

Project portfolio success determinants: a dynamic capability perspective

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Masoud Aghajani

School of Business and Law, Edith Cowan University, Perth, Australia

Ashkan Memari

*School of Engineering and Technology, Central Queensland University,
Brisbane, Australia, and*

Reza Kiani Mavi

School of Business and Law, Edith Cowan University, Perth, Australia

Abstract

Purpose – This study reconceptualizes project portfolio management (PPM) through dynamic capabilities (DC) theory, explaining how sensing, seizing, and transforming routines co-evolve to sustain strategic alignment and adaptive portfolio performance.

Design/methodology/approach – An integrative review of 66 peer-reviewed studies (1999–2024) identifies and classifies 26 success determinants (SDs) by DC domains (sensing, seizing, transforming, or cross-cutting microfoundations) and analytical role (antecedent, routine, mediator, outcome), producing a mechanism-view framework of portfolio success.

Findings – Portfolio success emerges from the simultaneous, mutually conditioning operation of sensing, seizing, and transforming domains, not from isolated practices or structures. Effects on performance are indirect, channeled through mediating capability states, such as decision effectiveness, management quality, and portfolio agility, and reinforced by cross-cutting microfoundations of leadership, culture, and stakeholder engagement. Two feedback pathways sustain renewal: a primary loop reshaping sensing capacity through lineage management and strategic recognition, and a secondary loop recalibrating seizing through portfolio reviews. The integrative framework consolidates these relationships into a single, empirically grounded, and directly testable architecture of portfolio capability.

Research limitations/implications – The synthesis reflects a field dominated by cross-sectional surveys. Five SDs, learning orientation, strategic recognition, structural alignment, transformational leadership, and individual managerial traits require large-scale quantitative verification, and the feedback pathways remain temporally undocumented. Longitudinal and process designs are the priority.

Practical implications – Portfolio success is sustained by the quality of feedback, learning, and integration routines, not governance structures alone. The three DC dimensions are interdependent: chronic underinvestment in both sensing and transforming erodes adaptive capacity that seizing cannot restore. As turbulence rises, sensing and transforming investments are likely to become proportionally more critical. Portfolio managers and steering committees govern different parts of this system and must coordinate to prevent capability compression under pressure.

Originality/value – The paper presents a novel mechanism-view framework that classifies project portfolio SDs by both their dynamic-capability domain and their functional role in the causal chain, turning a fragmented catalog of factors into a coherent, testable architecture of portfolio success.

Keywords Project portfolio management (PPM), Dynamic capabilities (DC), Success determinant (SD), Microfoundations, Project governance, Integrative review

Paper type Literature review



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1. Introduction

Project portfolio management (PPM) is central to implementing organizational strategy through multiple, interdependent projects (Martinsuo and Geraldi, 2020). Unlike single-project success, often measured by time, cost, and scope, portfolio success has a broader strategic orientation, reflecting how well a collection of projects collectively delivers sustained organizational value (Kock *et al.*, 2024; Martinsuo and Killen, 2014). Over the past 2 decades, a substantial body of primary empirical research has identified factors associated with portfolio success, including formal governance processes (Teller *et al.*, 2012), decision-making quality (Kester *et al.*, 2011), leadership and culture (Kaufmann *et al.*, 2020), and project execution capabilities (Martinsuo and Lehtonen, 2007). This work has been productive, yet its cumulative effect has been a growing inventory of success determinants (SDs) studied in isolation across governance, strategic alignment, resource allocation, and capability development sub-literature, with little theoretical account of how they jointly produce portfolio success.

The PPM review literature has made significant strides in mapping the field's intellectual landscape, yet its focus has been elsewhere (Table 1). Hansen and Svejvig (2022, 2023) have traced 7 decades of disciplinary evolution and identified the field's enduring principles. Meifort (2016) and Eckert and Hüsig (2022) have synthesized the innovation PPM literature within new product development (NPD) and digital service contexts, respectively. Aghajani *et al.* (2023b) have developed an integrative framework for sustainability integration in PPM. Barbosa and Carvalho (2024) have mapped dynamic capabilities (DC) across project management, PPM, and project-based organizations. These are valuable contributions on their own terms; the question of what drives portfolio success, which specific factors matter, what causal roles they play, and how they interact, has simply not been their object of inquiry. The result is a primary empirical literature rich in SD identification but lacking the synthesis that would render those determinants theoretically tractable and practically actionable.

This matters because SDs do not operate independently. For example, formalized governance processes enhance management quality because structured routines provide the informational infrastructure that managerial competence requires to function (Kock *et al.*, 2020; Teller *et al.*, 2012). Conversely, high entrepreneurial orientation (EO) without commensurate decision-making effectiveness can destabilize rather than enhance portfolio performance, as the capacity to sense opportunities outstrips the ability to evaluate and act on them (Kaufmann *et al.*, 2020; Kock and Gemünden, 2016). A catalog of factors, however comprehensive, offers portfolio managers limited guidance on where to invest, in what sequence, and through what mechanisms. What is needed is a theoretical account of how SDs are causally structured and mutually conditioning, one that explains portfolio success as the outcome of an adaptive system rather than the sum of discrete inputs.

To address this, the present study adopts DC theory as an integrative lens. DC theory holds that sustained competitive advantage under uncertainty derives from an organization's capacity to sense emerging opportunities and threats, seize them through coordinated resource mobilization, and transform its resource base to maintain strategic fit as conditions evolve (Teece *et al.*, 1997; Teece, 2007, 2018). PPM is inherently a DC-laden activity: it operates in turbulent, multi-project environments that demand continuous environmental scanning, disciplined prioritization, and ongoing reconfiguration of governance structures (Bechtel *et al.*, 2023; Biedenbach and Müller, 2012; Killen *et al.*, 2008a, 2012; Petit, 2012). Applying this lens allows us to reconceptualize the dispersed SD literature not as a list of independent variables but as an interconnected system of microfoundations comprising antecedents that shape organizational readiness, routines that enact adaptive processes, and mediating states that translate these into sustained performance.

