et al., 2025). Building on the foundational work of Neilson et al. (2003), organizational DNA was initially conceptualized through four interdependent elements: decision rights, information, motivators, and structure. Decision rights determine who has authority and accountability for particular decisions; information concerns the availability and flow of knowledge required for decision-making; motivators shape employee behavior and incentives; and structure defines formal roles, reporting relationships, and coordination mechanisms (Reitzig & Maciejovsky, 2015; Talukdar, 2026). Subsequent work identified seven organizational DNA profiles, resilient, just-in-time, military, passive-aggressive, fits-and-starts, overmanaged, and outgrown, illustrating how different configurations of these elements can either facilitate or constrain strategy execution (Neilson et al., 2004). Thus, organizational DNA initially offered an important mechanism-based explanation of why organizations with seemingly similar strategies can differ in their ability to execute them.

However, the contemporary organizational environment reveals a phenomenon that cannot be sufficiently explained by the original four-component architecture alone. Organizational outcomes are increasingly shaped not only by formal structures and managerial mechanisms but also by organizational identity, culture, leadership, values, knowledge, routines, human capabilities, and organizational learning (Balarezo et al., 2024). These elements evolve through organizational experience and may become deeply embedded, influencing how organizational members interpret situations and reproduce or challenge established patterns of action (Albert & Whetten, 1985; Gioia et al., 2013; Schein & Schein, 2017). Organizational imprinting may also create enduring effects of founding conditions and historical experiences on organizational structures and practices (Marquis & Tilcsik, 2013; Stinchcombe, 1965), while organizational routines can simultaneously preserve established patterns and provide sources of flexibility and change (Feldman & Pentland, 2003). At the same time, structural inertia can constrain organizational adaptation, particularly when established arrangements become difficult to alter (Hannan & Freeman, 1984). These conditions create a central research problem: if organizational DNA represents the underlying characteristics that distinguish one organization from another, what precisely constitutes that DNA, how do its elements interact, and how can an organization simultaneously preserve its distinctive identity while adapting and renewing itself? The problem is particularly important because organizational DNA has increasingly been associated with organizational performance (Nafei, 2014), strategic balance (Alshawabkeh, 2021), institutional excellence (Al-Khasabah, 2025; Elsakaan et al., 2021), corporate agility and sustainability (Elsanhawy & Badway, 2023), and organizational renewal (Madi, 2025). Nevertheless, these relationships also reveal considerable conceptual variation in how organizational DNA is defined and operationalized.

The literature therefore provides substantial evidence of the relevance of organizational DNA but remains fragmented in its conceptualization. One stream treats organizational DNA primarily as the configuration of decision rights, information,

motivators, and structure (Neilson et al., 2003, 2004), whereas other studies use the concept more broadly to encompass organizational culture, leadership, values, human resources, knowledge, innovation, and organizational capabilities (Alshawabkeh, 2021; Elsanhawy & Badway, 2023; Madi, 2025; Nafei, 2014). This conceptual expansion is valuable, but it has also blurred the boundaries between organizational DNA and related constructs such as organizational identity, organizational culture, organizational imprinting, organizational routines, organizational learning, and dynamic capabilities. Moreover, much of the empirical literature examines individual DNA dimensions as separate explanatory variables rather than considering the configuration and interaction among them. Such an approach is potentially inconsistent with the central logic of the DNA metaphor because organizational effectiveness is unlikely to emerge from isolated elements. Organizational components may generate outcomes through complementarity and alignment: greater decision authority, for example, may improve responsiveness only when employees possess adequate information, capabilities, and incentives, while an innovation-oriented culture may fail to produce innovation when formal structures punish experimentation. This configurational perspective is consistent with research emphasizing organizational fit and complementarities (Meyer et al., 1993; Milgrom & Roberts, 1995; Miller, 1986; Whittington et al., 1999). Furthermore, organizational DNA should not be understood as an entirely fixed or deterministic structure. Organizations are social systems whose members continuously interpret, reproduce, modify, and transform existing arrangements through learning, leadership, technological change, crises, restructuring, and other forms of organizational evolution (Feldman & Pentland, 2003; Levitt & March, 1988; March, 1991). Although dynamic capabilities explain how organizations sense opportunities and threats, seize opportunities, and transform their resource bases (Helfat et al., 2007; Teece, 2007; Teece et al., 1997), and organizational resilience research emphasizes the capabilities required to anticipate, cope with, and adapt to disruption (Duchek, 2020; Joussem et al., 2025), these perspectives have not yet been sufficiently integrated with organizational DNA. The research gap, therefore, lies in the absence of a coherent integrative framework that defines the conceptual boundaries of organizational DNA, explains its configurational nature, distinguishes it from adjacent constructs, and incorporates both relatively enduring organizational foundations and dynamic capabilities for adaptation and renewal. Addressing this gap, the present study introduces the concept of an organizational DNA fingerprint as a novel integrative perspective in which organizational identity-related foundations, organizational architecture, and dynamic capabilities interact to create a distinctive and evolving pattern that shapes organizational interpretation, decision-making, coordination, learning, strategic action, and renewal.

