Received: 28 November 2022 | Revised: 6 March 2023 | Accepted: 8 March 2023

DOI: 10.1002/mde.3866

RESEARCH ARTICLE

WILEY

Microfoundations of innovation: A dynamic CEO capabilities perspective

Tim Heubeck | **Reinhard Meckl**

Faculty of Law, Business, and Economics, Chair of International Management, University of Bayreuth, Bayreuth, Germany

Correspondence
Tim Heubeck, Faculty of Law, Business, and Economics, Chair of International Management, University of Bayreuth, Universitätsstrasse 30, Bayreuth 95447, Germany.
Email: tim.heubeck@uni-bayreuth.de

Funding information
The authors received no external funding for this research.

Abstract

Although sustainable competitive advantages in today's hypercompetitive economy call for strong management skills, the literature lacks a holistic understanding of the specific capabilities chief executive officers (CEOs) utilize to drive innovation. This article derives the dynamic CEO capabilities (DCCs) concept to examine whether CEOs' individual-level DCCs facilitate firm-level innovation and proposes that CEO power moderates this relationship. Results from a longitudinal sample of S&P 900 manufacturing firms confirm that strong DCCs drive innovation. Further, powerful CEOs can exert a more significant influence on firms' innovativeness through their DCCs, yet this effect is contingent on the type of CEO power.

1 | INTRODUCTION

In today's era of ubiquitous hypercompetition, where Schumpeter's (1994) notion of a "gale of creative destruction" (p. 84) pertains, sustainable competitive advantage is bygone (D'Aveni, 1994; Wiggins & Ruefli, 2005). Highly volatile, uncertain, complex, and ambiguous (VUCA) competition, driven by globalization and digitalization, increases the challenge for managers to identify, assess, and implement innovation (Acciarini et al., 2021; Martin & Bachrach, 2018; Penttilä et al., 2020; Schoemaker et al., 2018). Thus, strong management capabilities are essential to building and defending competitive advantage (Adner & Helfat, 2003; Helfat & Martin, 2015b).

The dynamic capabilities view (DCV) is the dominant theoretical approach to analyzing how competitive advantages develop in dynamic environments (Arndt et al., 2022; Fainshmidt et al., 2016; Teece, 2014). It proposes that organizational capabilities lead to heterogeneities in firms' abilities "to integrate, build, and reconfigure internal and external competencies" (Teece et al., 1997, p. 516). Despite considering the managerial role in strategic decision-making, the DCV neglects the pivotal role of individual managers by focusing on firm-level dynamic capabilities (DCs) (Aguinis et al., 2022; Augier & Teece, 2009; Felin & Foss, 2005). Adner and Helfat (2003) introduced dynamic managerial capabilities (DMCs) theory to highlight the role of individual-level DCs for strategic change, thereby addressing a major limitation of the DCV. According to this microfoundational theory, DMCs consist of three interdependent subcomponents—managerial human capital, social capital, and cognition—that, individually and jointly, determine the manager's ability to "build, integrate, and reconfigure organizational resources and competences" (Adner & Helfat, 2003, p. 1012).

Although empirical research has started to progress from its firm-level focus, studies on managerial-level DCs remain scarce and fragmented (Heubeck & Meckl, 2022a; Holzmayer & Schmidt, 2020; Tasheva & Nielsen, 2020). George et al. (2022) point out that existing DMC research focuses on isolated DMC subcomponents (e.g., Åberg & Torchia, 2020; McDonald & Westphal, 2003). This dearth of holistic empirical studies is startling in today's hypercompetitive economy, where managerial capabilities are significant sources of competitive advantage (Durán & Aguado, 2022; Heubeck & Meckl, 2022a).

To close this research gap and answer the calls for holistic DMC studies (George et al., 2022; Helfat & Martin, 2015a), this article develops the dynamic CEO capabilities (DCCs) concept by complementing Adner and Helfat's (2003) DMC theory with Hambrick and

Mason's (1984) upper echelons theory (UET). The DCC perspective conjectures that CEOs' individual-level DMCs are critical microlevel antecedents to innovation. DCCs may consequently be *the* pivotal innovation drivers in today's hypercompetitive economy. This argumentation echoes Teece's (2007) notion that "enterprises with strong dynamic capabilities are intensely entrepreneurial" (p. 1319) and leads to the following research question: *Do individual-level DCCs cause higher firm-level innovation?*

Beyond exploring the direct antecedents to innovation, scholars have also stressed the importance of developing multilevel models (George et al., 2022; Heubeck & Meckl, 2022a; Witschel et al., 2022). Innovation investments are particularly susceptible to the influence of power owing to their inherently uncertain and long-term nature (Finkelstein, 1992; Mintzberg, 1983). Building on a contingency perspective, this article hypothesizes that more powerful CEOs have a greater influence on firm-level outcomes (Hambrick & Finkelstein, 1987). CEO power is consequently proposed to amply the DCC–innovation relationship. This argument leads to the second research question: *How does CEO power shape the DCC–innovation relationship?*

This article proceeds as follows. Section 2 derives the DCC concept by complementing DMC theory with UET. Section 3 examines the direct effects of DCCs on innovation and the moderation effect of CEO power, leading to the formulation of the research hypotheses. Section 4 outlines the research methods, and Section 5 presents the empirical results. Section 6 discusses the findings, derives theoretical and practical implications, and provides future research recommendations. Section 7 concludes.

2 | THEORETICAL BACKGROUND

2.1 | DMCs and their subcomponents

DMC theory argues that differences in organizational strategies emerge from the heterogeneously distributed capabilities of managers due to their effect on the development, assimilation, and configuration of resources and competencies (Adner & Helfat, 2003; Beck & Wiersema, 2013). Strong DMCs represent a necessary, although insufficient, condition for sustained competitive advantage because managers with superior DMCs facilitate organizational change (Beck & Wiersema, 2013; Helfat et al., 2007; Helfat & Martin, 2015a). Figure 1 summarizes these relationships.

DMCs contain three subcomponents. First, *managerial human capital* refers to specialized and general knowledge acquired through formal training (e.g., education) or informal training (e.g., trial and error). Human capital differs in its context specificity. Generic human capital originates from general training, making it nonspecific, broadly applicable, and readily transferrable. In contrast, firm-specific human capital is of minimal value outside a particular organization as it contains highly unique organizational knowledge (Bailey & Helfat, 2003). Although human capital differs in its characteristics, all types shape the executive ability to recognize, interpret, and implement strategic change (Cohen & Levinthal, 1990; Helfat & Martin, 2015b).

Second, *managerial social capital* contains firm-internal and firm-external networks that give managers access to tangible and intangible resources. Social capital develops through personal relationships and elicits various socially constructed features and benefits (e.g., trust, reciprocity, and access to resources) that shape individual and collective behaviors (Adler & Kwon, 2002; Nahapiet & Ghoshal, 1998). Therefore, strong social capital supports managers in recognizing, assessing, and implementing strategic change (Adner & Helfat, 2003; Helfat & Martin, 2015b).

Third, *managerial cognition* shapes strategic decision-making by serving as the basis for information processing (Adner & Helfat, 2003; Walsh, 1995). Especially in complex information environments, managers process information in an automatic mode. Thus, managers primarily process new information through the lens of historically developed heuristics (i.e., decision-making rules) and reference frames (i.e., abstractions of complex choice situations) (Kahneman, 2012; Walsh, 1995). However, due to the environment's ever-changing nature, mental models can quickly become outdated. Inaccurate mental models lead to biased or erroneous judgments (Beck & Wiersema, 2013; Tripsas & Gavetti, 2000). For this reason, decision-makers draw on controlled information processing in unfamiliar situations for which they do not possess preexisting cognitions or when they modify their existing cognitions. Managers must expend their cognitive capacities in this nonautomatic processing mode to all pertinent information

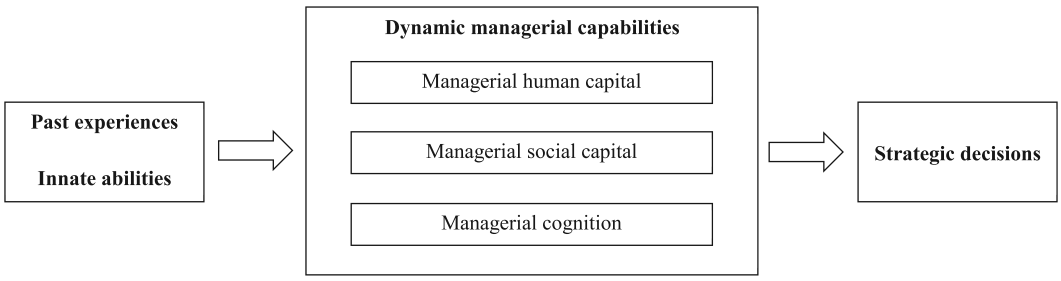

FIGURE 1 DMC subcomponents: Origins and effect on organizational strategy.

(Kahneman, 2012; Walsh, 1995). Therefore, cognition determines a manager's proficiency in making strategic decisions (Adner & Helfat, 2003; Walsh, 1995).

2.2 | Toward a synthesis of DMC theory and UET: The DCC concept

DMC theory offers a holistic perspective on how top managers affect strategic change by focalizing the capabilities of individual managers (Adner & Helfat, 2003; Helfat & Martin, 2015b). Although DMC theory implicitly builds on existing theory by highlighting the significance of top management, Adner and Helfat (2003) did not explicitly consider theories that might complement the understanding of DMCs. Thus, the present article links DMC theory with the complementary theory of upper echelons to provide a holistic perspective on the microlevel origins of strategic decision-making and subsequent organizational outcomes. This is a fruitful endeavor, as DMC theory is not a closed theoretical platform but offers a basis for integrating theory (Arndt et al., 2022).

According to UET, organizational strategies are determined by top managers' decision-making based on their strategic interpretations that originate from observable managerial characteristics, such as age or education (Cannella & Holcomb, 2005; Hambrick & Mason, 1984). UET serves as a fruitful expansion of DMC theory. First, the upper-echelon perspective is suitable for studying innovation (Kurzhals et al., 2020). It conceptualizes executive decision-making in "weak situations" (Mischel, 1977, p. 347) in which CEOs cannot be fully comprehensive. Due to cognitive limitations, temporal pressures, and resource constraints (Simsek, 2007), executive decision-making is driven by selective attention and incomplete preferences, making managers only boundedly rational actors (Cyert & March, 1963; Hambrick & Mason, 1984). Second, UET focuses on individual managerial characteristics yet lacks an overarching framework for integrating these characteristics into a comprehensive categorization of managerial skills. DMC theory provides this framework by identifying three distinguishable subcomponents of managerial capabilities (Adner & Helfat, 2003). Third, UET omits the individual-level origins of decision-making by focusing on top management teams (Cannella & Holcomb, 2005). DMC theory closes this explanatory gap by highlighting the significance of individual management capabilities (Adner & Helfat, 2003). In sum, the synthesis of UET and DMC theory provides a holistic yet parsimonious lens for analyzing the role of individual managerial capabilities in firms' strategic decision-making.

CEOs occupy the most powerful position (Quigley & Hambrick, 2015) and realize the firm's long-term vision by designing and implementing organizational strategies (Vera et al., 2022). Due to their central role, CEOs differ from lower-level managers in their capabilities (Hitt & Tyler, 1991; Wai & Rindermann, 2015) and personalities (Holmes et al., 2021). Thus, the unique DMCs of CEOs—*DCCs*—are critical in developing and sustaining competitive advantage because they are the foundation for organizational change and competitive advantage due to their benefits for strategic change and innovation.

3 | HYPOTHESES DEVELOPMENT

3.1 | Direct effect of DCCs on innovation

Innovation refers to the commercialization of new ideas, including new products, services, or processes (Damanpour, 1991; Gupta et al., 2007; Van de Ven, 1986). Continuous investments in innovation ensure that firms can adapt and safeguard future financial returns (Deutsch, 2005). Nevertheless, innovation investments infer short-term performance detriments and are inherently risky, making them a trade-off between short-term losses and long-term gains (Baysinger et al., 1991; Laverty, 1996).