The study addresses the following research question:

How do dynamic capability dimensions (sensing, seizing, and transforming) jointly explain the determinants of portfolio success?

Table 1. Positioning the present study relative to prior PPM reviews

Dimension	Barbosa and Carvalho (2024)	Aghajani <i>et al.</i> (2023b)	Hansen and Svejvig (2023)	Eckert and Hüsigg (2022)	Hansen and Svejvig (2022)	Meifort (2016)	Present study
Focus/scope	Dynamic capabilities across project management, PPM & project-based organizations	Sustainability integration in PPM (2000–2021)	PPM principles across 7 decades	Innovation PPM for digital service portfolios (to 2019)	Seven decades of PPM research (1950–2019)	Innovation PPM (NPD portfolios)	SDs of PPM across all project types (1999–2024)
Reviewed articles	62 articles	63 articles	100 articles	52 articles	669 articles	112 articles	66 articles
Theoretical lens	DC theory; multilevel classification	Sustainability/thematic framework	Descriptive–normative; no single integrating theory	Antecedents–consequences taxonomy	Historical/narrative; no single theory	Four perspectives (optimization, strategic, decision-making, organizational)	DC theory: sensing–seizing–transforming microfoundations
Primary object of inquiry	Classifying DCs across project management levels	Sustainability integration processes and frameworks in PPM	Identification and interpretation of enduring PPM principles	Antecedents, consequences, frameworks, and challenges of innovation PPM for digital services	Historical narrative and intellectual evolution of the PPM discipline	Perspectives and research streams in innovation PPM	Identification, synthesis, and causal classification of PPM SDs
Primary output	Multilevel DC framework classifying 99 DCs by level of analysis	Integrative sustainability framework with thematic research agenda	17 PPM principles organized in a semantic hierarchy	Classification of findings; digital service research agenda	Historical narrative model; seven-decade future agenda	Taxonomy of IPM perspectives; research agenda	Mechanism-view DC framework: 26 SDs classified by DC dimension and causal role, explaining how they interact to produce portfolio success
Source(s): Authors' own work							

To answer this, we conducted an integrative review of 66 peer-reviewed studies (1999–2024), identifying 26 SDs and classifying each by its DC dimension and analytical role (Antecedent, Routine, Mediator, or Outcome). This dual classification yields a mechanism-view framework in which portfolio success is theorized to emerge from the recursive interaction among sensing, seizing, and transforming routines, mediated by capability states such as decision effectiveness and portfolio agility, and reinforced by cross-cutting microfoundations including stakeholder engagement, leadership, and organizational culture. [Section 4](#) develops this architecture in full.

The study makes three contributions. First, it reframes portfolio success as a recursive, self-renewing system, specifying the mediating capability states and the two feedback pathways through which outcomes re-enter the capability system. Second, it provides a systematic synthesis and classification of PPM SDs within a unifying theoretical framework, identifying the complementarities among them and resolving a longstanding gap in the literature that has generated extensive empirical evidence without an integrative account. Third, it clarifies how this capability system operates across organizational, portfolio, and individual levels, and in doing so advances practical understanding of how organizations can strengthen adaptive portfolio performance through deliberate configuration of governance structures, decision routines, leadership, and culture.

The paper proceeds as follows. [Section 2](#) reviews the theoretical foundations of portfolio success and DC theory, including the established PPM-as-DC stream that this study extends. [Section 3](#) details the review methodology. [Section 4](#) presents the findings and integrative framework. [Section 5](#) discusses theoretical and managerial implications, as well as future research directions. Finally, [Section 6](#) concludes the paper.

2. Background and theoretical foundation

2.1 Measuring project portfolio success

Portfolio success is typically evaluated through a multifaceted lens that goes beyond individual project measures of time, cost, and scope to capture overall strategic value ([Cooper et al., 1999, 2001](#); [Meskendahl, 2010](#)). Much of the PPM literature treats portfolio success as the dependent variable, emphasizing how diverse factors, ranging from project-level execution to high-level governance, collectively influence organizational outcomes. Five success criteria (SCs) have become the dominant framework in empirical PPM research:

- (1) *SC1. Value maximization*: Ensuring strong performance across multiple projects while exploiting synergies among them ([Jonas et al., 2013](#); [Kock et al., 2015, 2016](#); [Kopmann et al., 2017](#)).
- (2) *SC2. Strategic alignment*: Continuously screening and prioritizing projects to maintain coherence with overarching corporate goals ([Jonas et al., 2013](#); [Unger et al., 2012b](#)).
- (3) *SC3. Portfolio balance*: Distributing risks, time horizons, and resource requirements across the project mix ([Killen et al., 2008b](#); [McNally et al., 2013](#)).
- (4) *SC4. Future preparedness*: Fostering adaptability through innovation, proactive learning, and rapid responsiveness to emerging trends ([Kaufmann et al., 2020](#); [Rank et al., 2015](#)).
- (5) *SC5. Economic success*: Realizing financial value through profitability, market impact, and revenue growth from portfolio initiatives ([Killen et al., 2008b](#); [Kock et al., 2024](#)).

These five criteria capture the dual imperative facing portfolio managers: doing the right projects (strategic effectiveness) and doing projects right (operational efficiency). They provide the outcome anchors against which SDs are evaluated throughout this study.

2.2 Project portfolio success determinants: a fragmented landscape

Building on this multidimensional success construct, 2 decades of empirical research have identified a broad range of SDs operating across organizational, portfolio, project, and people levels.