Against this background, this study aims to develop an integrative conceptual framework for understanding organizational DNA as a multidimensional and configurational phenomenon rather than as a collection of independent organizational attributes. Specifically, the study seeks to clarify the conceptual meaning and boundaries of organizational DNA; synthesize its principal dimensions across the existing literature; distinguish organizational DNA from related concepts including organizational identity, culture, imprinting, routines, organizational learning, and dynamic capabilities; and explain how the interaction and alignment among these dimensions constitute an organization's distinctive DNA fingerprint. The framework further seeks to connect organizational foundations and architectural mechanisms with dynamic capabilities that enable organizations to adapt, innovate, build resilience, and renew themselves in

changing environments. This approach extends the foundational four-component model of Neilson et al. (2003, 2004) without discarding its core insight that organizational elements are interdependent. Instead, it situates decision rights, information, motivators, and structure within a broader system that also recognizes identity, culture, values, leadership, knowledge, routines, capabilities, and organizational learning. Consistent with the principles of integrative literature review methodology, the study synthesizes and connects previously fragmented perspectives to generate a more comprehensive conceptual explanation (Snyder, 2019; Torraco, 2005). In doing so, the organizational DNA fingerprint is proposed not as a replacement for existing organizational DNA perspectives, but as an integrative extension that explains how distinctive organizational characteristics are configured, reproduced, adapted, and transformed over time.

The importance of this research lies in its potential to strengthen both the theoretical and practical understanding of why organizations respond differently to similar strategic and environmental conditions. Theoretically, the proposed organizational DNA fingerprint contributes by establishing clearer conceptual boundaries, moving the discussion from isolated organizational dimensions toward configurations and complementarities, and connecting relatively enduring organizational foundations with the dynamic capabilities required for adaptation and renewal. It thereby provides a bridge between organizational DNA research and established perspectives on identity (Albert & Whetten, 1985; Gioia et al., 2013), culture (Schein & Schein, 2017), organizational routines and learning (Feldman & Pentland, 2003; Levitt & March, 1988), resource-based advantage (Barney, 1991), configurational theory (Meyer et al., 1993), and dynamic capabilities (Teece, 2007; Teece et al., 1997). Practically, the framework can help managers diagnose the deeper organizational patterns that either enable or constrain strategy execution, agility, innovation, resilience, sustainability, and organizational renewal. Rather than focusing only on changing structures or strategies, organizations can use the fingerprint perspective to identify whether their decision rights, information systems, incentives, values, leadership, routines, knowledge, and capabilities are mutually reinforcing or contradictory. The expected contribution is therefore a more coherent foundation for diagnosing organizational distinctiveness and designing context-sensitive organizational change. Ultimately, this research argues that organizational DNA should be understood not as a static organizational blueprint, but as an evolving configurational fingerprint whose coherence, complementarities, and capacity for renewal shape how organizations convert strategy into action and sustain effectiveness under changing conditions.

Literature review

Organizational DNA: concept and evolution

Organizational DNA refers to the relatively stable yet adaptable configuration of interconnected characteristics that shapes how an organization interprets its environment, makes decisions, coordinates activities, motivates members, and implements strategy. The concept originated primarily as a managerial metaphor for explaining why organizations with similar strategies and resources may produce different outcomes. The foundational model proposed by Neilson et al. (2003, 2004) identified four core elements, decision rights, information, motivators, and structure, and demonstrated that their alignment influences organizational execution. Decision rights determine where authority and accountability reside, information concerns the

availability and flow of knowledge, motivators shape behavior through rewards and expectations, and structure establishes formal roles and reporting relationships. The model subsequently generated seven organizational profiles, resilient, just-in-time, military, passive-aggressive, fits-and-starts, overmanaged, and outgrown, illustrating how different configurations can enable or constrain execution (Neilson et al., 2004). Subsequent research has broadened the concept by incorporating culture, leadership, human resources, knowledge, innovation, and organizational capabilities, linking organizational DNA to performance, strategic balance, institutional excellence, agility, sustainability, and renewal (Al-Khasabah, 2025; Alshawabkeh, 2021; Elsakaan et al., 2021; Elsanhawy & Badway, 2023; Madi, 2025; Nafei, 2014). This evolution suggests three overlapping stages: a metaphorical stage emphasizing organizational essence and culture, an architectural stage emphasizing the four bases of execution, and an emerging strategic-configurational stage that connects organizational DNA with adaptability, innovation, resilience, sustainability, and long-term renewal. Building on these developments, this study conceptualizes organizational DNA as the historically developed and internally interconnected configuration of identity foundations, organizational architecture, and dynamic capabilities that shapes how an organization perceives, decides, coordinates, learns, and acts strategically.

Nature and defining characteristics of organizational DNA

Organizational DNA should not be interpreted as a literal or deterministic genetic code. Rather, it represents a distinctive pattern that is relatively persistent but capable of modification. Six characteristics are particularly important. First, distinctiveness emerges from an organization's history, leadership, values, knowledge, relationships, routines, and capabilities, which can create strategically valuable resources that are difficult for competitors to imitate (Barney, 1991). Second, configurational interdependence means that the effect of one organizational element depends on its fit with others; for example, decentralizing decision authority is unlikely to improve responsiveness when decision-makers lack adequate information, capabilities, or incentives (Milgrom & Roberts, 1995; Miller, 1986; Whittington et al., 1999). Third, historical embeddedness reflects the influence of founding conditions, critical events, leadership changes, and institutional pressures, consistent with imprinting theory (Marquis & Tilcsik, 2013). Fourth, organizational DNA has multilevel expression, appearing in governance and strategy at the organizational level, coordination and routines at the departmental level, and decisions and interpretations at the individual level. Fifth, its relative persistence is reproduced through selection, socialization, routines, incentives, leadership narratives, and organizational memory. Finally, organizational DNA possesses adaptive capacity because organizations can modify structures, authority, routines, knowledge, and capabilities in response to environmental change. Organizational routines may simultaneously reproduce established patterns and generate flexibility (Feldman & Pentland, 2003), while dynamic capabilities enable organizations to sense changes, seize opportunities, and reconfigure resources while maintaining sufficient continuity for coordinated action (Helfat et al., 2007; Teece, 2007; Teece et al., 1997).