This section derives the research model by combining three fundamental levels of strategic management: the individual, governance, and firm levels. The research model conjectures that strong individual-level DCCs facilitate firm-level innovation. Additionally, CEO power vis-á-vis the board of directors is proposed as a governance-level contingency factor of this relationship. Figure 2 summarizes the research model.

As the CEO embodies a firm's innovative capacities (Drucker, 1985; Elenkov et al., 2005), differences in innovativeness between firms are likely to originate from heterogeneities in their CEOs' unique capabilities. Specifically, strong DCCs may cause CEOs to become champions of innovation that possess the requisite abilities to facilitate innovation (Howell et al., 2005; Howell & Higgins, 1990). Champion CEOs exhibit three interrelated behaviors that promote innovation: First, they proactively communicate innovation strategies; second, they are persistent in innovation efforts; and, third, they ensure the commitment of key decision-makers (Howell et al., 2005; Howell & Higgins, 1990). Based on this argument, DCCs are essential in driving innovation by improving the abilities of CEOs to sense and seize opportunities as well as reconfigure resources (Helfat & Martin, 2015a; Teece, 2007, 2018). This argument leads to the first hypothesis:

Hypothesis 1a. Higher DCC levels promote innovation.

The three DCC subcomponents are also likely to drive innovation individually. First, human capital shapes CEOs' sensing capacity as individuals draw on their existing knowledge while interpreting new information (Cohen & Levinthal, 1990). Further, human capital influences the type of ideas managers develop during the sensing process. While general human capital allows managers to understand generic information, firm-specific human capital infuses sensemaking processes with realizable ideas tailored to the firm's requirements (Helfat & Martin, 2015a). Second, higher levels of social capital may improve managers' sensing processes. Social networks are valuable conduits to information, resources, and capabilities (Alguezaui & Filieri, 2010; Manev & Elenkov, 2005). Managerial social capital, therefore, enhances innovation by providing information about best practices (Geletkanycz & Hambrick, 1997) and securing necessary support (Geletkanycz & Hambrick, 1997; Martin & Bachrach, 2018). Third, managerial cognition determines which types of information

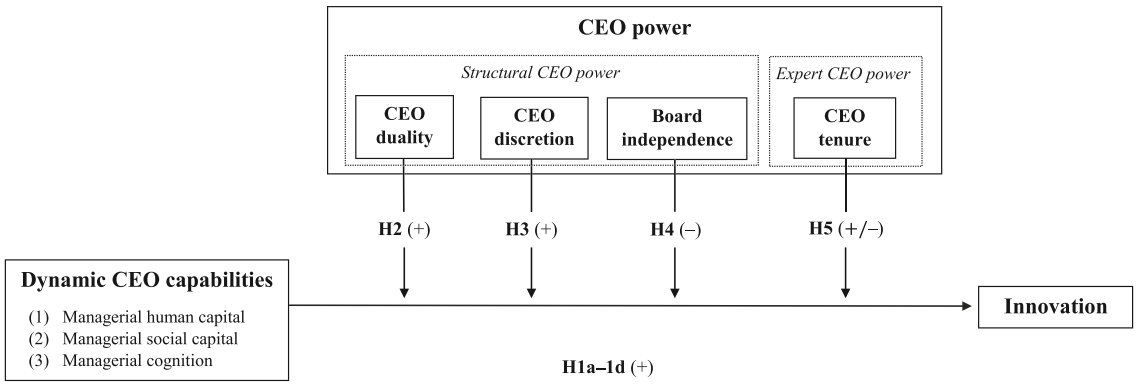

FIGURE 2 Research model: Direct effect of DCCs on innovation and the moderating role of CEO power.

are most salient for managers and how they subsequently interpret perceived information (Gavetti, 2012; Walsh, 1995). Especially in today's economy, CEOs must possess high cognitive abilities to continuously realign their preexisting cognitions with altered realities (Heubeck & Meckl, 2022b; Walsh, 1995). Individual-level DCCs are thus likely to shape opportunity sensing (Helfat & Martin, 2015a).

Further, DCCs improve opportunity seizing and lead to proactive reactions to external threats (Helfat & Martin, 2015a; Tasheva & Nielsen, 2020). Human capital predisposes CEOs to make innovation investments based on existing knowledge and capabilities (Helfat & Martin, 2015a) and is a requirement for efficient resource deployment (Sirmon & Hitt, 2009). Further, social capital allows managers to access complementary assets (Beck & Wiersema, 2013; Blyler & Coff, 2003), which is conducive to innovation (Helfat & Martin, 2015a). Social capital also supports managers in implementing innovations by increasing cooperation between actors (Fukuyama, 1996). Thus, social capital may create an experimentation-enhancing environment, allowing CEOs to overcome resource constraints in implementing innovation (Beck & Wiersema, 2013; Faleye et al., 2014; Helfat & Martin, 2015b). Finally, managerial cognition influences seizing by serving as the mental foundation for decision-making. Differences in firm-level innovation can be attributed to cognitive heterogeneities between managers (Heubeck & Meckl, 2022a; Tasheva & Nielsen, 2020), as managers must possess considerable cognitive abilities to overcome path dependencies and break with dominant logics that hinder innovation (Helfat & Martin, 2015a; Prahalad & Bettis, 1986).

Last, DCCs are critical for sustaining competitive advantage (Tasheva & Nielsen, 2020). CEOs draw on their human capital to modify a firm's resources, routines, and structures (Helfat & Martin, 2015a), while social capital aids reconfiguration processes by giving CEOs access to external resources and capabilities (Helfat & Martin, 2015a). Relatedly, cognition determines a CEO's perception of organizational assets and structures (Gavetti, 2012; Tripsas & Gavetti, 2000; Walsh, 1995), allowing CEOs to reach a comprehensive understanding of the competitive environment and make more astute reconfiguration decisions (Adner & Helfat, 2003; Beck & Wiersema, 2013; Tripsas & Gavetti, 2000). Altogether, CEOs with high DCC levels possess the necessary breadth and depth of human capital acquired through past learnings, hold sufficient social capital to access external assets, and process information comprehensively to continually adapt (Beck & Wiersema, 2013).

Furthermore, the DCC subcomponents interact in shaping the ability of CEOs to realize innovation. First, human capital reinforces social capital by making highly skilled managers more desirable as relationship partners. Similarly, social capital augments human capital by complementing existing knowledge with unfamiliar information. Finally, managerial cognition impacts human and social capital by shaping information processing and the perception of relationship partners (Adner & Helfat, 2003; Helfat & Martin, 2015a). Hence, the continued ability of firms to recognize, implement, and redefine innovation strategies is contingent on individual-level DCCs (Adner & Helfat, 2003; Helfat & Martin, 2015a). These arguments lead to the following three hypotheses:

Hypothesis 1b. Higher levels of managerial human capital promote innovation.

Hypothesis 1c. Higher levels of managerial social capital promote innovation.

Hypothesis 1d. Higher levels of managerial cognition promote innovation.

3.2 | Moderation effects of CEO power

CEO power refers to the capacity of top-level managers to leverage personal interests, intentions, and plans (Combs et al., 2007; Finkelstein, 1992). Agency theory has influenced much of governance research (Combs et al., 2007). Fundamentally, agency theory conjectures that managers are inherently self-interested, while separation of ownership from control provides opportunities for exploiting information asymmetries to the shareholders' detriment (Fama & Jensen, 1983; Jensen & Meckling, 1976). Thus, agency theory focuses on the misalignment of goals and conflicts of interest between

managers and shareholders as the source of additional costs (Eisenhardt, 1989).

Agency theory has glorified directors for their capacity to monitor, control, and discipline opportunistic managers (Fama & Jensen, 1983; Jensen & Meckling, 1976). Empirical studies show that organizational theories may provide a more comprehensive account of governance mechanisms (Hillman et al., 2009). For one, stewardship theory posits that managers are not opportunists but good stewards who prioritize long-term organizational goals rather than subdue to their personal motives. Thus, governance mechanisms should not restrict managerial behavior—as proposed by agency theory—but give managers sufficient discretion over organizational strategies (Davis et al., 1997; Hernandez, 2008). Relatedly, resource dependence theory highlights that CEOs and directors actively contribute to strategic decision-making by providing valuable resources (Hillman et al., 2009; Krause et al., 2016) and signal legitimacy to external actors (Pfeffer & Salancik, 1978). Contrary to agency theory, organizational theories propose that powerful CEOs may be catalysts to innovation that are intrinsically motivated by higher-order goals (Davis et al., 1997).

In real-world decision-making, CEO power is neither unequivocally detrimental nor beneficial for organizations—it is a double-edged sword (Finkelstein & D'Aveni, 1994). Contrary to agency theory, CEOs may not only exploit their power to pursue their self-interests but may also utilize it for effective leadership (McClelland, 1970). At the same time, organizational theories ignore agency problems in conceptualizing managerial behavior. This neglect is particularly alarming in innovation, which is highly vulnerable to agency problems (He & Wang, 2009). While agency and organizational theories propose two fundamentally diverging notions of CEO behavior, the opposing camps concur that more powerful CEOs exert more significant capacity to govern innovation investment decisions (Combs et al., 2007; Kor, 2006; Sheikh, 2019). Therefore, CEO power may determine the extent to which top-level executives can deploy their DCCs to pursue innovation.

Although CEO power is recognized as a multidimensional construct, there is no consensus on its conceptualization (Sheikh, 2019). Consistent with UET and DMC theory, structural CEO power originating from a CEO's firm-internal position is the most widely used indicator of power (Adams et al., 2005; Finkelstein, 1992; Liu & Jiraporn, 2010). Three sources of structural power are likely to be most critical for the DCC–innovation relationship: CEO duality, CEO discretion, and board independence (Adams et al., 2005; Liu & Jiraporn, 2010). This article expands the literature by including expert CEO power, which CEOs acquire during their tenure, as an additional source of power (Finkelstein, 1992; Hambrick & Fukutomi, 1991).

3.2.1 | CEO duality

CEO duality refers to a leadership structure in which the same person serves as CEO and board chairman (Rechner & Dalton, 1991). Dual CEOs are in a structural position to make strategic decisions as the firm's CEO, which they can ratify as the firm's chairman (Finkelstein & D'Aveni, 1994). According to agency theory, CEO duality compromises the board's monitoring and discipline functions by providing the structural context in which CEOs can circumvent proper checks and balances (Mallette & Fowler, 1992). In contrast, organizational theorists argue that CEO duality benefits organizations in dynamic environments by streamlining the command chain (Boyd, 1995; Peng et al., 2007).

Research on CEO duality remains scarce and often contradictory (Dalton & Dalton, 2011; Faleye, 2007). Therefore, this article employs a contingency perspective grounded in agency and organizational theories to investigate the duality–innovation relationship. Accordingly, CEO duality is neither unequivocally beneficial nor detrimental for organizations but must be evaluated by weighing its costs (i.e., agency problems) and benefits (i.e., unity of command) in the specific task environment (Elsayed, 2007; Faleye, 2007).

Due to five underlying mechanisms, CEO duality will likely increase the benefits of DCCs for innovation. First, dual leadership structures establish clear command lines, strategic focus, and long-term commitment within the firm (Floyd & Lane, 2000). Second, nondual structures inhibit the implementation of change by increasing the complexity of securing board approval for innovation investments (Li & Yang, 2019). Third, nonduality translates into significant information asymmetries between CEOs and directors. Reduced communication between the two structurally separated entities may initiate a vicious cycle: Boards inhibit the decision implementation by increasing leverage over CEOs; in response, CEOs minimize information sharing with directors or distort information to secure board approval (Adams & Ferreira, 2007; Brickley et al., 1997; Faleye et al., 2011). Fourth, dual leadership averts excessive monitoring and unnecessary interference (Finkelstein & D'Aveni, 1994). While agency theorists propose that CEO duality threatens board independence (Boyd, 1995), the abundance of dispersed ambiguous information in innovation-related decisions restricts monitoring abilities (He & Wang, 2009). Fifth, nondual CEOs face higher employment risks and pressures for immediate success than their dual counterparts. Nonduality may forestall long-term innovation investments by causing board chairs to be more short-sighted and financially focused in their decision-making (Laverty, 1996; Li & Yang, 2019).