At the organizational or strategic level, factors such as a supportive culture (Kester *et al.*, 2011; Kock *et al.*, 2024) and dynamic capabilities (Bechtel *et al.*, 2023; Biedenbach and Müller, 2012) lay the groundwork for continual adaptation. Entrepreneurial orientation (Kaufmann *et al.*, 2020; Kock and Gemünden, 2020) helps identify emerging opportunities, while structural alignment (Hoffmann *et al.*, 2020; Kaiser *et al.*, 2015) ensures coherence between portfolios and strategy. Transformational leadership reinforces shared purpose and supports ongoing adaptation (Kester *et al.*, 2011; Zaman *et al.*, 2020).

At the portfolio level, formalized PPM processes (Elonen and Artto, 2003; Kock *et al.*, 2024; Teller *et al.*, 2012), management quality (Kock *et al.*, 2020; Teller *et al.*, 2012; Unger *et al.*, 2012a), and portfolio agility (Bechtel *et al.*, 2023; Kaufmann *et al.*, 2020; Kock and Gemünden, 2016) are consistently linked to portfolio success. These mechanisms not only enable efficient resource allocation and governance but also facilitate rapid reprioritization when market conditions or internal priorities shift (Bechtel *et al.*, 2023; Kock *et al.*, 2020). Additional SDs, such as front-end planning (Kock *et al.*, 2015, 2016), decision-making effectiveness (Kester *et al.*, 2014; Kock and Gemünden, 2016), and an emphasis on customer relationship value (Voss, 2012; Voss and Kock, 2013), enhance the portfolio's responsiveness and alignment with organizational goals. Though addressed less frequently, portfolio visualization tools (Killen *et al.*, 2020) and real options reasoning (ROR) (Kaufmann *et al.*, 2021) further enhance adaptability by improving transparency and flexibility in decision-making.

At the project level, many SDs converge on the importance of information availability, standardized project management processes, and clearly defined project goals, all of which bolster project portfolio efficiency and strategic congruence (Dietrich and Lehtonen, 2005; Martinsuo and Lehtonen, 2007; Urhahn and Spieth, 2014). Meanwhile, people-related SDs, such as active stakeholder engagement (Beringer *et al.*, 2012, 2013; Unger *et al.*, 2012a), proactive voice behavior (Kaufmann *et al.*, 2020; Kock *et al.*, 2024) and certain managerial traits (McNally *et al.*, 2013), play a critical role in ensuring collaborative PPM decision-making and success.

Despite this progress, the field lacks both a systematic synthesis of these dispersed findings into a unified SD catalog and a theoretical account of how the identified determinants interact. Most studies operationalize SDs as isolated independent variables statistically linked to outcomes (Jonas *et al.*, 2013; Teller *et al.*, 2012), effectively treating them as separable levers. However, SDs interact in ways this approach cannot capture. For instance, formalized PPM processes enhance the effect of management quality because structured governance provides the informational infrastructure that managerial competence requires to function (Kock *et al.*, 2020; Teller *et al.*, 2012). Conversely, high EO (SD5) without adequate decision-making effectiveness (SD7) can destabilize rather than enhance portfolio performance, as the capacity to sense opportunities outstrips the ability to evaluate and act on them (Kaufmann *et al.*, 2020; Kock and Gemünden, 2016). These interdependencies call for a theoretical perspective that treats the SD landscape as a capability system rather than a list of factors, motivating the reinterpretation pursued in this study.

2.3 PPM as a dynamic capability: an established stream and a new contribution

DC theory explains how organizations integrate, build, and reconfigure internal and external resources to sustain competitiveness in changing environments (Teece *et al.*, 1997; Teece, 2007). Emerging from critiques of the resource-based view, i.e. adequate for stable environments but unable to explain sustained advantage under rapid market and technological change (Ambrosini and Bowman, 2009; Eisenhardt and Martin, 2000), DC theory shifts attention from resource stocks to the *processes* through which resource bases are purposefully modified. Eisenhardt and Martin (2000) specify these as identifiable organizational routines through which firms achieve new resource configurations as markets evolve, while Zollo and Winter (2002) explain how such routines themselves develop through deliberate learning mechanisms, including experiential accumulation,

knowledge articulation, and codification. Crucially, [Winter \(2003\)](#) distinguishes ordinary capabilities, which operate on a firm's resource base to produce outputs, from dynamic capabilities, which operate on ordinary capabilities themselves, serving as a second-order function that enables continuous adaptation rather than merely efficient execution. [Teece \(2007\)](#) disaggregates this second-order function into three clusters of capacities: *sensing* (scanning and interpreting opportunities and threats), *seizing* (mobilizing resources and governance structures to capture value), and *transforming/reconfiguring* (renewing the asset base to maintain strategic fit as conditions evolve). [Schilke \(2014\)](#) adds an important boundary condition: the DC–advantage relationship is inverted-U-shaped, strongest at intermediate levels of environmental dynamism and weaker under both stable and highly dynamic conditions. Two recent contributions sharpen this DC foundation. [Cristofaro et al. \(2025\)](#) show that most DC research reflects “adaptive evolution” (firms responding to discrete environmental shocks) and argue that continuous, reciprocal adjustment between firms and their environments, or adaptive co-evolution, remains comparatively underexplored. [Cristofaro et al. \(2026\)](#) reach a related conclusion, indicating that DCs are better understood as mechanisms of strategic orchestration that continuously rebalance persistent tensions, such as stability versus flexibility, rather than resolving them into a fixed configuration.