Organizational DNA and adjacent constructs

Conceptual clarity requires distinguishing organizational DNA from related organizational constructs. Organizational identity concerns members' shared understanding of "who we are" and the characteristics perceived as central and

distinctive (Albert & Whetten, 1985; Gioia et al., 2013). Identity therefore constitutes an important foundation of organizational DNA but does not encompass all mechanisms through which identity is enacted. Organizational culture concerns shared assumptions, values, meanings, and patterns of interpretation (Schein & Schein, 2017), whereas organizational DNA also includes formal and capability-based mechanisms. Organizational imprinting explains how characteristics established during sensitive periods can persist over time (Marquis & Tilcsik, 2013); it is therefore a mechanism of DNA formation rather than the DNA itself. Organizational routines represent recurrent patterns of interdependent action that coordinate activities, preserve organizational memory, and enable variation and change (Feldman & Pentland, 2003), making them important manifestations and reproduction mechanisms of DNA. Organizational architecture represents the operational allocation of tasks, authority, information, and incentives, while dynamic capabilities represent the adaptive and transformational dimension through which resources and capabilities are deliberately developed and reconfigured (Teece, 2007; Teece et al., 1997). Organizational DNA can therefore be understood as a second-order configurational construct that describes how these elements combine rather than simply serving as an umbrella term for all organizational characteristics.

Table 1 conceptual boundaries between organizational DNA and adjacent constructs

Adjacent construct	Relationship with organizational DNA
Organizational identity	Provides the core basis of collective self-understanding and distinctiveness.
Organizational culture	Provides shared assumptions, values, and interpretive patterns.
Organizational imprinting	Explains historical formation and persistence.
Organizational routines	Represent behavioral manifestations and reproduction mechanisms.
Organizational architecture	Defines the allocation of tasks, authority, information, and incentives.
Dynamic capabilities	Provide the adaptive and transformational capacity of the organizational fingerprint.

Source: developed by the author based on the reviewed literature.

Theoretical foundations and configurational logic

Although organizational DNA originated primarily as a managerial metaphor, its theoretical foundations can be strengthened through several established perspectives. Organizational identity theory explains continuity and distinctiveness (Albert & Whetten, 1985), configuration theory explains the interaction and internal fit among organizational elements (Meyer et al., 1993; Miller, 1986), the resource-based view explains why historically developed combinations of resources, knowledge, routines, and capabilities may create difficult-to-imitate advantages (Barney, 1991), imprinting theory explains historical persistence (Marquis & Tilcsik, 2013), and dynamic capabilities theory explains organizational adaptation and transformation (Teece, 2007; Teece et al., 1997). Together, these perspectives support the view that organizational DNA is neither a collection of independent variables nor a static organizational blueprint. Its strategic consequences depend on the coherence and complementarity among its elements. Accordingly, the central analytical issue is not whether an organization possesses a particular structure, culture, leadership style, or capability, but how these elements interact to form a distinctive and strategically coherent configuration.

Organizational DNA fingerprint: an integrative framework

Based on the literature, this study proposes the organizational DNA fingerprint as an integrative framework comprising three interconnected domains. The first is identity foundations, including organizational purpose, values, assumptions, identity, and leadership logic, which provide meaning and direction. The second is organizational architecture, consisting of decision rights, structure, information, motivators, coordination mechanisms, and human-resource systems, which translates organizational intentions into operational arrangements. The third is dynamic capabilities, including organizational learning, knowledge integration, sensing, innovation, adaptability, and reconfiguration, which enable the organization to respond to environmental change and renew its existing configuration. The framework therefore integrates the original four bases of organizational DNA with the deeper identity and cultural foundations and the adaptive capabilities emphasized in subsequent research. It also recognizes that organizational DNA is formed, reproduced, and transformed through organizational history, recruitment, socialization, leadership, routines, incentives, critical events, and institutional pressures. Because the components are complementary, transformation of one element may require corresponding changes in others. Effective renewal consequently requires both continuity and change: preserving identity and strategic elements that remain valuable while reconfiguring structures, routines, incentives, knowledge, and capabilities that no longer fit the environment. The organizational DNA fingerprint thus provides a configurational lens for explaining not only why organizations are different, but also how their distinctive patterns can become sources of strategic alignment, adaptability, innovation, resilience, sustainability, and organizational renewal.

Method

This study employs an integrative conceptual literature review to develop and refine a comprehensive framework of organizational DNA and to propose the organizational DNA fingerprint as an extension of existing conceptualizations. An integrative review is appropriate because the literature on organizational DNA is conceptually fragmented across different streams of research and includes both foundational organizational DNA studies and adjacent perspectives on organizational identity, culture, imprinting, routines, configuration, organizational learning, and dynamic capabilities. Rather than merely summarizing existing findings, the review systematically compares and synthesizes different conceptualizations to identify areas of convergence, contradiction, conceptual ambiguity, and theoretical opportunity (Snyder, 2019; Torraco, 2005).