Based on these arguments grounded in a contingency perspective, CEO duality will likely be an innovation-enhancing governance structure. Dual CEOs are structurally empowered to identify environmental change, make appropriate innovation investments, and swiftly realize their decisions (Finkelstein & D'Aveni, 1994; Pfeffer & Salancik, 1978). Altogether, CEO duality may instill pro-organizational CEO behavior by offering an appropriate structural context to deploy strong DCCs to a firm's benefit. These arguments lead to the second hypothesis:

> **Hypothesis 2.** The positive DCC–innovation relationship is strengthened by CEO duality.

3.2.2 | CEO discretion

The extent to which managerial decision-making impacts firm-level outcomes is contingent on environmental, organizational, and managerial factors (Finkelstein & Boyd, 1998; Hambrick & Finkelstein, 1987). CEO discretion refers to the CEO's latitude of action in a given situation, which is primarily determined by the level of resource availability within the firm (Finkelstein & Hambrick, 1990; Hambrick & Finkelstein, 1987).

Readily available resources are integral for innovation, while budget constraints limit managerial leeway (Finkelstein & Hambrick, 1990). CEOs need sufficient funds to pursue innovation and sustain steady investment levels. Otherwise, competitive advantage will likely decay, as the firm cannot develop new value offerings, generate valuable knowledge, and establish a leading position in the innovation-driven marketplace (Kor, 2006). Therefore, the extent to which DCCs materialize in innovation strategy depends on the level of discretion available to managers. In low discretion environments, the innovation-enhancing effect of DCC will likely be reduced because firms' tight budgets constrain CEOs from pursuing innovation (Hambrick et al., 1993).

In highly discretionary settings, CEOs can conversely exert a more significant impact on innovation. Discretion empowers CEOs to make decisions conducive to innovation, as CEOs can pursue opportunities at a nascent stage and proactively respond to a broader range of opportunities (Lockett et al., 2009; Wangrow et al., 2015). Additionally, giving CEOs sufficient discretion encourages them to be more creative and entrepreneurial (Chin et al., 2021) and motivates them to pursue uncertain endeavors (Yan et al., 2010). High discretion also reduces the pressures for immediate payoffs (Cyert & March, 1963; Lockett et al., 2009). Based on these arguments, CEO discretion is essential for CEOs to invest in innovation. Further, CEOs are more likely to engage in pro-organizational behavior in high-discretion environments than in low-discretion ones. Thus, the benefits of DCCs on innovation are likely to be amplified. More formally:

> **Hypothesis 3.** The positive DCC–innovation relationship is strengthened by CEO discretion.

3.2.3 | Board independence

Independent boards comprise a large share of outside directors with no material relationship or personal affiliation with the firm (Dalton et al., 2007). Rooted in the fundamental premise of agency theory, independent boards safeguard shareholders against opportunistic managers (Dalton et al., 1999; Fama, 1980). In the context of innovation, however, the evidence contradicts agency theory by showing that inside rather than outside directors set the appropriate structural environment (Balsmeier et al., 2014; Dalziel et al., 2011; Hoskisson et al., 2002; Zona et al., 2013).

While outside directors can provide external resources to the CEO (Hillman et al., 2000), the costs of outside directors are likely to prevail in the context of innovation. First, external board members often lack firm-specific knowledge due to their part-time directorship (Deutsch, 2007). Further, outsiders are worse monitors managers than insiders because they often lack the time or motivation to examine all relevant information (Baysinger et al., 1991; Jensen, 1993). Therefore, more independent boards face greater difficulties in assessing the future returns of innovation projects (Hoskisson et al., 2002). For this reason, outside directors favor financial over strategic controls (Baysinger & Hoskisson, 1990). The objective controls, however, fail to capture the financial trade-off inherent to innovation (Baysinger et al., 1991; Hoskisson et al., 2002; Zona, 2012). The lack of knowledge makes outside directors more reluctant to approve innovation investments and inclined to withdraw investments that fail to materialize rapidly (Hoskisson et al., 2002; Zona, 2012). Based on these arguments, it can be inferred that outside-dominated boards are likely unable to supervise and support innovation-related decision-making. Rather than making CEOs inclined to pursue risky but potentially highly profitable innovation projects, independent boards may induce inertia, give CEOs poor advice (Mahadeo et al., 2012), and decrease commitment to innovation strategies (He & Wang, 2009). Thus, more independent boards may disincentivize CEOs from deploying their DCCs to foster innovation investments. More formally:

> **Hypothesis 4.** The positive DCC–innovation relationship is dampened by board independence.

3.2.4 | CEO tenure

The advantageousness of CEO tenure follows a temporal pattern. After their appointment, CEOs gain firm-specific knowledge and valuable contacts (Finkelstein et al., 2009; Simsek, 2007). With longer tenures, CEOs acquire more leverage over a firm's resource portfolio (Buchholtz et al., 1998) and gain a track record for being skilled leaders (Lewellyn & Muller-Kahle, 2012; Simsek, 2007) while becoming overly confident in their abilities—even when these abilities become obsolete (Hambrick & Fukutomi, 1991; Henderson et al., 2006). Although long-tenured CEOs may not necessarily resist change, research shows that their decisions seldom depart from the status quo (Hambrick et al., 1993; Miller, 1991). Evidence supports this argument by showing that CEOs become increasingly routinized and risk averse during their tenure (Miller & Shamsie, 2001; Musteen et al., 2006). Additionally, long-tenured CEOs primarily retain like-minded individuals inclined to validate existing beliefs instead of questioning the managerial prerogative (Mintzberg, 1983; Pfeffer & Salancik, 1978). With lengthening tenures, CEOs might also reduce their time horizon due to impeding departure or retirement (Sonnenfeld, 1991) and refrain from taking risks that materialize only in the long run (Simsek, 2007).

In the specific context of the DCC–innovation relationship, CEO tenure may function as a double-edged contingency factor, initially increasing the positive influence of DCCs on innovation. As CEOs grow "stale in the saddle" (Miller, 1991, p. 49), the negative effects of

their excessive time in office prevail. Based on the insights from agency and organizational theories, shorter-tenured CEOs may promote innovation-enhancing DCC effects by focusing on exploration instead of exploitation. In contrast, longer-tenured CEOs forestall the innovation-enhancing deployment of DCCs due to their emphasis on exploitation rooted in stability- and efficiency-oriented strategies (Barker & Mueller, 2002; Rajagopalan & Datta, 1996). These arguments lead to the final hypothesis.

> **Hypothesis 5.** The positive DCC–innovation relationship is nonlinearly moderated by CEO tenure so that the positive relationship between DCCs and innovation is stronger for firms with shorter-tenured CEOs and weaker for firms with longer-tenured CEOs.

4 | METHODOLOGY

4.1 | Data collection and sample

This study builds on a sample of manufacturing firms listed in Standard and Poor's (S&P) 900 Index from 2016 to 2020. The initial sample contained all firms listed at least once during the observation period to avoid potential survivorship bias (Brown et al., 1992). Due to the industry-specific characteristics of innovation (Becheikh et al., 2006), focusing on a particular industry—in this case, the manufacturing industry as classified under the NAICS 31–33 codes (US Census Bureau, 2022)—is an accepted approach within the management literature (e.g., Barker & Mueller, 2002; Datta et al., 2003). Innovation is a prerequisite to competitive advantage in manufacturing firms, and these firms are particularly affected by the increasing dynamism of today's globalized digital economy (Björkdahl, 2020; Laudien & Daxböck, 2016; Witschel et al., 2022). Manufacturing firms also have separate research and development (R&D) departments (Helfat & Martin, 2015a), which stresses the importance of innovation for strategic renewal.

Financial and CEO data were acquired using Thomson Reuters' Refinitiv Eikon database. In case neither the database nor a firm's annual report or proxy statement contained CEO-related information, missing CEO data were manually collected on company and university websites, LinkedIn, and Bloomberg (Seo et al., 2022). If more than one individual served as CEO in a specific firm within 1 year, the CEO with the most time in office was selected (Quigley & Hambrick, 2015). The final sample consisted of 332 manufacturing firms with 480 CEOs from 2016 to 2020.

4.2 | Measures

4.2.1 | Dependent variable

Innovation is operationalized as R&D intensity (R&D expenditures/sales) (Adams et al., 2006). Top managers must critically monitor innovation spending because these long-term investments are inherently risky and failure prone (Barker & Mueller, 2002). The level of R&D expenditures is under the direct control of the top-level executive (Daellenbach et al., 1999), reflecting the strategic importance managers attribute to innovation (Hill & Snell, 1988; Kor, 2006). R&D intensity is consequently an appropriate proxy for innovation in the DCC context.

4.2.2 | Independent and moderator variables

The DCC concept includes three subcomponents. First, *managerial human capital* entails general and firm-specific human capital (Bailey & Helfat, 2003). General human capital was measured on a scale that captures the highest degree of a CEO's formal education (Herrmann & Datta, 2005). Firm-specific human capital was proxied by the years a CEO has spent at the current firm, as CEOs develop firm-specific knowledge during their tenure (Bailey & Helfat, 2003; Tabesh et al., 2019). Second, the number of a CEO's other active or past corporate affiliations was used to measure *managerial social capital* (Holzmayer & Schmidt, 2020). Third, *managerial cognition* was operationalized on a 10-point scale that captures the level and field of education (see Table A1). The technical degree level shapes managerial mental models and belief structures (Daellenbach et al., 1999; Rodenbach & Brettel, 2012). Managers with a technical education are more skilled at judging the long-term financial implications of innovation investments (Hayes & Abernathy, 1980) and prioritize long-term innovation benefits over their short-term costs (Cummings & Knott, 2018). Therefore, higher levels of technical education increase a CEO's propensity to drive innovation (Barker & Mueller, 2002; Marvel & Lumpkin, 2007). Managerial cognition is also likely to differ between CEOs with and without an additional business education (Daellenbach et al., 1999; Hambrick & Mason, 1984; Rodenbach & Brettel, 2012). An education in technology and business prevents the narrow-mindedness associated with functional specialization (Geletkanycz & Black, 2001; Musteen et al., 2006), making dual-skilled CEOs likely to consider investment alternatives more comprehensively because they can draw on technical and business knowledge in making innovation decisions (Daellenbach et al., 1999). Altogether, dual-skilled CEOs are more likely to invest resources in R&D due to three mechanisms: (1) They tend to recognize the necessity for change earlier; (2) their more diverse skillset allows them to react to a wider variety of strategic issues; and (3) they have an augmented risk tolerance due to a more extensive breadth of human and social capital (Geletkanycz & Black, 2001; Musteen et al., 2006). Finally, the composite variable *DCCs* was calculated as the average score of a manager's human capital, social capital, and cognition.

Four sources of CEO power as moderators of the DCC–innovation relationship were considered. First, *CEO duality* was coded as a dummy variable, taking the value of 1 if the CEO served as board chairman, and 0 if otherwise (Kor, 2006; Uzun et al., 2004). Second, *CEO discretion* was proxied by the number of discretionary resources using three indicators: current ratio, quick ratio, and working capital

(Marlin & Geiger, 2015). Third, *board independence* was proxied as the share of outside directors on a firm's board (Fama, 1980; Mizruchi, 1983). Fourth, *CEO tenure* was measured as the years the current CEO has served in this function (Henderson et al., 2006; Li & Yang, 2019).

4.2.3 | Control variables

Several control variables at the individual, board, and firm levels were added to the model as potential influences on firm innovation. At the individual level, *CEO age* was included as an influence on a CEO's risk-taking propensity (Tabesh et al., 2019; Wrede & Dauth, 2020) and cognitive capacities (Rodenbach & Brettel, 2012). Second, *CEO gender* was coded as a binary variable (0 = female, 1 = male). Due to their biological and psychological differences, male and female executives have different predispositions for risk taking (Faccio et al., 2016; Ho et al., 2015). To control for possible cultural influences on decision-making, *CEO long-term orientation* and *CEO uncertainty avoidance* were incorporated into the model following previous research recommendations (Heubeck & Meckl, 2022a, 2022b). A CEO's cultural orientation is approximated on a scale of 0 to 100. Long-term orientation captures if a culture focuses on the future (high scores) or the past and present (low scores). High scores in uncertainty avoidance mean that societies are less tolerant of ambiguous or unfamiliar situations, while low scores imply that societies are more relaxed in their attitudes and value practice over principle (Hofstede et al., 2010; Holzmayer & Schmidt, 2020). Last, *top management compensation* was measured as the compensation paid to all senior executives divided by total sales. Executive compensation may influence innovation by shaping a CEO's risk propensity and time horizon (Wheatley & Doty, 2010).