The conceptualization of PPM as a DC has an established empirical foundation. [Killen and Hunt \(2010\)](#) were among the first to formally identify PPM capability as a DC, applying [Teece et al.'s \(1997\)](#) Processes, Positions, and Paths framework to show that PPM capabilities evolve along path-dependent maturity trajectories shaped by cumulative learning investments. [Petit and Hobbs \(2010\)](#) and [Petit \(2012\)](#) operationalized the sensing–seizing–reconfiguring structure at the portfolio level through qualitative case research, demonstrating that PPM involves not merely periodic reviews but continuous operational adjustment: dedicated sensing mechanisms, governance structures for seizing, and both first-order reconfiguring of portfolio content and second-order transforming of the PPM processes themselves, directly instantiating [Winter's \(2003\)](#) higher-order capability logic in a PPM context. More recently, [Barbosa and Carvalho's \(2024\)](#) review on DCs in the project management field identified PPM capability as the most prevalent DC across all three dimensions and positioned it as a second-order capability bridging project-level practices and organizational strategy. Empirically, [Bechtel et al. \(2023\)](#) show that DC strength across at least two dimensions enhances portfolio agility, which mediates the DC–performance link, while [Biedenbach and Müller \(2012\)](#) demonstrate that absorptive and adaptive capabilities significantly improve both project- and portfolio-level outcomes.

Within the sensing–seizing–transforming logic, sensing in PPM involves scanning technological and market trends to identify emerging opportunities and threats ([Killen et al., 2008a](#); [Petit and Hobbs, 2010](#)); seizing entails disciplined project selection, governance structuring, and resource deployment to capture identified value ([Kaufmann et al., 2020](#); [Kock and Gemünden, 2019](#)); and transforming concerns reconfiguring portfolio composition and governance structures to maintain strategic fit as contexts evolve ([Kock and Gemünden, 2016](#); [Petit, 2012](#)). These three dimensions depend on microfoundations, i.e. specific routines, leadership behaviors, cultural norms, and informational practices, that enable the capability system to function cohesively ([Helfat and Peteraf, 2009](#); [Teece, 2007](#)). Formal elements such as stage-gate reviews, PPM information systems (PPMIS), and steering committees work alongside relational mechanisms such as empowering leadership, stakeholder engagement, and voice behavior to constitute the observable interior of the DC ([Barbosa and Carvalho, 2024](#)).

Critically, these three dimensions do not operate as sequential stages in PPM. Across the PPM–DC literature, sensing, seizing, and reconfiguring are consistently classified as simultaneously and continuously active, not as ordered phases that complete before the next begins. [Killen and Hunt \(2010\)](#) show PPM capabilities co-evolving through iterative learning cycles in which all three dimensions develop together. [Petit \(2012\)](#) and [Petit and Hobbs \(2010\)](#)

demonstrate continuous parallel operation of dedicated sensing mechanisms, governance structures for seizing, and reconfiguring routines. [Barbosa and Carvalho \(2024\)](#) classify PPM capability as spanning all three dimensions simultaneously in every study that treats PPM as a DC. [Bechtel et al. \(2023\)](#) add an important empirical refinement: the three dimensions are not simply additive but complementary, with threshold properties; at least two must be strongly present to enhance portfolio agility; sensing shows the strongest independent direct effect, while reconfiguring carries the highest loading as a second-order component. This simultaneous, mutually conditioning view, rather than a stage-gated sequence, is the theoretical foundation of the framework developed in this study.

Recognizing PPM as a DC, however, does not resolve the fragmentation identified in [Section 2.2](#). Existing DC-PPM research treats PPM capability as the unit of analysis, asking how PPM as a whole contributes to competitive advantage, how it evolves, and what learning investments sustain it. These contributions, however, largely overlook the internal aspects of this capability: which particular organizational factors form its microfoundations, how they relate to the three DC dimensions, and how they interact systemically to achieve portfolio success. This is the focus of the present study.

To make this interior visible, the study classifies the SDs identified in the review along two complementary dimensions. The first is the *DC dimension*: each SD is located within the sensing, seizing, or transforming domain according to its *primary* functional contribution to the capability system, with a fourth category of cross-cutting enablers for SDs that span multiple dimensions simultaneously. The second is the *analytical role*: each SD is assigned to one of four positions in the mechanism chain (Antecedent, Routine, Mediator, and Outcome), reflecting the causal logic through which DCs exert their effects ([Eriksson, 2014](#)). Antecedents are enabling conditions, such as leadership or culture, that shape the likelihood of DC enactment but are not routines themselves ([Helfat and Peteraf, 2009](#); [Teece, 2007](#)). Routines are repeatable organizational practices that operationalize DCs ([Eisenhardt and Martin, 2000](#)), such as formalized portfolio processes, decision-making mechanisms, and information systems. Mediators capture emergent capability states, such as portfolio agility or decision quality, that arise from the interaction of antecedents and routines and channel their effects toward performance ([Ambrosini and Bowman, 2009](#); [Pavlou and El Sawy, 2011](#)). Outcomes correspond to the five portfolio success criteria (SC1–SC5) identified in [Section 2.1](#). This multi-stage logic reflects the prevailing DC view that capabilities rarely exert direct effects on performance but operate through indirect developmental pathways ([Baía and Ferreira, 2024](#); [Teece, 2018](#)). A DC lens best supports this dual classification: unlike frameworks organized around static resource stocks or single-mechanism accounts of learning or governance, DC theory natively integrates enabling conditions, enacted practices, and emergent adaptive states within one recursive architecture, which is the structure this review’s corpus consistently exhibits.