The literature search was conducted using Scopus, Web of Science, and Google Scholar. The search strategy combined the following core terms: “organizational DNA,” “organisational DNA,” “corporate DNA,” “organizational DNA dimensions,” “organizational DNA and strategy,” “organizational DNA and performance,” “organizational DNA and agility,” and “organizational DNA and sustainability.” These terms were used individually and in combination to identify studies addressing the conceptualization, dimensions, applications, outcomes, and evolution of organizational DNA. In addition, targeted searches were conducted for adjacent concepts, including organizational identity, organizational culture, organizational imprinting, organizational routines, organizational configuration, organizational learning, and dynamic capabilities, because these perspectives are necessary for establishing the conceptual boundaries and theoretical foundations of the proposed framework.

The selection process followed predefined inclusion and exclusion criteria. Included sources comprised peer-reviewed journal articles, scholarly books, and book chapters that explicitly define, conceptualize, operationalize, theorize, or empirically examine organizational DNA and its relationship with organizational outcomes. Foundational publications were retained regardless of publication year when they introduced influential concepts or provided important theoretical foundations for understanding organizational DNA. Studies from adjacent theoretical streams were selectively included when they contributed directly to explaining the identity, historical, configurational, operational, or adaptive dimensions of organizational DNA. Excluded sources included studies using DNA exclusively in a biological or genetic context, publications that used organizational DNA only rhetorically without substantive conceptual content, duplicate records, and publications whose bibliographic information or scholarly provenance could not be verified.

The selected literature was analyzed through thematic comparison and conceptual synthesis. Each source was examined according to its definition of organizational DNA, theoretical assumptions, dimensions or components, antecedents, mechanisms, organizational outcomes, contextual conditions, and identified limitations. Particular attention was given to whether organizational DNA was treated as a set of independent dimensions, an integrated configuration, a metaphor for organizational culture and identity, or a mechanism explaining organizational adaptation and performance. The analysis also examined how the literature distinguishes organizational DNA from related constructs and whether the proposed dimensions operate at the same or different conceptual levels.

The synthesis proceeded by identifying recurring themes, points of agreement and disagreement, conceptual overlaps, and gaps across the literature. The analysis specifically focused on three questions: (1) what constitutes organizational DNA, (2) how its elements interact and become historically embedded, and (3) how organizational DNA can simultaneously explain organizational continuity and adaptive renewal. The findings from the thematic analysis were subsequently integrated into three conceptual domains, identity foundations, organizational architecture, and dynamic capabilities, which form the basis of the proposed organizational DNA fingerprint. This synthesis allows the study to move beyond the traditional four-component model of decision rights, information, motivators, and structure while retaining its central insight regarding organizational interdependence (Neilson et al., 2003, 2004).

Finally, the review was used to construct an integrative conceptual framework and identify priorities for future research. In accordance with the principles of integrative literature review methodology, the objective was not to aggregate findings statistically but to generate a theoretically coherent explanation from diverse bodies of literature (Snyder, 2019; Torraco, 2005). The resulting framework positions organizational DNA as a second-order configurational phenomenon in which historically developed identity foundations, organizational architecture, and dynamic capabilities interact to shape organizational interpretation, decision-making, coordination, learning, strategic execution, adaptation, and renewal.

Results and discussion

Synthesis of the main findings

The integrative review produced four principal findings that provide the conceptual foundation for the proposed organizational DNA fingerprint framework. First, the literature remains conceptually fragmented. The foundational organizational DNA perspective focuses on four architectural elements, decision rights, information, motivators, and structure, whereas subsequent studies have expanded the construct to include identity, culture, leadership, human resources, knowledge, learning, innovation, and organizational capabilities (Al-Khasabah, 2025; Alshawabkeh, 2021; Elsakaan et al., 2021; Elsanhawy & Badway, 2023; Madi, 2025; Nafei, 2014; Neilson et al., 2003, 2004). Second, the explanatory value of organizational DNA appears to derive less from the independent strength of individual dimensions than from their configuration, interdependence, and complementarity. This finding is consistent with the original four-bases model and with configurational perspectives, which emphasize that organizational outcomes arise from the fit among multiple organizational elements rather than from isolated attributes (Meyer et al., 1993; Milgrom & Roberts, 1995; Miller, 1986; Neilson et al., 2003). Third, the synthesis indicates that the fragmented dimensions can be organized into three interrelated domains: core identity, organizational architecture, and dynamic capabilities. Fourth, the strategic value of this configuration is conditional on two alignment mechanisms: internal coherence among organizational components and external fit with strategy and environmental conditions. Taken together, these findings suggest that organizational DNA is better understood as an evolving, second-order configurational phenomenon than as an additive collection of independent organizational characteristics.

Strategic importance and implications of organizational DNA

The review indicates that the strategic importance of organizational DNA lies in its ability to explain persistent organizational behaviors that cannot be fully understood through formal strategy, organizational structure, or resource availability alone. Organizations may formally adopt similar strategies and structures but implement them differently because employees interpret authority, information, incentives, values, leadership expectations, and organizational routines differently. The organizational DNA perspective therefore shifts attention from what an organization formally intends to do toward how its underlying configuration enables or constrains what it can actually do. This interpretation is strongly aligned with Neilson et al. (2003), who argued that successful strategy execution requires the mutual reinforcement of decision rights, information, motivators, and structure. It is also consistent with Barney's (1991) resource-based view, in which historically accumulated resources, knowledge, relationships, routines, and capabilities may create complex combinations that are difficult for competitors to imitate.