At the board level, *board size* captured the total number of directors on the board. Board size may impact innovation by shaping corporate governance efficacy (Goodstein et al., 1994). Further, *board compensation* was measured as the average compensation of directors. Sufficient pay is necessary to attract, motivate, and retain skilled directors, while excess remuneration may render boards increasingly passive by impairing independence (Dah & Frye, 2017). Last, *director functional background* was operationalized as the percentage of directors with either an industry-specific or financial background, which infuses decision-making with function-specific experiences (Dalziel et al., 2011; Kor, 2006).

At the firm level, the model controlled for four variables. First, three logarithmized indicators captured *firm size*: total assets, total sales, and total employees (Azar & Ciabuschi, 2017; Finkelstein & Boyd, 1998). Smaller firms have less formalized organizational structures that allow timely decision-making, while larger firms benefit from increased resource availability and a higher likelihood of innovation success (Chandy & Tellis, 2000; Leiponen & Helfat, 2010). Second, two proxies for *firm performance* were used: return on assets and return on equity (Daniel et al., 2004). Firm performance may affect innovation by causing resource availability heterogeneity between organizations (Bourgeois, 1981). Further, *firm age* was considered due to its conflicting effects on firm innovativeness: Older firms benefit from increased resource availability, while younger firms benefit from a faster recognition and implementation of innovation (Audia & Greve, 2006; Rogers, 2004). Last, *institutional ownership* was included in the model. Although research has yet to produce conclusive evidence on whether institutional ownership hinders or facilitates innovation, its significance for innovation is undisputed (Atallah et al., 2021; Brossard et al., 2013).

4.3 | Statistical model

The following tests were used to determine the appropriate estimation model for the data. First, the Breusch–Pagan Lagrange multiplier tested for the existence of random effects. The results confirmed significant differences across years, validating that a panel regression model is preferred over a simple Ordinary Least Squares regression (Breusch & Pagan, 1980). Next, the Hausman specification test indicated that the fixed-effects model is a consistent estimation method (Baltagi, 2021; Greene, 2019). Finally, the modified Wald test suggested that groupwise heteroskedasticity is present in the residuals of the fixed-effects model, leading to the usage of a fixed-effects estimation model with heteroskedasticity-robust standard errors (Greene, 2019).

5 | RESULTS

Table 1 reports the means, standard deviations, and correlations of all study variables. Table 2 summarizes the regression results using two fixed-effects models. Table 3 presents the hypothesis results discussed in the following.

Hypotheses 1a to 1d assessed the direct composite and subcomponent DCC effects on innovation. Hypothesis 1a predicted that higher DCC levels promote innovation. The results show a significant, positive effect of DCCs on innovation ($b = 0.036$, $se = 0.017$, $p = .041$), supporting Hypothesis 1a. Hypothesis 1b presumed that the relationship between managerial human capital and innovation is positive, which is supported by the data ($b = 0.012$, $se = 0.006$, $p = .035$). Hypothesis 1c is supported, as managerial social capital exerts a significant, positive effect on innovation ($b = 0.013$, $se = 0.006$, $p = .025$). Finally, Hypothesis 1d predicted that higher levels of managerial cognition promote innovation. The analysis supports this hypothesis ($b = 0.016$, $se = 0.006$, $p = .009$).

Hypotheses 2 to 5 were concerned with the moderation effects of CEO power on the DCC–innovation relationship. Hypothesis 2 predicted that CEO duality amplifies this relationship. The interaction term is significant yet, contrary to expectations, negative ($b = -0.011$, $se = 0.005$, $p = .030$). Thus, Hypothesis 2 is rejected. Hypothesis 3 postulated a positive moderation of CEO discretion on the DCC–innovation relationship, which is supported by a positive,

TABLE 1 Descriptive statistics: Means, standard deviations, and correlations.

	Variable	Mean	*SD*	1	2	3	4	5	6	7	8	9	10
1	Innovation	0.844	0.222	1.000									
2	DCC	5.325	2.060	.121***	1.000								
3	Managerial human capital	8.333	5.490	.053	.835***	1.000							
4	Managerial social capital	2.930	2.477	.012	.237***	−.194***	1.000						
5	Managerial cognition	4.712	2.288	.176***	.422***	.074*	.008	1.000					
6	CEO duality	0.680	0.467	−.091**	.100**	.146***	.065†	−.201***	1.000				
7	CEO discretion	1.627	1.311	.410***	.073*	.056†	−.117***	.160***	−.057†	1.000			
8	Board independence	83.865	7.963	−.026	.099**	.058†	.148***	−.021	.151***	−.260***	1.000		
9	CEO tenure	6.662	8.035	.046	.384***	.372***	.072*	.085*	.061†	.200***	−.037	1.000	
10	CEO age	55.851	6.382	.005	.196***	.139***	.207***	−.046	.122***	.067*	−.042	.243***	1.000
11	CEO gender	0.0530	0.224	.001	.052	.013	.080*	.038	−.186***	−.030	−.114***	.017	−.030
12	CEO long-term orientation	31.903	14.502	.025	.016	−.085*	.067*	.138***	−.012	.051	−.051	.084*	.013
13	CEO uncertainty avoidance	47.273	9.378	−.028	.030	−.049	.072*	.082*	.108**	−.045	.013	.003	.146***
14	Top management compensation	11,502.847	48,148.138	.826***	−.007	−.003	−.053	.072*	−.095**	.357***	−.057†	.080*	−.021
15	Board size	9.871	2.010	−.096**	.005	.024	.081*	−.131***	.155***	−.315***	.404***	−.119***	.018
16	Board compensation	2,310,766.093	2,907,984.181	.030	.045	.017	.055†	.021	.066*	−.094**	.054	−.032	−.065†
17	Director functional background	58.736	17.608	.099**	.018	.008	−.030	.030	−.005	.160***	−.140***	−.102**	.027
18	Firm age	38.035	32.891	−.061†	.058†	.120***	−.031	−.095**	.192***	−.174***	.217***	−.083*	.068*
19	Total assets	21.624	1.327	−.042	.237***	.137***	.168***	.083*	.151***	−.303***	.266***	−.126***	.077*
20	Total revenue	22.150	1.412	−.185***	.176***	.109***	.172***	−.001	.169***	−.521***	.319***	−.172***	.055
21	Total employees	9.190	1.461	−.211***	.137***	.099**	.188***	−.092**	.223***	−.553***	.316***	−.180***	.075*
22	Return on assets	0.093	0.345	−.840***	−.003	.015	−.026	−.043	.076*	−.188***	−.018	−.006	.057†
23	Return on equity	0.210	1.293	−.033	.081*	.091**	−.028	.027	.046	−.048	.050	.001	.003
24	Institutional ownership	85.434	14.154	.028	−.195***	−.182***	−.049	−.014	−.121***	.130***	−.039	−.078*	−.112***

Note: $N = 906$.

Abbreviations: CEO, chief executive officer; DC, dynamic CEO capability; *SD*, standard deviation.

†$p < .10$.

*$p < .05$.

**$p < .01$.

***$p < .001$.

TABLE 1 (Continued)

	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
11	1.000													
12	.073*	1.000												
13	−.092**	.302***	1.000											
14	.005	−.040	−.025	1.000										
15	−.009	.054	.207***	−.128***	1.000									
16	−.035	.011	.047	.029	.197***	1.000								
17	.061†	.035	.076*	.049	−.138***	−.038	1.000							
18	−.065*	.052	.009	−.075*	.346***	.024	−.089**	1.000						
19	−.051	.043	.124***	−.190***	.484***	.208***	−.046	.232***	1.000					
20	−.052	.029	.117***	−.304***	.542***	.223***	−.068*	.282***	.931***	1.000				
21	−.037	.035	.123***	−.292***	.544***	.189***	−.094**	.275***	.813***	.897***	1.000			
22	−.047	.011	−.001	−.779***	−.003	−.023	−.056†	.032	.091**	.147***	.079*	1.000		
23	−.024	.002	−.005	−.028	.075*	.024	−.040	.061†	.092**	.078*	.068*	.065†	1.000	
24	−.088**	−.117***	−.090**	.044	−.178***	−.167***	.052	−.114***	−.444***	−.422***	−.303***	−.052	−.149***	1.000

Note: $N = 906$.

Abbreviations: CEO, chief executive officer; DC, dynamic CEO capability; *SD*, standard deviation.

†$p < .10$.

*$p < .05$.

**$p < .01$.

***$p < .001$.

TABLE 2 Regression results.

	Model 1 innovation		Model 2 innovation	
	Coefficient	*se*	Coefficient	*se*
Study variables				
DCC	.036*	0.017		
Managerial human capital			.012*	0.005
Managerial social capital			.013*	0.006
Managerial cognition			.016**	0.006
CEO duality	.046†	0.024	.050*	0.024
DCC × CEO duality	−.011*	0.005	−.011*	0.005
CEO discretion	−.000	0.007	.001	0.006
DCC × CEO discretion	.003*	0.001	.002*	0.001
Board independence	.002*	0.001	.002*	0.001
DCC × board independence	−.000†	0.000	−.000†	0.000
CEO tenure	.001	0.001	.001	0.001
DCC × CEO tenure	−0.000	0.000	−0.000	0.000
DCC × CEO tenure^2	−.000	0.000	−.000	0.000
Control variables				
CEO age	−.000	0.001	−.000	0.001
CEO gender	.000	0.019	−.003	0.016
CEO long-term orientation	−.000	0.000	−.000	0.000
CEO uncertainty avoidance	−.000	0.000	−.000	0.000
Top management compensation	.000†	0.000	.000†	0.000
Board size	−.001	0.002	−.001	0.002
Board compensation	−.000	0.000	−.000	0.000
Director functional background	.000	0.000	.000	0.000
Firm age	.005*	0.002	.005*	0.002
Total assets	−.010	0.012	.011	0.013
Total revenue	−.010	0.023	−.008	0.019
Number of employees	−.003	0.015	−.003	0.015
Return on assets	−.460***	0.074	−.460***	0.064
Return on equity	.007*	0.003	.007*	0.003
Institutional ownership	−.004	0.003	−.004	0.003
Constant	.596	0.548	.553	0.563
Model specifications				
Number of observations	906		906	
R-squared	.966		.966	
R-squared (adjusted)	.954		.954	
p	<.001		<.001	
ρ	.943		.943	

Abbreviations: CEO, chief executive officer; DCC, dynamic CEO capability; *se*, standard error.
†$p < .10$.
*$p < .05$.
**$p < .01$.
***$p < .001$.

significant interaction effect ($b = 0.003$, $se = 0.001$, $p = .030$). Hypothesis 4 proposed that board independence negatively moderates the positive impact of DCCs on innovation. In support of this hypothesis, the interaction effect is negative and significant ($b = -0.000$, $se = 0.000$, $p = .065$). Hypothesis 5 presumed a nonlinear moderation effect of CEO tenure on the DCC–innovation relationship. The results do not support the fifth hypothesis, as both the DCC–CEO tenure interaction ($b = -0.000$, $se = 0.000$, $p = .954$) and the DCC–CEO tenure squared interaction ($b = -0.000$, $se = 0.000$, $p = .775$) are statistically insignificant.

TABLE 3 Summary of hypotheses tests.