Also, such dual classification produces a substantively different output from prior DC-PPM work: not a catalog of success factors organized by analytical level, but a mechanism-view framework that articulates how antecedents create enabling conditions, routines enact capability processes, mediators translate these into adaptive states, and outcomes register realized performance. In doing so, it directly addresses the long-standing tautology concern in DC research: the circularity that arises when capabilities are inferred from the performance they are meant to explain ([Arend and Bromiley, 2009](#); [Priem and Butler, 2001](#)). Because this study is an integrative review rather than a primary empirical test, it does not measure DCs in firms or correlate them with performance outcomes; the risk of tautology is therefore structurally limited. Nonetheless, the mechanism-view classification reinforces analytical rigor: by operationalizing each SD through its functional role, with definitions drawn directly from source study operationalizations, the framework renders the capability system independently observable, consistent with how the PPM literature has rendered DC constructs empirically observable ([Barbosa and Carvalho, 2024](#); [Bechtel et al., 2023](#); [Killen and Hunt, 2010](#)) and aligned with the design-science approach advocated by [Sebrek et al.](#)

(2024, 2025) for making DC constructs empirically tractable in project-based settings. The study thus advances the PPM-as-DC stream by opening its internal structure to systematic theoretical scrutiny.

A terminological distinction is warranted before proceeding. In DC theory, organizational routines are repeatable collective practices through which dynamic capabilities are enacted, e.g. stage-gate reviews, prioritization processes, and portfolio monitoring cycles (Eisenhardt and Martin, 2000). Microfoundations, in Teece's (2007) original formulation, refer to the individual-level skills, cognitive processes, and behavioral dispositions that underlie and enable those routines. In this study, the cross-cutting enablers identified in Section 4.4 span both levels: some are routinized behavioral practices enacted collectively, while others are antecedent conditions operating at the individual and organizational level that shape whether and how those routines function. The term microfoundations is used in Section 4.4 in the broad sense of Helfat and Peteraf (2009) to encompass both individual-level antecedents and behavioral routines that together constitute the behavioral and cognitive foundations of capability enactment.

3. Methodology

To synthesize fragmented findings on project portfolio SDs, this study employed an integrative literature review (Torraco, 2005, 2016), to ensure transparency, replicability, and conceptual rigor. The final set of 66 peer-reviewed journal articles, selected using this approach, provides both breadth of coverage and depth of synthesis.

3.1 Literature search and selection

We followed a four-step process to ensure the reliability and reproducibility of our review (Snyder, 2019): (1) selecting electronic databases, (2) determining search keywords, (3) setting inclusion/exclusion criteria, and (4) conducting and refining the database search. We used *Scopus* and *Web of Science* for their comprehensive coverage (Wang et al., 2023). Various keyword combinations were tested, and after multiple iterations, we finalized a search string to obtain the most relevant articles related to PPM as follows:

“project portfolio” OR “multi-project” OR “multi project”) AND (“success factor” OR “success determinant” OR “performance factor” OR “success driver” OR “success enabler” OR “critical to success” OR “governance mechanism” OR “capability”)

The search included literature up to December 2024 and initially yielded 2,173 unique records. Titles and abstracts were screened using the following inclusion/exclusion criteria to identify articles to be included. The included article must: 1) have a clear focus on SDs in PPM, 2) be a peer-reviewed journal article, 3) be written in English, and 4) pass the minimum quality assessment threshold. Also, studies focusing on investment portfolios, product portfolios, or single-project success were excluded. Using the Kitchenham and Charters's (2007) checklist, we assessed methodological quality and excluded low-quality or off-topic studies, resulting in a final sample of 66 eligible articles for qualitative synthesis (see Figure 1 for the article selection process).

3.2 Data extraction and synthesis

All 66 studies were imported into NVivo 12 for systematic analysis. For each study, we extracted key information, including publication year, context, research method, and SDs (i.e. how each determinant was defined and measured).

The coding process followed a thematic synthesis approach, incorporating elements of constant comparison (Creswell and Creswell, 2017). Concepts identified across studies were compared iteratively, and semantically similar constructs were consolidated into 26 distinct SDs. This approach allowed for the integration of both qualitative and quantitative evidence.

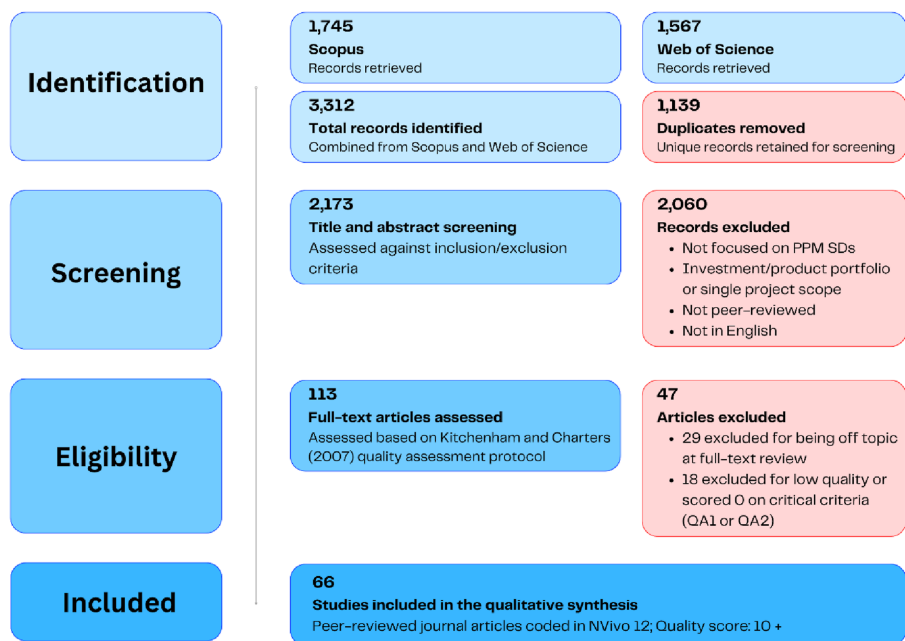


Figure 1. Article selection process. Source: Authors' own work

Quantitative studies typically presented SDs as independent variables statistically linked to success criteria (e.g. [Kock et al., 2024](#); [Teller et al., 2014](#)), whereas qualitative studies revealed determinants indirectly through interviews and case-based observations of enabling conditions, routines, or behaviors associated with portfolio performance (e.g. [Aghajani et al., 2023a](#); [Patanakul, 2020](#)).