The findings further indicate that organizational DNA can be used to diagnose systemic sources of recurring organizational problems. Slow decision-making, weak coordination, information silos, conflicting incentives, poor knowledge sharing, and implementation failures may not result from one dysfunctional component but from misalignment among several components. For example, decentralizing decision authority may improve responsiveness only when decision-makers have sufficient information, expertise, incentives, and accountability. Similarly, a strategy emphasizing innovation may fail when organizational values support experimentation rhetorically

but leadership, performance systems, or structures penalize failure. This finding reinforces the configurational logic proposed by Miller (1986), Meyer et al. (1993), Milgrom & Roberts (1995), and Whittington et al. (1999), who emphasize that organizational effectiveness depends on the coherence and complementarities among organizational elements. Thus, the organizational DNA perspective provides a stronger explanation of organizational performance when the focus moves from individual dimensions to patterns of mutually reinforcing characteristics.

The empirical literature also supports the strategic relevance of organizational DNA. Nafei (2014) found a relationship between the traditional DNA dimensions and organizational performance, while Alshawabkeh (2021) demonstrated the relevance of organizational DNA to strategic balance in commercial banks. Elsakaan et al. (2021) connected organizational DNA with institutional excellence through organizational performance, whereas Elsanhawy & Badway (2023) linked organizational DNA with corporate agility and sustainability. Al-Khasabah (2025) further examined organizational agility as a mechanism linking organizational DNA to institutional excellence. These studies collectively indicate that organizational DNA has consequences beyond internal administrative arrangements and may influence an organization's capacity to achieve strategic and institutional outcomes. However, the present synthesis adds an important qualification: organizational DNA does not create positive outcomes automatically. Its strategic value depends on the degree to which its elements are internally coherent and externally appropriate.

The implications are particularly important for strategy execution, agility, innovation, resilience, and sustainability. Strategy execution requires the alignment of decision authority, information, incentives, structures, cultural legitimacy, and employee capabilities. Agility requires not simply rapid responses but the capacity to sense changes, make timely decisions, mobilize knowledge, and reconfigure resources. Innovation similarly requires a supportive configuration of leadership, culture, information, incentives, knowledge, skills, and structural flexibility. These arguments extend the original organizational DNA model by demonstrating why its four architectural elements may be insufficient when considered independently. Resilience requires an additional adaptive dimension because organizations must anticipate, cope with, and adapt to disruptions rather than merely return to their previous state (Duchek, 2020). Sustainability also requires environmental and social considerations to be embedded in governance, decision-making, information systems, incentives, and organizational priorities. Consequently, the strategic contribution of organizational DNA lies in explaining how underlying organizational characteristics collectively translate strategic intentions into coordinated and adaptive action.

An additional implication concerns organizational change. The review suggests that structural redesign alone may change the formal appearance of an organization without fundamentally changing its characteristic behavior. Values, trust, identity, routines, leadership assumptions, and informal patterns of influence are reproduced through organizational experience and social interaction. This is consistent with Feldman & Pentland (2003), who show that routines can simultaneously reproduce organizational stability and generate variation and change. It also reflects the role of organizational identity in maintaining continuity while allowing identity to evolve through organizational interpretation and interaction (Albert & Whetten, 1985; Gioia et al., 2013). Consequently, systemic transformation requires coordinated changes across identity foundations, organizational architecture, and dynamic capabilities. The

organizational DNA fingerprint therefore helps distinguish symbolic reform from systemic organizational transformation.

The configurational logic of organizational DNA

A central finding of the synthesis is that organizational DNA should be conceptualized as a configuration rather than a set of independent variables. The traditional four-bases model already implies that decision rights, information, motivators, and structure must work together (Neilson et al., 2003, 2004). The broader literature strengthens this argument by showing that organizational characteristics operate through complementarities and patterns of fit (Meyer et al., 1993; Milgrom & Roberts, 1995; Miller, 1986; Whittington et al., 1999). Therefore, the effect of a particular DNA element depends partly on the presence and quality of other elements. Decentralization, for instance, may generate responsiveness in one configuration but confusion in another if information, accountability, skills, or coordination mechanisms are inadequate.

This configurational interpretation also provides an explanation for why organizational change initiatives frequently produce disappointing results when implemented in isolation. A change in reporting structure may not alter actual decision behavior if informal authority, incentives, information access, leadership assumptions, and routines remain unchanged. Similarly, introducing digital information systems may not improve organizational decision-making if organizational members do not trust the information, lack analytical capabilities, or continue to operate through established power relationships. The effectiveness of organizational change therefore depends on whether changes in one component are accompanied by corresponding adjustments in complementary components. This reinforces the argument that organizational DNA is an interdependent system of organizational arrangements and meanings, rather than a checklist of desirable attributes.