Hypothesis		Result
Hypothesis 1a	Higher DCC levels promote innovation.	Supported ($p < .05$)
Hypothesis 1b	Higher levels of managerial human capital promote innovation.	Supported ($p < .05$)
Hypothesis 1c	Higher levels of managerial social capital promote innovation.	Supported ($p < .05$)
Hypothesis 1d	Higher levels of managerial cognition promote innovation.	Supported ($p < .01$)
Hypothesis 2	The positive DCC–innovation relationship is strengthened by CEO duality.	Rejected (opposite effect)
Hypothesis 3	The positive DCC–innovation relationship is strengthened by CEO discretion.	Supported ($p < .05$)
Hypothesis 4	The positive DCC–innovation relationship is dampened by board independence.	Supported ($p < .10$)
Hypothesis 5	The positive DCC–innovation relationship is nonlinearly moderated by CEO tenure so that the positive relationship between DCC and innovation is stronger for firms with shorter-tenured CEOs and weaker for firms with longer-tenured CEOs.	Rejected ($p > .10$)

Abbreviations: CEO, chief executive officer; DCC, dynamic CEO capability; *p*, significance value.

6 | DISCUSSION

This article aimed to empirically test the assumptions of microfoundational research by developing the DCC concept. It also answered many scholars' calls to study innovation from a microlevel perspective (e.g., Aguinis et al., 2022; Felin et al., 2012; Felin & Foss, 2005). The results demonstrate that the propositions of UET and DMC theory are still valid in a globalized digital economy, offering several starting points for discussion. In line with theoretical arguments, the evidence shows that CEOs are pivotal contributors to innovation through their DCCs. The analysis demonstrates that DCCs and their subcomponents—managerial human capital, social capital, and cognition—are integral to pursuing higher innovation levels. Therefore, the findings confirm that CEOs with high DCC levels can master the challenges of innovation, which ensures that firms can develop and sustain competitive advantages.

The results provide much-needed insights into the magnitude of the DCC effect. It is found that DCCs jointly exert a more significant influence on innovation than their three subcomponents separately. Therefore, DCCs are compositely more significant microlevel antecedents to innovation than the individual DCC subcomponents are. The results reveal that the DCC subcomponents are relatively similar in their magnitude for innovation, underscoring that all components are essential for a CEO's ability to facilitate innovation.

Further, this study supports the adopted contingency perspective by showing that CEO power moderates the DCC–innovation relationship. Specifically, structural CEO power is confirmed as a moderator of this relationship. In line with theoretical arguments, more discretion increases a CEO's ability to deploy their DCCs to facilitate innovation. Hence, the results concur with the predictions of stewardship theory: More CEO discretion does not amplify agency problems; instead, it increases the positive DCC effect on innovation. Highly skilled CEOs can therefore exert a more beneficial effect on innovation in highly discretionary settings rather than in low discretionary ones.

The results reveal that board independence weakens the positive DCC–innovation relationship. This finding suggests that a higher share of outside directors reduces the degree to which CEOs can influence strategic decision-making, alleviating the positive DCC effect on innovation. However, the impact is relatively small and only weakly statistically significant. Future research can build on the DCC model to assess the possible influence of industry characteristics.

In contrast to expectations, CEO duality reduces the DCC effect on innovation. CEO duality, therefore, enhances agency problems instead of benefitting firms in VUCA innovation contexts. Although the findings oppose organizational theories, they corroborate the notion of CEO duality as a double-edged sword (Finkelstein & D'Aveni, 1994).

Further, this study shows that expert CEO power does not moderate the DCC–innovation relationship. CEO tenure will likely produce conflicting effects depending on the strategic choice situation and CEO characteristics. In the unique innovation context, highly skilled CEOs might not require long tenures to acquire firm-specific knowledge beneficial to innovation, while their less capable counterparts require longer tenures to develop this knowledge. Furthermore, the adverse effects of excessive tenure may manifest unevenly among CEOs: Longer tenures might benefit some CEOs by offering increased learning opportunities, while other CEOs may forestall innovation investments by becoming overly entrenched and inert (Hambrick & Fukutomi, 1991; Henderson et al., 2006; Simsek, 2007).

6.1 | Theoretical contributions

This article makes several contributions to the management literature. First, it developed the DCC concept by combining UET and DMC theory. Although scholars have previously drawn on these perspectives to study innovation, no comprehensive theoretical framework combines these two complementary theories. This article demonstrates that DMC theory is "a platform on which to build theory, rather than a singular theory" (Arndt et al., 2022, p. 5).

Second, the analysis showed that CEOs are integral contributors to innovation in today's hypercompetitive economy, supporting previous research in nondigitalized contexts (e.g., Bock et al., 2012; Tasheva & Nielsen, 2020; Tripsas & Gavetti, 2000). Although empirical DMC research remains scarce, the findings oppose Heubeck and Meckl's (2022a) recent study of German Industry 4.0 firms. Their analysis revealed that middle and top managers' DMCs compositely

facilitate firm innovation, while the subcomponents individually have no isolated effect. This paper provides empirical evidence that a manager's hierarchical position may influence the DCC effect on innovation, showing that CEOs—in contrast to lower-level managers—contribute to higher levels of innovation through all DCC subcomponents. The governance model may represent another influence on the DCC–innovation relationship, as the present study focused on US firms with one-tier board structures, while Heubeck and Meckl (2022a) analyzed German firms with two-tier board structures. Regarding the direct DCC effect, the findings of this study altogether concur with the theoretical assumptions of DMC theory (e.g., Adner & Helfat, 2003; Beck & Wiersema, 2013; Helfat & Martin, 2015b), providing evidence that DCCs are significant micro-level antecedents to innovation in today's dynamic economy. This article reaffirms the significance of CEOs and their individual-level DCs for innovation, as demonstrated by previous research that has not explicitly considered the transformed decision-making context of today's digital economy (e.g., Barker & Mueller, 2002; Smith & Tushman, 2005).

Third, the results show that the extent to which CEOs can use their DCCs, and firms benefit from superior DCCs, is contingent on structural CEO power. The evidence provides a nuanced account of CEO power by considering two sources: structural and expert power. A contingency approach based on agency and organizational theories revealed insightful implications. In line with organizational theories, CEO discretion strengthens this relationship, and board independence weakens it. Contrary to organizational theories, CEO duality alleviates this relationship, providing evidence for the prescription of agency theorists to separate decision-making from decision-control functions. Last, the analysis provided no evidence for a moderation effect of CEO tenure on the DCC–innovation relationship, neither confirming organizational theories nor agency theory.

Altogether, this paper significantly advances management literature from a conceptual and empirical perspective. The findings reconfirm the innovation-enhancing DCC effect in today's transformed decision-making context, showing that the propositions of UET and DMC theory are still valid. The results demonstrate that DCCs can be a make-or-break factor in sustained innovation and that the advantageousness of DCCs is contingent on structural CEO power levels. Besides these contributions to theory, the paper may also propel future empirical research due to the developed holistic DCC operationalization.

6.2 | Practical implications

These findings also have significant implications for practitioners. This article demonstrates that CEOs with superior DCCs contribute more strongly to innovation than their less capable counterparts. Hence, boards of directors are advised to emphasize appointing and retaining CEOs with high DCC levels to develop and sustain competitive advantage. Relatedly, a firm lacking innovation capacity should question the capabilities of its current CEO. Firms can enhance DCCs by offering learning and training opportunities. The findings show that the entire DCC portfolio benefits innovation and that all underlying drivers ensure innovation strategies are implemented. Therefore, firms are advised to develop a CEO's human capital and cognition while encouraging the expansion of external social ties to ensure sustained innovation. In contrast to previous research on lower-level managers (e.g., Heubeck & Meckl, 2022a), the findings caution firms that their CEOs' entire portfolio of DCCs is integral for pursuing innovation. This makes the holistic development of the CEO's individual-level capabilities even more integral for developing and sustaining competitive advantage.

The findings also caution firms to design organizational structures conducive to innovation. First, they demonstrate that CEO discretion is integral in pursuing innovation by giving CEOs leeway in allocating resources. CEO discretion may also positively reinforce the motivation of top-level executives to pursue innovation in future periods because they are not constrained in their innovation-related decision-making by short-term success pressures. Second, dual structures and independent boards inhibit the translation of DCCs into innovation. The findings warrant that firms should structurally separate the CEO from the board chair and appoint more inside than outside directors. Last, the findings reveal the ambiguous nature of CEO tenure: Neither shorter tenures nor longer tenures are unequivocally beneficial for innovation. Firms are advised to consider the individual characteristics of their CEO in judging the innovation-related implications of tenure.

Altogether, the findings provide unequivocal evidence that individual-level DCCs matter for firm-level innovation and that the magnitude of the CEO effect is contingent on structural CEO power. Especially in today's digital economy, where digital transformation is a central managerial task (Palmié et al., 2022; Warner & Wäger, 2019), CEOs need strong DCCs to foster digital transformation through continuous innovation. Otherwise, firms cannot address the increasing dynamics of a technology-driven economy necessary to compete successfully in the long term (Heubeck, 2023; Kraus et al., 2021).

6.3 | Limitations and recommendations for future research

This article's limitations may serve as potential starting points for future research. First, future studies could supplement objective with subjective data. Additional data could offer insight into whether objective power measures differ from subjective perceptions. Second, this article relied on an input-oriented innovation measure. While this approach is prevalent within the innovation literature (Adams et al., 2006) and coincides with the rationale behind DCCs by capturing a CEO's intentions to pursue innovation (Hill & Snell, 1988; Kor, 2006), outcome-based innovation measures could serve as a fruitful expansion. Third, the sample is limited to public medium- and large-cap firms from manufacturing industries. Future researchers could test the relationships in family-owned firms. Last, the sample

focuses on US-based firms with one-tier boards. Future research should assess the replicability of the findings under different governance structures, such as the more stakeholder-friendly German two-tier board.

7 | CONCLUSION

This article underlined the significance of individual-level DMCs for innovation by deriving the DCC concept as a synthesis of UET and DMC theory. The research model was expanded by taking a contingency perspective on the DCC–innovation relationship. The study's findings add further support to the microfoundational research in strategic management (e.g., Barker & Mueller, 2002; Felin & Foss, 2005; Rodenbach & Brettel, 2012), and contribute to the emerging stream of empirical DMC literature (e.g., Heubeck & Meckl, 2022a, 2022b; Holzmayer & Schmidt, 2020; Tasheva & Nielsen, 2020). The findings demonstrate that DCCs, individually and in concert, are critical micro-level antecedents to innovation and that these benefits are contingent on the level of structural CEO power. In conclusion, this article adds valuable empirical evidence to the rich debate on the microfoundations of organizational adaptation in general and innovation management in particular.

ACKNOWLEDGEMENTS

Open Access funding enabled and organized by Projekt DEAL.

CONFLICT OF INTEREST STATEMENT

The authors declare none.

DATA AVAILABILITY STATEMENT

The data sets generated and analyzed in this study are available from the corresponding author upon reasonable request.