Each SD was then classified along the two dimensions introduced in [Section 2.3](#): its DC domain (sensing, seizing, transforming, or cross-cutting) and its analytical role (Antecedent, Routine, Mediator, and Outcome). The first two authors independently completed all assignments; disagreements were resolved through structured three-way consensus discussions involving the third author, with reference to the source study's operationalizations, and classifications were finalized only upon full agreement. The full coding protocol, construct definitions, intercoder procedure, and an exemplar coding entry are provided in Supplemental Material ([Appendix A](#)). The resulting 26 SDs, together with their definitions, supported success criteria, and key references, are presented in [Table 2](#).

Of the 26 SDs, 21 are validated, and five require further large-scale quantitative verification: SD1, SD2, SD20, SD25, and SD26. As with any integrative review, consolidating findings across studies employing heterogeneous measurement approaches entails methodological approximation that may obscure meaningful variation in how constructs manifest across contexts, and, as with any review restricted to published studies, may under-represent null or small-effect findings ([Whittemore and Knafl, 2005](#)). The validation status column addresses this directly by differentiating SDs according to the quality and breadth of their quantitative support.

A systematic conceptual collinearity check was conducted across all 26 SDs, following [Torraco \(2005\)](#), who establishes that constructs consolidated through integrative synthesis must be treated as distinct only when their source-study operationalizations represent genuinely different underlying phenomena. The independence criterion applied is causal-role distinctness: if source studies position two SDs at structurally different positions in the

Table 2. SDs for portfolio success

Success determinant (SD)	Description	Supported success criteria (SCs)	Validation status ^a	Key references
SD1. Learning orientation	An organization's collective commitment to acquiring, sharing, interpreting, and applying knowledge that enhances environmental sensing and adaptive portfolio decision-making	SC1-SC5	Needs validation	Biedenbach and Müller (2012) , Kester et al. (2011) , Killen et al. (2008a)
SD2. Strategic recognition	Managers' ability to identify and interpret projects' strategic relevance	SC1-SC4	Needs validation	Hoffmann et al. (2020) , Kaiser et al. (2015)
SD3. Customer relationship value	Consideration of long-term customer relationships as a basis for portfolio design	SC1-SC5	Validated	Voss (2012) , Voss and Kock (2013)
SD4. Voice behavior	Willingness of employees to raise concerns, insights, or suggestions in portfolio decision-making	SC1-SC5	Validated	Kaufmann et al. (2020) , Kock et al. (2024)
SD5. Entrepreneurial orientation (EO)	Strategic posture of proactiveness, innovativeness, and risk-taking that stimulates opportunity recognition within portfolio sensing	SC1-SC5	Validated	Kaufmann et al. (2020, 2021) , Kock et al. (2016) , Kock and Gemünden (2020) , Rank et al. (2015) , Saeed et al. (2021) , Zaman et al. (2020)
SD6. Information availability	Transparency, accessibility, and reliability of decision-relevant information that enable effective sensing and decision-making across portfolio levels	SC1-SC4	Validated	Aghajani et al. (2023a) , Dietrich and Lehtonen (2005) , Jiao et al. (2020) , Lerch and Spieth (2013) , Martinsuo and Lehtonen (2007) , Müller et al. (2008) , Spieth and Lerch (2014) , Urhahn and Spieth (2014)
SD7. Decision-making effectiveness	The quality, speed, and consistency of portfolio-level decisions reflect balanced use of data, experience, and judgment	SC1-SC3	Validated	Kester et al. (2011, 2014) , Killen et al. (2020) , Kock and Gemünden (2016) , Zaman et al. (2020)

(continued)

Table 2. Continued

Success determinant (SD)	Description	Supported success criteria (SCs)	Validation status ^a	Key references
SD8. Management quality	Competence and experience of portfolio managers and their ability to integrate diverse perspectives	SC1-SC5	Validated	Jiao <i>et al.</i> (2020), Jonas (2010), Jonas <i>et al.</i> (2013), Kock <i>et al.</i> (2020, 2024), Rank <i>et al.</i> (2015), Teller <i>et al.</i> (2012), Teller (2013), Teller and Kock (2013), Unger <i>et al.</i> (2012a, b)
SD9. Project management efficiency	Efficient execution of projects across the portfolio, minimizing waste and maximizing resource use	SC1-SC5	Validated	Biedenbach and Müller (2012), Martinsuo and Lehtonen (2007), Teller <i>et al.</i> (2014)
SD10. Formalized PPM processes	Standardized governance processes for selection, prioritization, and monitoring	SC1-SC5	Validated	Bechtel <i>et al.</i> (2023), Cooper <i>et al.</i> (1999, 2001, 2004), Dietrich and Lehtonen (2005), Elonen and Arto (2003), Kock <i>et al.</i> (2015, 2020, 2024), Kock and Gemünden (2016, 2020), Kopmann <i>et al.</i> (2015, 2017), Lerch and Spieth (2013), Micán <i>et al.</i> (2022), Padovani and Carvalho (2016), Spieth and Lerch (2014), Teller <i>et al.</i> (2012), Teller (2013), Urhahn and Spieth (2014)
SD11. Front-end planning	Systematic assessment and planning of projects before resource commitment	SC1-SC5	Validated	Heising (2012), Kock <i>et al.</i> (2015, 2016)
SD12. Project goal setting	Establishing clear and strategically aligned project goals	SC1-SC3	Validated	Aghajani <i>et al.</i> (2023a), Elonen and Arto (2003), Martinsuo and Lehtonen (2007)
SD13. Systematic PM process	Adoption of consistent PM methods and tools across projects	SC1-SC4	Validated	Dietrich and Lehtonen (2005), Elonen and Arto (2003), Martinsuo and Lehtonen (2007), Patanakul and Milosevic (2009), Teller <i>et al.</i> (2012, 2014)