The concept of internal coherence is consequently central to the proposed framework. Internal coherence refers to the extent to which identity foundations, organizational architecture, and dynamic capabilities provide compatible and mutually reinforcing signals. However, coherence alone does not guarantee effectiveness. An organization can be highly coherent while pursuing a strategy that is inappropriate for its environment. This creates the second alignment mechanism, external fit, defined as the extent to which the overall organizational configuration corresponds with strategic objectives and environmental requirements. An internally coherent fingerprint without external fit may enable the organization to execute an inappropriate strategy efficiently. Conversely, an externally appropriate strategy without internal coherence may remain a strategic intention that the organization cannot effectively implement. The combined presence of internal coherence and external fit therefore provides a more complete explanation of organizational effectiveness than either mechanism alone.

The dark side and boundary conditions of organizational DNA

The findings also demonstrate that organizational DNA is not inherently positive. A strong and coherent organizational configuration can facilitate coordination, reliability, identity, and efficient execution, but excessive coherence may also generate rigidity, conformity, and resistance to contradictory information. Hannan & Freeman (1984) explain how structural inertia can preserve established arrangements even when environmental conditions change. Similarly, Levitt & March (1988) and March (1991) show how organizational learning may create competency traps when organizations

repeatedly exploit successful practices while reducing experimentation and exploration. Thus, organizational DNA can become a source of strategic inertia when historically successful patterns are preserved after their environmental relevance has declined.

This finding has important implications for the interpretation of organizational identity and culture. Strong identity can provide continuity and commitment, but it may also make alternative interpretations of the organization more difficult to accept (Albert & Whetten, 1985; Gioia et al., 2013). Likewise, cohesive cultures may facilitate coordination while simultaneously suppressing dissent or experimentation when conformity becomes valued more strongly than learning (Schein & Schein, 2017). The organizational DNA fingerprint therefore should not be assessed according to whether it is simply “strong” or “weak.” Instead, its effectiveness should be evaluated according to whether it is coherent, contextually appropriate, strategically aligned, and adaptable.

The value of different organizational configurations is also likely to vary according to environmental dynamism, organizational size and age, industry characteristics, technological intensity, regulatory conditions, national culture, and stakeholder complexity. In relatively stable environments, configurations emphasizing standardization, reliability, and control may be advantageous. In turbulent environments, however, organizations require stronger sensing, experimentation, learning, and reconfiguration capabilities. Dynamic capabilities theory provides a theoretical explanation for this requirement by emphasizing the capacity to sense opportunities and threats, seize opportunities, and transform organizational resources and capabilities (Helfat et al., 2007; Teece, 2007; Teece et al., 1997). Organizational resilience similarly depends on the ability to anticipate, cope with, and adapt to disruption (Duchek, 2020). Accordingly, there is no universally optimal organizational fingerprint. The effectiveness of a configuration is contingent on the context in which it operates.

Integrative organizational DNA fingerprint framework

The conceptual synthesis led to the development of the integrative organizational DNA fingerprint framework, which brings together the fragmented dimensions identified in the literature into a unified explanatory structure. The framework consists of four major elements: (1) formation sources, (2) three organizational DNA domains, (3) alignment mechanisms, and (4) strategic outcomes, with contextual boundary conditions and feedback processes influencing the relationships among them.

The first element comprises the sources of organizational DNA formation. Organizational fingerprints develop through founding conditions, organizational history, leadership decisions, institutional environments, organizational learning, and accumulated experience. Consistent with imprinting theory, conditions experienced during sensitive periods may create persistent organizational characteristics (Marquis & Tilcsik, 2013; Stinchcombe, 1965). Critical events such as crises, mergers, leadership succession, expansion, restructuring, privatization, and digital transformation may generate new imprints or challenge existing ones. These patterns can subsequently become embedded through recruitment, socialization, promotion, incentives, routines, narratives, and organizational memory. Organizational DNA is therefore historically embedded but not necessarily permanently fixed.

The second element consists of three interrelated domains. Core identity encompasses purpose, organizational identity, values, assumptions, and leadership logic and provides meaning, continuity, and interpretive direction. Organizational architecture encompasses decision rights, structure, information, motivators,

coordination mechanisms, and human-resource systems and translates organizational purpose and strategy into organized action. This domain incorporates the four foundational elements proposed by Neilson et al. (2003, 2004) while placing them within a broader organizational system. Dynamic capabilities encompass sensing, learning, knowledge integration, innovation, adaptability, and reconfiguration and provide the mechanisms through which the organization can modify its existing configuration in response to change (Helfat et al., 2007; Teece, 2007; Teece et al., 1997). The three domains are distinct analytically but mutually dependent in practice.

The third element consists of internal coherence and external fit, which connect the three DNA domains to organizational outcomes. Internal coherence represents the degree of compatibility and mutual reinforcement among identity, architecture, and dynamic capabilities. External fit represents the extent to which the overall fingerprint corresponds with organizational strategy and environmental requirements. These two mechanisms explain why the same organizational characteristics may produce different outcomes in different contexts. A configuration characterized by centralized decision-making, strong controls, and standardized routines may be highly effective in a stable and tightly regulated environment but problematic in an environment requiring rapid experimentation and decentralized responses. Conversely, a highly flexible configuration may facilitate innovation but create coordination problems where reliability and standardization are critical.

The fourth element consists of strategic and organizational outcomes, including strategy execution, agility, innovation, resilience, organizational performance, sustainability, and organizational renewal. These outcomes should be understood as consequences of the configuration and its alignment rather than as direct effects of individual DNA components. Organizational outcomes subsequently generate feedback that can either reinforce the existing fingerprint or trigger learning and reconfiguration. However, the effectiveness of feedback depends on leadership openness, information quality, organizational learning, and the willingness to question established assumptions. This feedback mechanism connects organizational DNA with the dynamic process of organizational renewal.