ORCID

Tim Heubeck https://orcid.org/0000-0002-8590-1435

REFERENCES

Åberg, C., & Torchia, M. (2020). Do boards of directors foster strategic change? A dynamic managerial capabilities perspective. *Journal of Management and Governance*, *24*(3), 655–684. https://doi.org/10.1007/s10997-019-09462-4

Acciarini, C., Brunetta, F., & Boccardelli, P. (2021). Cognitive biases and decision-making strategies in times of change: A systematic literature review. *Management Decision*, *59*(3), 638–652. https://doi.org/10.1108/MD-07-2019-1006

Adams, R., Bessant, J., & Phelps, R. (2006). Innovation management measurement: A review. *International Journal of Management Reviews*, *8*(1), 21–47. https://doi.org/10.1111/j.1468-2370.2006.00119.x

Adams, R. B., Almeida, H., & Ferreira, D. (2005). Powerful CEOs and their impact on corporate performance. *The Review of Financial Studies*, *18*(4), 1403–1432. https://doi.org/10.1093/rfs/hhi030

Adams, R. B., & Ferreira, D. (2007). A theory of friendly boards. *The Journal of Finance*, *62*(1), 217–250. https://doi.org/10.1111/j.1540-6261.2007.01206.x

Adler, P. S., & Kwon, S.-W. (2002). Social capital: Prospects for a new concept. *The Academy of Management Review*, *27*(1), 17–40. https://doi.org/10.2307/4134367

Adner, R., & Helfat, C. E. (2003). Corporate effects and dynamic managerial capabilities. *Strategic Management Journal*, *24*(10), 1011–1025. https://doi.org/10.1002/smj.331

Aguinis, H., Audretsch, D., Flammer, C., Meyer, K., Peng, M., & Teece, D. J. (2022). Bringing the manager back into management scholarship. *Journal of Management*, *48*(7), 1849–1857. https://doi.org/10.1177/01492063221082555

Alguezaui, S., & Filieri, R. (2010). Investigating the role of social capital in innovation: Sparse versus dense network. *Journal of Knowledge Management*, *14*(6), 891–909. https://doi.org/10.1108/13673271011084925

Arndt, F., Galvin, P., Jansen, R. J. G., Lucas, G. J. M., & Su, P. (2022). Dynamic capabilities: New ideas, microfoundations, and criticism. *Journal of Management & Organization*, *1–6*, 423–428. https://doi.org/10.1017/jmo.2022.57

Atallah, G., De Fuentes, C., & Panasian, C. A. (2021). Ownership, compensation and board diversity as innovation drivers: A comparison of U.S. and Canadian firms. *International Journal of Innovation Management*, *25*(03), 2150025. https://doi.org/10.1142/S1363919621500250

Audia, P. G., & Greve, H. R. (2006). Less likely to fail: Low performance, firm size, and factory expansion in the shipbuilding industry. *Management Science*, *52*(1), 83–94. https://doi.org/10.1287/mnsc.1050.0446

Augier, M., & Teece, D. J. (2009). Dynamic capabilities and the role of managers in business strategy and economic performance. *Organization Science*, *20*(2), 410–421. https://doi.org/10.1287/orsc.1090.0424

Azar, G., & Ciabuschi, F. (2017). Organizational innovation, technological innovation, and export performance: The effects of innovation radicalness and extensiveness. *International Business Review*, *26*(2), 324–336. https://doi.org/10.1016/j.ibusrev.2016.09.002

Bailey, E. E., & Helfat, C. E. (2003). External management succession, human capital, and firm performance: An integrative analysis. *Managerial and Decision Economics*, *24*(4), 347–369. https://doi.org/10.1002/mde.1119

Balsmeier, B., Buchwald, A., & Stiebale, J. (2014). Outside directors on the board and innovative firm performance. *Research Policy*, *43*(10), 1800–1815. https://doi.org/10.1016/j.respol.2014.06.003

Baltagi, B. H. (2021). *Econometric analysis of panel data* (6th ed.). Springer International Publishing. https://doi.org/10.1007/978-3-030-53953-5

Barker, V. L., & Mueller, G. C. (2002). CEO characteristics and firm R&D spending. *Management Science*, *48*(6), 782–801. https://doi.org/10.1287/mnsc.48.6.782.187

Baysinger, B. D., & Hoskisson, R. E. (1990). The composition of boards of directors and strategic control: Effects on corporate strategy. *Academy of Management Review*, *15*(1), 72–87. https://doi.org/10.5465/amr.1990.4308231

Baysinger, B. D., Kosnik, R. D., & Turk, T. A. (1991). Effects of board and ownership structure on corporate R&D strategy. *Academy of Management Journal*, *34*(1), 205–214. https://doi.org/10.5465/256308

Becheikh, N., Landry, R., & Amara, N. (2006). Lessons from innovation empirical studies in the manufacturing sector: A systematic review of the literature from 1993–2003. *Technovation*, *26*(5), 644–664. https://doi.org/10.1016/j.technovation.2005.06.016

Beck, J. B., & Wiersema, M. F. (2013). Executive decision making: Linking dynamic managerial capabilities to the resource portfolio and strategic outcomes. *Journal of Leadership & Organizational Studies*, *20*(4), 408–419. https://doi.org/10.1177/1548051812471722

Björkdahl, J. (2020). Strategies for digitalization in manufacturing firms. *California Management Review*, *62*(4), 17–36. https://doi.org/10.1177/0008125620920349

Blyler, M., & Coff, R. W. (2003). Dynamic capabilities, social capital, and rent appropriation: Ties that split pies. *Strategic Management Journal*, *24*(7), 677–686. https://doi.org/10.1002/smj.327

Bock, A. J., Opsahl, T., George, G., & Gann, D. M. (2012). The effects of culture and structure on strategic flexibility during business model innovation. *Journal of Management Studies*, *49*(2), 279–305. https://doi.org/10.1111/j.1467-6486.2011.01030.x

Bourgeois, L. J. (1981). On the measurement of organizational slack. *Academy of Management Review*, *6*(1), 29–39. https://doi.org/10.5465/AMR.1981.4287985

Boyd, B. K. (1995). CEO duality and firm performance: A contingency model. *Strategic Management Journal*, *16*(4), 301–312. https://doi.org/10.1002/smj.4250160404

Breusch, T. S., & Pagan, A. (1980). The Lagrange multiplier test and its applications to model specification in econometrics. *Review of Economic Studies*, *47*(1), 239–253. https://doi.org/10.2307/2297111

Brickley, J. A., Coles, J. L., & Jarrell, G. (1997). Leadership structure: Separating the CEO and chairman of the board. *Journal of Corporate Finance*, *3*(3), 189–220. https://doi.org/10.1016/S0929-1199(96)00013-2

Brossard, O., Lavigne, S., & Erdem Sakinç, M. (2013). Ownership structures and R&D in Europe: The good institutional investors, the bad and ugly impatient shareholders. *Industrial and Corporate Change*, *22*(4), 1031–1068. https://doi.org/10.1093/icc/dtt018

Brown, S. J., Goetzmann, W., Ibbotson, R. G., & Ross, S. A. (1992). Survivorship bias in performance studies. *Review of Financial Studies*, *5*(4), 553–580. https://doi.org/10.1093/rfs/5.4.553

Buchholtz, A. K., Young, M. N., & Powell, G. N. (1998). Are board members pawns or watchdogs? The link between CEO pay and firm performance. *Group & Organization Management*, *23*(1), 6–26. https://doi.org/10.1177/1059601198231002

Cannella, A. A., & Holcomb, T. R. (2005). A multi-level analysis of the upper-echelons model. In F. Dansereau & F. J. Yammarino (Eds.), *Multi-level issues in strategy and methods* (Vol. 4, pp. 195–237). Emerald Group Publishing Limited. https://doi.org/10.1016/S1475-9144(05)04009-9

Chandy, R. K., & Tellis, G. J. (2000). The incumbent's curse? Incumbency, size, and radical product innovation. *Journal of Marketing*, *64*(3), 1–17. https://doi.org/10.1509/jmkg.64.3.1.18033

Chin, T., Wang, W., Yang, M., Duan, Y., & Chen, Y. (2021). The moderating effect of managerial discretion on blockchain technology and the firms' innovation quality: Evidence from Chinese manufacturing firms. *International Journal of Production Economics*, *240*, 108219. https://doi.org/10.1016/j.ijpe.2021.108219

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, *35*(1), 128–152. https://doi.org/10.2307/2393553

Combs, J. G., Ketchen, D. J. Jr., Perryman, A. A., & Donahue, M. S. (2007). The moderating effect of CEO power on the board composition–firm performance relationship. *Journal of Management Studies*, *44*(8), 1299–1323. https://doi.org/10.1111/j.1467-6486.2007.00708.x

Cummings, T., & Knott, A. M. (2018). Outside CEOs and innovation. *Strategic Management Journal*, *39*(8), 2095–2119. https://doi.org/10.1002/smj.2792

Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm* (1st ed.). Prentice-Hall.

Daellenbach, U. S., McCarthy, A. M., & Schoenecker, T. S. (1999). Commitment to innovation: The impact of top management team characteristics. *R&D Management*, *29*(3), 199–208. https://doi.org/10.1111/1467-9310.00130

Dah, M. A., & Frye, M. B. (2017). Is board compensation excessive? *Journal of Corporate Finance*, *45*, 566–585. https://doi.org/10.1016/j.jcorpfin.2017.06.001

Dalton, D. R., Daily, C. M., Johnson, J. L., & Ellstrand, A. E. (1999). Number of directors and financial performance: A meta-analysis. *Academy of Management Journal*, *42*(6), 674–686. https://doi.org/10.5465/256988

Dalton, D. R., & Dalton, C. M. (2011). Integration of micro and macro studies in governance research: CEO duality, board composition, and financial performance. *Journal of Management*, *37*(2), 404–411. https://doi.org/10.1177/0149206310373399

Dalton, D. R., Hitt, M. A., Certo, S. T., & Dalton, C. M. (2007). The fundamental agency problem and its mitigation. *Academy of Management Annals*, *1*(1), 1–64. https://doi.org/10.5465/078559806

Dalziel, T., Gentry, R. J., & Bowerman, M. (2011). An integrated agency–resource dependence view of the influence of directors' human and relational capital on firms' R&D spending. *Journal of Management Studies*, *48*(6), 1217–1242. https://doi.org/10.1111/j.1467-6486.2010.01003.x

Damanpour, F. (1991). Organizational innovation: A meta-analysis of effects of determinants and moderators. *Academy of Management Journal*, *34*(3), 555–590. https://doi.org/10.2307/256406

Daniel, F., Lohrke, F. T., Fornaciari, C. J., & Turner, R. A. (2004). Slack resources and firm performance: A meta-analysis. *Journal of Business Research*, *57*(6), 565–574. https://doi.org/10.1016/S0148-2963(02)00439-3

Datta, D. K., Rajagopalan, N., & Zhang, Y. (2003). New CEO openness to change and strategic persistence: The moderating role of industry characteristics. *British Journal of Management*, *14*(2), 101–114. https://doi.org/10.1111/1467-8551.00268

D'Aveni, R. A. (1994). *Hypercompetition*. Free Press.

Davis, J. H., Schoorman, F. D., & Donaldson, L. (1997). Toward a stewardship theory of management. *Academy of Management Review*, *22*(1), 20–47. https://doi.org/10.5465/amr.1997.9707180258

Deutsch, Y. (2005). The impact of board composition on firms' critical decisions: A meta-analytic review. *Journal of Management*, *31*(3), 424–444. https://doi.org/10.1177/0149206304272185

Deutsch, Y. (2007). The influence of outside directors' stock-option compensation on firms' R&D. *Corporate Governance: an International Review*, *15*(5), 816–827. https://doi.org/10.1111/j.1467-8683.2007.00611.x

Drucker, P. F. (1985). *Innovation and entrepreneurship: Practice and principles* (1st ed.). HarperCollins.

Durán, W. F., & Aguado, D. (2022). CEOs' managerial cognition and dynamic capabilities: A meta-analytical study from the microfoundations approach. *Journal of Management & Organization*, *1–29*, 451–479. https://doi.org/10.1017/jmo.2022.24

Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *Academy of Management Review*, *14*(1), 57–74. https://doi.org/10.5465/amr.1989.4279003

Elenkov, D. S., Judge, W., & Wright, P. (2005). Strategic leadership and executive innovation influence: An international multi-cluster comparative study. *Strategic Management Journal*, *26*(7), 665–682. https://doi.org/10.1002/smj.469

Elsayed, K. (2007). Does CEO duality really affect corporate performance? *Corporate Governance: An International Review*, *15*(6), 1203–1214. https://doi.org/10.1111/j.1467-8683.2007.00641.x

Faccio, M., Marchica, M.-T., & Mura, R. (2016). CEO gender, corporate risk-taking, and the efficiency of capital allocation. *Journal of Corporate Finance*, *39*, 193–209. https://doi.org/10.1016/j.jcorpfin.2016.02.008

Fainshmidt, S., Pezeshkan, A., Lance Frazier, M., Nair, A., & Markowski, E. (2016). Dynamic capabilities and organizational performance: A meta-analytic evaluation and extension. *Journal of Management Studies*, *53*(8), 1348–1380. https://doi.org/10.1111/joms.12213

Faleye, O. (2007). Does one hat fit all? The case of corporate leadership structure. *Journal of Management & Governance*, *11*(3), 239–259. https://doi.org/10.1007/s10997-007-9028-3

Faleye, O., Hoitash, R., & Hoitash, U. (2011). The costs of intense board monitoring. *Journal of Financial Economics*, *101*(1), 160–181. https://doi.org/10.1016/j.jfineco.2011.02.010

Faleye, O., Kovacs, T., & Venkateswaran, A. (2014). Do better-connected CEOs innovate more? *Journal of Financial and Quantitative Analysis*, *49*(5–6), 1201–1225. https://doi.org/10.1017/S0022109014000714