(continued)

Table 2. Continued

Success determinant (SD)	Description	Supported success criteria (SCs)	Validation status ^a	Key references
SD14. PPMIS application	Systematic and integrative use of portfolio management information systems to support coordination, transparency, and decision-making	SC1-SC4	Validated	Kock et al. (2020)
SD15. Portfolio visualization	Use of visual and dashboard-based tools to enhance transparency, alignment, and collective sensemaking within portfolios	SC1-SC3	Validated	Killen et al. (2020)
SD16. PPM office (PPMO) contributions	Institutionalized support and monitoring from project/portfolio management offices	SC1, SC5	Validated	Kock et al. (2024) , Unger et al. (2012a)
SD17. Portfolio agility	The portfolio's capacity to sense, respond, and adapt rapidly to environmental or strategic change	SC1-SC3	Validated	Aghajani et al. (2023a) , Bechtel et al. (2023) , Hoffmann et al. (2020) , Kaufmann et al. (2020) , Kester et al. (2011, 2014) , Kock and Gemünden (2016, 2020) , Kock and Gemünden (2019) , Kopmann et al. (2017)
SD18. Project lineage management	Systematic capture, transfer, and reuse of knowledge from completed projects to inform new portfolio initiatives	SC1-SC3	Validated	Kaufmann et al. (2021)
SD19. Real options reasoning (ROR)	A repeatable decision routine enabling managers to navigate uncertainty through staged investments, limited initial commitment, and flexible resource reallocation	SC1-SC4	Validated	Kaufmann et al. (2021)
SD20. Structural alignment	Ensuring governance structures fit and reinforce strategic objectives	SC2	Needs validation	Hoffmann et al. (2020) , Kaiser et al. (2015)
SD21. Stakeholder engagement	Active involvement of stakeholders to balance multiple interests	SC1-SC4	Validated	Beringer et al. (2012, 2013) , Jonas (2010) , Petro and Gardiner (2015) , Unger et al. (2012b)

(continued)

Table 2. Continued

Success determinant (SD)	Description	Supported success criteria (SCs)	Validation status ^a	Key references
SD22. Team empowerment and voice	Practices that give autonomy and encourage participation in portfolio decisions	SC1-SC5	Validated	Jonas (2010) , Jonas et al. (2013) , Kaufmann et al. (2020) , Unger et al. (2012a)
SD23. Project manager's influence	The extent to which project managers shape portfolio-level prioritization and outcomes	SC1-SC3	Validated	Beringer et al. (2013) , Patanakul and Milosevic (2009) , Petro and Gardiner (2015)
SD24. Organizational culture	Shared values and behavioral norms that shape portfolio governance, collaboration, and learning practices	SC1-SC4	Validated	Aghajani et al. (2023a) , Kaufmann et al. (2020) , Kester et al. (2011) , Killen and Kjaer (2012) , Kopmann et al. (2017) , Patanakul (2015, 2020) , Patanakul and Milosevic (2009) , Rank et al. (2015) , Teller and Kock (2013) , Unger et al. (2014)
SD25. Transformational leadership	Leadership that inspires, motivates, and aligns teams toward shared strategic and portfolio objectives	SC1, SC2	Needs validation	Kester et al. (2011) , Zaman et al. (2020)
SD26. Individual managerial traits	Cognitive, relational, and risk-related traits of managers influencing portfolio performance	SC1-SC3	Needs validation	McNally et al. (2013) , Patanakul (2020) , Patanakul and Milosevic (2009)

Note(s): ^aValidation status reflects the current level of quantitative empirical support within the reviewed articles. Validated = supported by at least one high-quality quantitative study with a multi-industry sample; this denotes sufficient large-sample support, not definitive causal confirmation across all contexts. Needs validation = empirical base confined to qualitative, conceptual, or single-sector studies; represents a priority agenda for future quantitative research

Source(s): Authors' own work

mechanism chain, one causing, enabling, or producing the other, they cannot be the same construct by definition. We identified all high-proximity SD pairs that may cause potential collinearity risk and examined them against this criterion. All 26 SDs are confirmed as conceptually independent. Where two SDs interact, the interaction reflects complementarity (one amplifying the effectiveness of the other) rather than collinearity (see established interactions in [Table 5](#)).