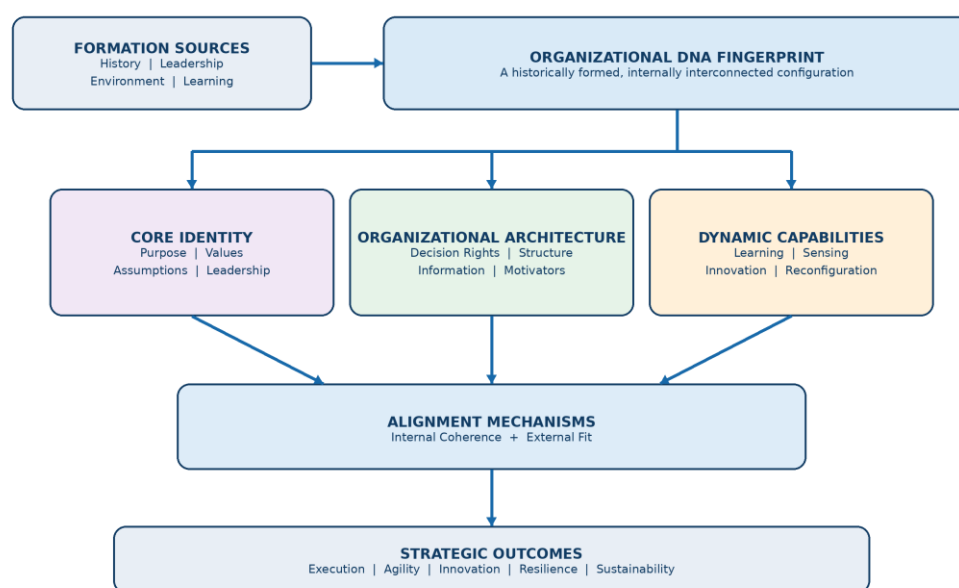


Figure 1 integrative organizational DNA fingerprint framework
Source: developed by the author based on the integrative conceptual synthesis.

The framework extends the traditional organizational DNA model by positioning decision rights, information, motivators, and structure within the broader organizational architecture domain and connecting them with core identity and dynamic capabilities. Its principal contribution is therefore not simply the addition of more dimensions but the reorganization of existing perspectives into a theoretically differentiated configuration. It distinguishes the constitutive elements of organizational DNA from its formation sources, alignment mechanisms, contextual boundary conditions, and outcomes. This distinction addresses a major conceptual weakness in the existing literature, in which culture, agility, innovation, and performance have sometimes been treated simultaneously as dimensions and outcomes of organizational DNA.

Overall, the framework proposes that organizational DNA influences strategic outcomes primarily through configuration and alignment, rather than through isolated direct effects. Its strategic value depends on the interaction among identity foundations, organizational architecture, and dynamic capabilities; the degree of internal coherence among these domains; their external fit with strategy and environmental conditions; and the organization's ability to learn and renew its configuration. The organizational DNA fingerprint therefore provides a conceptual explanation for how organizations can maintain continuity while simultaneously developing the capacity to adapt, innovate, and renew themselves.

Research gaps and future research

The integrative review identifies several theoretical and methodological gaps that provide directions for future research. The first concerns the conceptual definition and boundaries of organizational DNA. Despite increasing scholarly attention, there remains no universally accepted definition that clearly distinguishes constitutive elements from antecedents and outcomes. Future research should explicitly separate what organizational DNA is from what forms it and what results from it. This distinction is necessary to avoid conceptual circularity, particularly when constructs such as culture, innovation, agility, and performance are treated simultaneously as components and consequences of organizational DNA.

The second gap concerns measurement. Much of the empirical research has relied on additive scales derived from the four traditional dimensions. Although such measures are useful for managerial diagnosis, they may not adequately capture the configurational logic proposed in this study. Future research should develop and validate multidimensional measures covering the three domains of identity, architecture, and dynamic capabilities. Configurational methods, including cluster analysis, latent profile analysis, fuzzy-set qualitative comparative analysis, and pattern-matching case studies, may be more appropriate for identifying different organizational fingerprints and examining how alternative configurations produce similar or different outcomes.

Third, future research should adopt more longitudinal and process-oriented designs. Most existing studies provide cross-sectional evidence, which limits understanding of how organizational fingerprints emerge, persist, and change. Longitudinal studies could examine organizational DNA during founding, growth, crisis, merger, leadership succession, restructuring, and digital transformation. Such research could identify which components change first, how resistance emerges, how complementary elements are reconfigured, and when new practices become embedded through routines and organizational learning. This direction is particularly consistent

with research emphasizing organizational routines as both sources of stability and mechanisms of change (Feldman & Pentland, 2003).

Fourth, greater attention is required to the multilevel nature of organizational DNA. Organizational fingerprints may be interpreted and enacted differently by senior leaders, middle managers, professional employees, teams, and frontline personnel. Differences across levels may represent fragmentation, subcultures, competing interpretations, or deliberate adaptation to different operational requirements. Future research should therefore examine whether organizations possess a single dominant fingerprint or multiple nested or competing fingerprints across organizational units.