Fama, E. F. (1980). Agency problems and the theory of the firm. *The Journal of Political Economy*, *88*(2), 288–307. https://doi.org/10.1086/260866

Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *The Journal of law & Economics*, *26*(2), 301–325. https://doi.org/10.1086/467037

Felin, T., & Foss, N. J. (2005). Strategic organization: A field in search of micro-foundations. *Strategic Organization*, *3*(4), 441–455. https://doi.org/10.1177/1476127005055796

Felin, T., Foss, N. J., Heimeriks, K. H., & Madsen, T. L. (2012). Microfoundations of routines and capabilities: Individuals, processes, and structure. *Journal of Management Studies*, *49*(8), 1351–1374. https://doi.org/10.1111/j.1467-6486.2012.01052.x

Finkelstein, S. (1992). Power in top management teams: Dimensions, measurement, and validation. *Academy of Management Journal*, *35*(3), 505–538. https://doi.org/10.5465/256485

Finkelstein, S., & Boyd, B. K. (1998). How much does the CEO matter? The role of managerial discretion in the setting of CEO compensation. *Academy of Management Journal*, *41*(2), 179–199. https://doi.org/10.5465/257101

Finkelstein, S., & D'Aveni, R. A. (1994). CEO duality as a double-edged sword: How boards of directors balance entrenchment avoidance and unity of command. *Academy of Management Journal*, *37*(5), 1079–1108. https://doi.org/10.5465/256667

Finkelstein, S., & Hambrick, D. C. (1990). Top-management-team tenure and organizational outcomes: The moderating role of managerial discretion. *Administrative Science Quarterly*, *35*(3), 484–503. https://doi.org/10.2307/2393314

Finkelstein, S., Hambrick, D. C., & Cannella, B. (2009). *Strategic leadership: Theory and research on executives, top management teams, and boards* (1st ed.). Oxford University Press.

Floyd, S. W., & Lane, P. J. (2000). Strategizing throughout the organization: Managing role conflict in strategic renewal. *Academy of Management Review*, *25*(1), 154–177. https://doi.org/10.5465/amr.2000.2791608

Fukuyama, F. (1996). *Trust: Social virtues and the creation of prosperity*. The Free Press.

Gavetti, G. (2012). Toward a behavioral theory of strategy. *Organization Science*, *23*(1), 267–285. https://doi.org/10.1287/orsc.1110.0644

Geletkanycz, M. A., & Black, S. S. (2001). Bound by the past? Experience-based effects on commitment to the strategic status quo. *Journal of Management*, *27*(1), 3–21. https://doi.org/10.1177/014920630102700103

Geletkanycz, M. A., & Hambrick, D. C. (1997). The external ties of top executives: Implications for strategic choice and performance. *Administrative Science Quarterly*, *42*(4), 654–681. https://doi.org/10.2307/2393653

George, N., Karna, A., & Sud, M. (2022). Entrepreneurship through the lens of dynamic managerial capabilities: A review of the literature. *Journal of Management & Organization*, *1–27*, 605–631. https://doi.org/10.1017/jmo.2022.25

Goodstein, J., Gautam, K., & Boeker, W. (1994). The effects of board size and diversity on strategic change. *Strategic Management Journal*, *15*(3), 241–250. https://doi.org/10.1002/smj.4250150305

Greene, W. H. (2019). *Econometric analysis* (8th ed.). Pearson.

Gupta, A. K., Tesluk, P. E., & Taylor, M. S. (2007). Innovation at and across multiple levels of analysis. *Organization Science*, *18*(6), 885–897. https://doi.org/10.1287/orsc.1070.0337

Hambrick, D. C., & Finkelstein, S. (1987). Managerial discretion: A bridge between polar views of organizational outcomes. In B. M. Staw & L. L. Cummings (Eds.), *Research in organizational behavior* (Vol. 9, pp. 369–406). JAI Press.

Hambrick, D. C., & Fukutomi, G. D. (1991). The seasons of a CEO's tenure. *The Academy of Management Review*, *16*(4), 719–742. https://doi.org/10.2307/258978

Hambrick, D. C., Geletkanycz, M. A., & Fredrickson, J. W. (1993). Top executive commitment to the status quo: Some tests of its determinants. *Strategic Management Journal*, *14*(6), 401–418. https://doi.org/10.1002/smj.4250140602

Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, *9*(2), 193–206. https://doi.org/10.5465/amr.1984.4277628

Hayes, R. H., & Abernathy, W. J. (1980). Managing our way to economic decline. *Harvard Business Review*, *58*(4), 67–77.

He, J., & Wang, H. C. (2009). Innovative knowledge assets and economic performance: The asymmetric roles of incentives and monitoring. *Academy of Management Journal*, *52*(5), 919–938. https://doi.org/10.5465/amj.2009.44633414

Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M. A., Singh, H., Teece, D. J., & Winter, S. (2007). *Dynamic capabilities: Understanding strategic change in organizations*. Blackwell Pub.

Helfat, C. E., & Martin, J. A. (2015a). Dynamic managerial capabilities: A perspective on the relationship between managers, creativity and innovation in organizations. In C. Shalley, M. A. Hitt, & J. Zhou (Eds.), *The Oxford handbook of creativity, innovation, and entrepreneurship: Multilevel linkages* (pp. 421–429). Oxford University Press.

Helfat, C. E., & Martin, J. A. (2015b). Dynamic managerial capabilities: Review and assessment of managerial impact on strategic change. *Journal of Management*, *41*(5), 1281–1312. https://doi.org/10.1177/0149206314561301

Henderson, A. D., Miller, D., & Hambrick, D. C. (2006). How quickly do CEOs become obsolete? Industry dynamism, CEO tenure, and company performance. *Strategic Management Journal*, *27*(5), 447–460. https://doi.org/10.1002/smj.524

Hernandez, M. (2008). Promoting stewardship behavior in organizations: A leadership model. *Journal of Business Ethics*, *80*(1), 121–128. https://doi.org/10.1007/s10551-007-9440-2

Herrmann, P., & Datta, D. K. (2005). Relationships between top management team characteristics and international diversification: An empirical investigation. *British Journal of Management*, *16*(1), 69–78. https://doi.org/10.1111/j.1467-8551.2005.00429.x

Heubeck, T. (2023). Managerial capabilities as facilitators of digital transformation? Dynamic managerial capabilities as antecedents to digital business model transformation and firm performance. *Digital Business*, *3*(1), 100053. https://doi.org/10.1016/j.digbus.2023.100053

Heubeck, T., & Meckl, R. (2022a). More capable, more innovative? An empirical inquiry into the effects of dynamic managerial capabilities on digital firms' innovativeness. *European Journal of Innovation Management*, *25*(6), 892–915. https://doi.org/10.1108/EJIM-02-2022-0099

Heubeck, T., & Meckl, R. (2022b). Antecedents to cognitive business model evaluation: A dynamic managerial capabilities perspective. *Review of Managerial Science*, *16*(8), 2441–2466. https://doi.org/10.1007/s11846-021-00503-7

Hill, C. W. L., & Snell, S. A. (1988). External control, corporate strategy, and firm performance in research-intensive industries. *Strategic Management Journal*, *9*(6), 577–590. https://doi.org/10.1002/smj.4250090605

Hillman, A. J., Cannella, A. A., & Paetzold, R. L. (2000). The resource dependence role of corporate directors: Strategic adaptation of board composition in response to environmental change. *Journal of Management Studies*, *37*(2), 235–256. https://doi.org/10.1111/1467-6486.00179

Hillman, A. J., Withers, M. C., & Collins, B. J. (2009). Resource dependence theory: A review. *Journal of Management*, *35*(6), 1404–1427. https://doi.org/10.1177/0149206309343469

Hitt, M. A., & Tyler, B. B. (1991). Strategic decision models: Integrating different perspectives. *Strategic Management Journal*, *12*(5), 327–351. https://doi.org/10.1002/smj.4250120502

Ho, S. S. M., Li, A. Y., Tam, K., & Zhang, F. (2015). CEO gender, ethical leadership, and accounting conservatism. *Journal of Business Ethics*, *127*(2), 351–370. https://doi.org/10.1007/s10551-013-2044-0

Hofstede, G., Hofstede, G. J., & Minkov, M. (2010). *Cultures and organizations—Software of the mind: Intercultural cooperation and its importance for survival* (3rd ed.). McGraw-Hill Education Ltd.

Holmes, R. M. Jr., Hitt, M. A., Perrewé, P. L., Palmer, J. C., & Molina-Sieiro, G. (2021). Building cross-disciplinary bridges in leadership: integrating top executive personality and leadership theory and research. *The Leadership Quarterly*, *32*(1), 101490.

Holzmayer, F., & Schmidt, S. L. (2020). Dynamic managerial capabilities, firm resources, and related business diversification—Evidence from the English Premier League. *Journal of Business Research*, *117*, 132–143. https://doi.org/10.1016/j.jbusres.2020.05.044

Hoskisson, R. E., Hitt, M. A., Johnson, R. A., & Grossman, W. (2002). Conflicting voices: The effects of institutional ownership heterogeneity and internal governance on corporate innovation strategies. *Academy of Management Journal*, *45*(4), 697–716. https://doi.org/10.5465/3069305

Howell, J. M., & Higgins, C. A. (1990). Champions of technological innovation. *Administrative Science Quarterly*, *35*(2), 317–341. https://doi.org/10.2307/2393393

Howell, J. M., Shea, C. M., & Higgins, C. A. (2005). Champions of product innovations: Defining, developing, and validating a measure of champion behavior. *Journal of Business Venturing*, *20*(5), 641–661. https://doi.org/10.1016/j.jbusvent.2004.06.001

Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *The Journal of Finance*, *48*(3), 831–880. https://doi.org/10.1111/j.1540-6261.1993.tb04022.x

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Kahneman, D. (2012). *Thinking, fast and slow* (1st ed.). Penguin.

Kor, Y. Y. (2006). Direct and interaction effects of top management team and board compositions on R&D investment strategy. *Strategic Management Journal*, *27*(11), 1081–1099. https://doi.org/10.1002/smj.554

Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, N., & Roig-Tierno, N. (2021). Digital transformation: An overview of the current state of the art of research. *SAGE Open*, *11*(3), 1–15. https://doi.org/10.1177/21582440211047576

Krause, R., Semadeni, M., & Withers, M. C. (2016). That special someone: When the board views its chair as a resource. *Strategic Management Journal*, *37*(9), 1990–2002. https://doi.org/10.1002/smj.2444

Kurzhals, C., Graf-Vlachy, L., & König, A. (2020). Strategic leadership and technological innovation: A comprehensive review and research agenda. *Corporate Governance: An International Review*, *28*(6), 437–464. https://doi.org/10.1111/corg.12351

Laudien, S. M., & Daxböck, B. (2016). The influence of the industrial internet of things on business model design: A qualitative-empirical analysis. *International Journal of Innovation Management*, *20*(08), 1640014. https://doi.org/10.1142/S1363919616400144

Laverty, K. J. (1996). Economic "short-termism": The debate, the unresolved issues, and the implications for management practice and research. *Academy of Management Review*, *21*(3), 825–860. https://doi.org/10.5465/amr.1996.9702100316

Leiponen, A., & Helfat, C. E. (2010). Innovation objectives, knowledge sources, and the benefits of breadth. *Strategic Management Journal*, *31*(2), 224–236. https://doi.org/10.1002/smj.807

Lewellyn, K. B., & Muller-Kahle, M. I. (2012). CEO power and risk taking: Evidence from the subprime lending industry. *Corporate Governance: An International Review*, *20*(3), 289–307. https://doi.org/10.1111/j.1467-8683.2011.00903.x

Li, M., & Yang, J. (2019). Effects of CEO duality and tenure on innovation. *Journal of Strategy and Management*, *12*(4), 536–552. https://doi.org/10.1108/JSMA-04-2019-0049

Liu, Y., & Jiraporn, P. (2010). The effect of CEO power on bond ratings and yields. *Journal of Empirical Finance*, *17*(4), 744–762. https://doi.org/10.1016/j.jempfin.2010.03.003

Lockett, A., Thompson, S., & Morgenstern, U. (2009). The development of the resource-based view of the firm: A critical appraisal. *International Journal of Management Reviews*, *11*(1), 9–28. https://doi.org/10.1111/j.1468-2370.2008.00252.x

Mahadeo, J. D., Soobaroyen, T., & Hanuman, V. O. (2012). Board composition and financial performance: Uncovering the effects of diversity in an emerging economy. *Journal of Business Ethics*, *105*(3), 375–388. https://doi.org/10.1007/s10551-011-0973-z

Mallette, P., & Fowler, K. L. (1992). Effects of board composition and stock ownership on the adoption of "poison pills". *Academy of Management Journal*, *35*(5), 1010–1035. https://doi.org/10.5465/256538

Manev, I. M., & Elenkov, D. (2005). Top management leadership and influence on innovation: The role of sociocultural context. *Journal of Management*, *31*, 381–402.

Marlin, D., & Geiger, S. W. (2015). A reexamination of the organizational slack and innovation relationship. *Journal of Business Research*, *68*(12), 2683–2690. https://doi.org/10.1016/j.jbusres.2015.03.047

Martin, J. A., & Bachrach, D. G. (2018). A relational perspective of the microfoundations of dynamic managerial capabilities and transactive memory systems. *Industrial Marketing Management*, *74*, 27–38. https://doi.org/10.1016/j.indmarman.2018.07.008

Marvel, M. R., & Lumpkin, G. T. (2007). Technology entrepreneurs' human capital and its effects on innovation radicalness. *Entrepreneurship Theory and Practice*, *31*(6), 807–828. https://doi.org/10.1111/j.1540-6520.2007.00209.x

McClelland, D. C. (1970). The two faces of power. *Journal of International Affairs*, *24*(1), 29–47.

McDonald, M. L., & Westphal, J. D. (2003). Getting by with the advice of their friends: CEOs' advice networks and firms' strategic responses to poor performance. *Administrative Science Quarterly*, *48*(1), 1–32. https://doi.org/10.2307/3556617

Miller, D. (1991). Stale in the saddle: CEO tenure and the match between organization and environment. *Management Science*, *37*(1), 34–52. https://doi.org/10.1287/mnsc.37.1.34

Miller, D., & Shamsie, J. (2001). Learning across the life cycle: Experimentation and performance among the Hollywood studio heads. *Strategic Management Journal*, *22*(8), 725–745. https://doi.org/10.1002/smj.171

Mintzberg, H. (1983). *Power in and around organizations*. Pearson.

Mischel, W. (1977). The interaction of the person and the situation. In *Personality at the crossroads: Current issues in interactional psychology* (pp. 333–352). Erlbaum.

Mizruchi, M. S. (1983). Who controls whom? An examination of the relation between management and boards of directors in large American corporations. *Academy of Management Review*, *8*(3), 426–435. https://doi.org/10.5465/amr.1983.4284426

Musteen, M., Barker, V. L., & Baeten, V. L. (2006). CEO attributes associated with attitude toward change: The direct and moderating effects of CEO tenure. *Journal of Business Research*, *59*(5), 604–612. https://doi.org/10.1016/j.jbusres.2005.10.008

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, *23*(2), 242–266. https://doi.org/10.5465/amr.1998.533225

Palmié, M., Miehè, L., Oghazi, P., Parida, V., & Wincent, J. (2022). The evolution of the digital service ecosystem and digital business model innovation in retail: The emergence of meta-ecosystems and the value of physical interactions. *Technological Forecasting and Social Change*, *177*, 121496. https://doi.org/10.1016/j.techfore.2022.121496

Peng, M. W., Zhang, S., & Li, X. (2007). CEO duality and firm performance during China's institutional transitions. *Management and Organization Review*, *3*(2), 205–225. https://doi.org/10.1111/j.1740-8784.2007.00069.x

Penttilä, K., Ravald, A., Dahl, J., & Björk, P. (2020). Managerial sensemaking in a transforming business ecosystem: Conditioning forces, moderating frames, and strategizing options. *Industrial Marketing Management*, *91*, 209–222. https://doi.org/10.1016/j.indmarman.2020.09.008

Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations: A resource dependence perspective* (1st ed.). Harper & Row.

Prahalad, C. K., & Bettis, R. A. (1986). The dominant logic: A new linkage between diversity and performance. *Strategic Management Journal*, *7*(6), 485–501. https://doi.org/10.1002/smj.4250070602

Quigley, T. J., & Hambrick, D. C. (2015). Has the "CEO effect" increased in recent decades? A new explanation for the great rise in America's attention to corporate leaders. *Strategic Management Journal*, *36*(6), 821–830. https://doi.org/10.1002/smj.2258

Rajagopalan, N., & Datta, D. K. (1996). CEO characteristics: Does industry matter? *Academy of Management Journal*, *39*(1), 197–215. https://doi.org/10.5465/256636

Rechner, P. L., & Dalton, D. R. (1991). CEO duality and organizational performance: A longitudinal analysis. *Strategic Management Journal*, *12*(2), 155–160. https://doi.org/10.1002/smj.4250120206

Rodenbach, M., & Brettel, M. (2012). CEO experience as micro-level origin of dynamic capabilities. *Management Decision*, *50*(4), 611–634. https://doi.org/10.1108/00251741211220174

Rogers, M. (2004). Networks, firm size and innovation. *Small Business Economics*, *22*(2), 141–153. https://doi.org/10.1023/B:SBEJ.0000014451.99047.69

Schoemaker, P. J. H., Heaton, S., & Teece, D. (2018). Innovation, dynamic capabilities, and leadership. *California Management Review*, *61*(1), 15–42. https://doi.org/10.1177/0008125618790246

Schumpeter, J. A. (1994). *Capitalism, socialism, and democracy*. Routledge.

Seo, J., Lee, G., & Park, C. (2022). CEO labor market and R&D investment in high-technology firms: An empirical study on the disciplinary effect of CEO labor market. *Journal of Management & Organization*, *1–18*, 30–47. https://doi.org/10.1017/jmo.2022.5

Sheikh, S. (2019). An examination of the dimensions of CEO power and corporate social responsibility. *Review of Accounting and Finance*, *18*(2), 221–244. https://doi.org/10.1108/RAF-01-2018-0034

Simsek, Z. (2007). CEO tenure and organizational performance: An intervening model. *Strategic Management Journal*, *28*(6), 653–662. https://doi.org/10.1002/smj.599

Sirmon, D. G., & Hitt, M. A. (2009). Contingencies within dynamic managerial capabilities: Interdependent effects of resource investment and deployment on firm performance. *Strategic Management Journal*, *30*(13), 1375–1394. https://doi.org/10.1002/smj.791

Smith, W. K., & Tushman, M. L. (2005). Managing strategic contradictions: A top management model for managing innovation streams. *Organization Science*, *16*(5), 522–536. https://doi.org/10.1287/orsc.1050.0134

Sonnenfeld, J. (1991). *The hero's farewell: What happens when CEOs retire*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195065831.001.0001

Tabesh, P., Vera, D., & Keller, R. T. (2019). Unabsorbed slack resource deployment and exploratory and exploitative innovation: How much does CEO expertise matter? *Journal of Business Research*, *94*, 65–80. https://doi.org/10.1016/j.jbusres.2018.08.023

Tasheva, S., & Nielsen, B. B. (2020). The role of global dynamic managerial capability in the pursuit of international strategy and superior performance. *Journal of International Business Studies*, *53*, 689–708. https://doi.org/10.1057/s41267-020-00336-8

Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, *28*(13), 1319–1350. https://doi.org/10.1002/smj.640

Teece, D. J. (2014). The foundations of enterprise performance: Dynamic and ordinary capabilities in an (economic) theory of firms. *Academy of Management Perspectives*, *28*(4), 328–352. https://doi.org/10.5465/amp.2013.0116

Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, *51*(1), 40–49. https://doi.org/10.1016/j.lrp.2017.06.007

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509–533. https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z

Tripsas, M., & Gavetti, G. (2000). Capabilities, cognition, and inertia: Evidence from digital imaging. *Strategic Management Journal*, *21*(10/11), 1147–1161. https://doi.org/10.1002/1097-0266(200010/11)21:10/11<1147::AID-SMJ128>3.0.CO;2-R

US Census Bureau. (2022). North American Industry Classification System (NAICS). Retrieved July 24, 2022, from https://www.census.gov/naics/?58967?yearbck=2022

Uzun, H., Szewczyk, S. H., & Varma, R. (2004). Board composition and corporate fraud. *Financial Analysts Journal*, *60*(3), 33–43. https://doi.org/10.2469/faj.v60.n3.2619

Van de Ven, A. H. (1986). Central problems in the management of innovation. *Management Science*, *32*(5), 590–607. https://doi.org/10.1287/mnsc.32.5.590

Vera, D., Bonardi, J.-P., Hitt, M. A., & Withers, M. C. (2022). Extending the boundaries of strategic leadership research. *The Leadership Quarterly*, *33*(3), 101617. https://doi.org/10.1016/j.leaqua.2022.101617

Wai, J., & Rindermann, H. (2015). The path and performance of a company leader: A historical examination of the education and cognitive ability of Fortune 500 CEOs. *Intelligence*, *53*, 102–107. https://doi.org/10.1016/j.intell.2015.10.001

Walsh, J. P. (1995). Managerial and organizational cognition: Notes from a trip down memory lane. *Organization Science*, *6*(3), 280–321. https://doi.org/10.1287/orsc.6.3.280

Wangrow, D. B., Schepker, D. J., & Barker, V. L. (2015). Managerial discretion: An empirical review and focus on future research directions. *Journal of Management*, *41*(1), 99–135. https://doi.org/10.1177/0149206314554214

Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, *52*(3), 326–349. https://doi.org/10.1016/j.lrp.2018.12.001

Wheatley, K. K., & Doty, D. H. (2010). Executive compensation as a moderator of the innovation–performance relationship. *Journal of Business & Management*, *16*(1), 89–102.

Wiggins, R. R., & Ruefli, T. W. (2005). Schumpeter's ghost: Is hypercompetition making the best of times shorter? *Strategic Management Journal*, *26*(10), 887–911. https://doi.org/10.1002/smj.492

Witschel, D., Baumann, D., & Voigt, K.-I. (2022). How manufacturing firms navigate through stormy waters of digitalization: The role of dynamic capabilities, organizational factors and environmental turbulence for business model innovation. *Journal of Management & Organization*, *1–34*, 681–714. https://doi.org/10.1017/jmo.2022.44

Wrede, M., & Dauth, T. (2020). A temporal perspective on the relationship between top management team internationalization and firms'

innovativeness. *Managerial and Decision Economics*, *41*(4), 542–561. https://doi.org/10.1002/mde.3119

Yan, Y., Chong, C. Y., & Mak, S. (2010). An exploration of managerial discretion and its impact on firm performance: Task autonomy, contractual control, and compensation. *International Business Review*, *19*(6), 521–530. https://doi.org/10.1016/j.ibusrev.2010.04.004

Zona, F. (2012). Corporate investing as a response to economic downturn: Prospect theory, the behavioural agency model and the role of financial slack. *British Journal of Management*, *23*(S1), S42–S57. https://doi.org/10.1111/j.1467-8551.2012.00818.x

Zona, F., Zattoni, A., & Minichilli, A. (2013). A contingency model of boards of directors and firm innovation: The moderating role of firm size. *British Journal of Management*, *24*(3), 299–315. https://doi.org/10.1111/j.1467-8551.2011.00805.x

How to cite this article: Heubeck, T., & Meckl, R. (2023). Microfoundations of innovation: A dynamic CEO capabilities perspective. *Managerial and Decision Economics*, *44*(6), 3108–3126. https://doi.org/10.1002/mde.3866

APPENDIX

TABLE A1 Operationalization of managerial cognition.

Score	1	2	3	4	5
Description	Neither technical nor business education	Business bachelor's degree	Business master's degree	Business doctorate/PhD degree	Technical bachelor's degree

TABLE A1 (Continued)

Score	6	7	8	9	10
Description	Technical bachelor's degree and business degree	Technical master's degree	Technical master's degree and business degree	Technical doctorate/PhD	Technical doctorate/PhD and business degree