Fifth, the contextual boundaries of the framework require empirical validation. Comparative research should examine public, private, nonprofit, and hybrid organizations and consider the effects of regulatory intensity, national institutions, organizational age, size, industry turbulence, technology, and stakeholder complexity. Public organizations are particularly important because political accountability, legal constraints, professional norms, and public-service values may generate organizational configurations that differ substantially from those observed in private-sector organizations. Cross-national research is also needed to determine whether existing organizational DNA models are broadly generalizable or reflect the institutional assumptions of the contexts in which they were developed.

Sixth, digital transformation and artificial intelligence represent an emerging area for organizational DNA research. Digital technologies can fundamentally alter information flows, decision rights, employee capabilities, accountability, coordination, and organizational learning. At the same time, technology may simply digitize existing structures and routines or reinforce existing power relationships. Future research should therefore investigate the conditions under which digital transformation genuinely changes organizational DNA and when it merely reproduces an existing fingerprint in digital form.

Finally, the dark side and nonlinear effects of organizational DNA require systematic empirical investigation. Strong identity and cultural coherence may increase commitment while suppressing dissent; strong routines may improve reliability while limiting experimentation; and highly coherent configurations may enhance execution while reducing adaptability. Future studies should therefore examine nonlinear and contingent relationships among DNA coherence, adaptability, organizational performance, and renewal. In particular, research should investigate whether there is an optimal level of coherence beyond which additional alignment produces diminishing or negative returns.

Taken together, these research gaps indicate that organizational DNA scholarship should move beyond examining the isolated net effects of individual dimensions toward a configurational, longitudinal, multilevel, and context-sensitive research agenda. The organizational DNA fingerprint framework proposed in this study provides a conceptual foundation for that agenda by integrating historical formation, identity, organizational architecture, dynamic capabilities, internal coherence, external fit, contextual conditions, and strategic outcomes. Its central proposition is that organizational DNA creates strategic value not because particular characteristics are universally desirable, but because coherent and contextually appropriate configurations enable organizations to execute strategy while retaining sufficient adaptive capacity to learn, innovate, respond to disruption, and renew themselves.

Conclusions

This integrative conceptual literature review concludes that organizational DNA is best understood as a historically developed, interconnected, and adaptive configuration rather than as a collection of independent organizational characteristics. The review identified substantial conceptual fragmentation in previous studies, ranging from the traditional four dimensions of decision rights, information, motivators, and structure to broader interpretations incorporating identity, culture, leadership, knowledge, learning, innovation, and organizational capabilities. To reconcile these perspectives, this study proposes the organizational DNA fingerprint, comprising three interrelated domains: core identity, organizational architecture, and dynamic capabilities. The findings further establish that organizational DNA generates strategic value through two central mechanisms: internal coherence among its components and external fit with organizational strategy and environmental conditions. Thus, organizational DNA can support strategy execution, agility, innovation, resilience, performance, sustainability, and renewal, but its effects are neither automatic nor universally positive. High coherence can also create rigidity, conformity, and resistance to change when established configurations become poorly aligned with environmental demands.

The principal contribution of this study is therefore conceptual integration and clarification. The proposed fingerprint framework extends the original organizational DNA model by embedding the four traditional architectural dimensions within a broader configuration of identity foundations and dynamic capabilities. It also establishes clearer conceptual boundaries between organizational DNA and related constructs such as organizational identity, culture, imprinting, routines, organizational architecture, and dynamic capabilities. More importantly, the framework distinguishes between formation sources, constitutive dimensions, alignment mechanisms, contextual conditions, and organizational outcomes, thereby reducing the risk of conceptual overlap and circularity in future research. The framework also contributes to strategic management by explaining why organizations with similar resources, technologies, or strategies may produce different outcomes: their underlying organizational fingerprints may differ in how authority, information, incentives, identity, knowledge, and adaptive capabilities are configured. Nevertheless, this study is subject to several limitations. As an integrative conceptual review, it does not empirically test the proposed relationships or establish causal effects. The reviewed literature is also heterogeneous in its definitions, measures, contexts, and methodological approaches, which limits direct comparability across studies. In addition, the proposed three-domain framework remains conceptually developed rather than empirically validated, and the relative importance of each domain may vary across organizational and institutional contexts.

Future research should therefore empirically validate and refine the organizational DNA fingerprint framework using configurational, longitudinal, multilevel, and comparative research designs. Rather than relying primarily on additive measures and independent net effects, future studies could employ cluster analysis, latent profile analysis, fuzzy-set qualitative comparative analysis, or case-based configurational methods to identify alternative organizational fingerprints and examine their relationships with strategic outcomes. Longitudinal studies are particularly important for examining how organizational fingerprints are formed, reproduced, disrupted, and renewed during organizational growth, crisis, mergers, leadership succession, restructuring, and digital transformation. Future research should also develop and validate measurement instruments that capture the three domains of

identity, architecture, and dynamic capabilities while testing the roles of internal coherence and external fit as alignment mechanisms. Comparative studies across public, private, nonprofit, and hybrid organizations, as well as across different countries, industries, organizational sizes, and levels of environmental dynamism, would help establish the boundary conditions of the framework. Finally, emerging technologies, particularly digital transformation and artificial intelligence, should be examined as potential forces that either transform organizational DNA or merely reproduce existing structures, routines, and power relationships. Such research would provide the empirical evidence necessary to validate, modify, or challenge the organizational DNA fingerprint framework and advance understanding of how organizations can preserve strategic coherence while developing the capacity for continuous adaptation and renewal.

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