3.3 Descriptive overview of the reviewed literature

To provide transparency and situate the synthesis within its empirical base, this section presents a descriptive overview of the 66 reviewed articles. The analysis draws on the full classification form (see Supplemental Material ([Appendix C](#))). [Figure 2](#) presents the annual distribution of the 66 included articles. The earliest contribution firmly seeking to

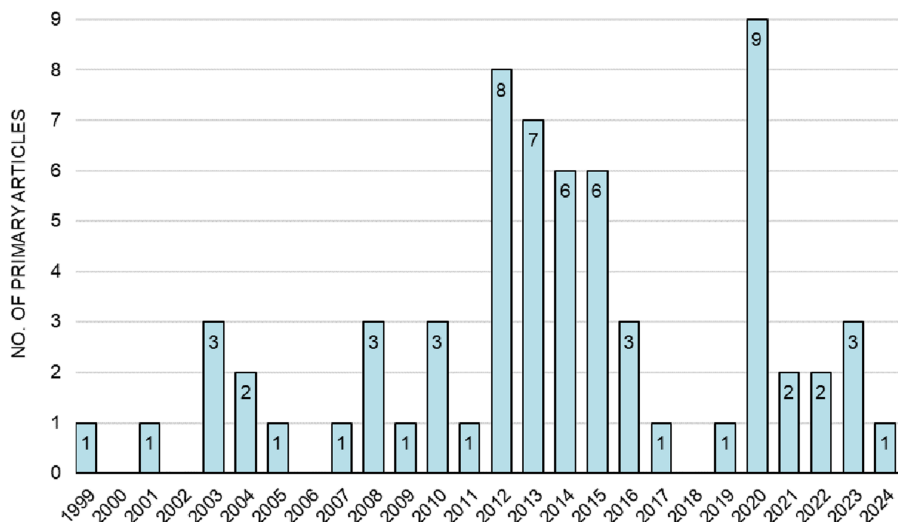


Figure 2. Annual distribution of included articles ($N = 66$). Source: Authors' own work

conceptualize strategic PPM success is [Cooper et al. \(1999\)](#). Publication volume was modest throughout the 2000s, then accelerated markedly between 2012 and 2016, during which 30 articles (45.45%) were published. This period reflects growing practitioner and academic recognition of PPM as a strategic discipline ([Hansen and Svejvig, 2022](#); [Meskendahl, 2010](#)). The peak single-year was 2020, with 9 articles, after which output declined, likely reflecting research disruptions associated with the COVID-19 pandemic.

The reviewed articles appeared across 13 journals, confirming that research on PPM success is concentrated in a small set of dedicated outlets. The International Journal of Project Management (IJPM) was the leading source, contributing 29 articles (43.94%), followed by the Project Management Journal (PMJ) with 10 articles (15.15%) and the Journal of Product Innovation Management (JPIM) with 7 articles (10.61%). Together, these three journals account for 69.70% of the reviewed articles. This concentration reflects the field's institutional home within project management studies, while the presence of JPIM and IEEE Transactions on Engineering Management signals ongoing cross-disciplinary interest in innovation and engineering contexts.

[Table 3](#) summarizes the research and data collection methods across the reviewed articles. Quantitative studies dominate, accounting for 43 articles (65.15%), with survey-based designs comprising the majority of these (42/58 empirical studies, 72.41%). Qualitative studies account for 18.18% (12 articles), predominantly employing multiple-case designs. Eight articles (12.12%) are conceptual, and three (4.55%) employ multimethod designs combining surveys and case studies. The prevalence of quantitative methods reflects the field's emphasis on generalizable, large-sample evidence, while the inclusion of qualitative and conceptual studies ensures that process-level insights and theoretical contributions are captured. Both method types inform the SD coding: quantitative studies typically operationalize SDs as statistically measured independent variables, whereas qualitative studies surface determinants inductively through interviews and observations.

[Table 4](#) presents sample size statistics for the 45 survey-based and 15 interview-based studies. Survey samples range from 18 to 1,565 participants (mean: 303; median: 278), reflecting rigorous data collection practices across a broad range of organizational contexts. Interview samples are considerably smaller (range: 4–75; mean: 27; median: 28), consistent with the depth-oriented logic of qualitative inquiry. Notably, 44.44% of surveys (20/45)

Table 3. Research and data collection methods used in the reviewed articles

	# Articles	Percentage (%)
<i>Research method (N = 66)</i>		
Quantitative	43	65.15%
Qualitative	12	18.18%
Conceptual	8	12.12%
Multimethod	3	4.55%
<i>Data collection method (N = 58)</i>		
Survey	42	72.41%
Multiple-case study	8	13.79%
Qualitative interviews	3	5.17%
Multimethod	3	5.17%
Single case study	1	1.72%
Experiment	1	1.72%
Source(s): Authors' own work		

Table 4. Sample size statistics for surveys and interviews

# Participants	Surveys (N = 45) ^a	Interviews (N = 15)
Minimum	18	4
Mean	303	27
Median	278	28
Maximum	1,565	75
Total	13,637	407
Note(s): ^a 42 surveys, along with 3 additional surveys from multimethod studies		
Source(s): Authors' own work		

employed multiple informants from the same portfolio. For example, [Bechtel et al. \(2023\)](#) engaged both a portfolio coordinator and a senior decision-maker from each of 135 portfolios, yielding 270 matched questionnaires, an approach that mitigates common method bias ([Podsakoff et al., 2003](#)).

[Figure 3](#) presents the industry coverage across 58 empirical articles (8 conceptual studies have no applicable industry). IT and telecommunications, financial services, and pharmaceuticals and chemicals are the most frequently studied sectors, reflecting the pervasive role of technology-driven projects and the complexity of PPM in regulated industries. Research spans manufacturing, construction and utilities, and healthcare contexts, demonstrating the broad applicability of PPM across organizational types. Notably, the education, defense, and public administration sectors are largely absent, representing an opportunity for future boundary-condition research.

Quality assessment followed the [Kitchenham and Charters's \(2007\)](#) protocol (see Supplemental Material ([Appendix B](#))). Each article was independently scored by both authors on 11 criteria (0 = not met; 1 = partially met; 2 = fully met). Maximum attainable scores were 22 for quantitative, 20 for qualitative, and 11 for conceptual studies. Any article scoring 0 on either critical screening criterion (QA1 or QA2) was excluded. The authors held consensus discussions for all articles scoring below 10. A total of 18 articles were excluded for low quality at the full-text stage (in addition to 29 excluded as off-topic), yielding a final set of 66.

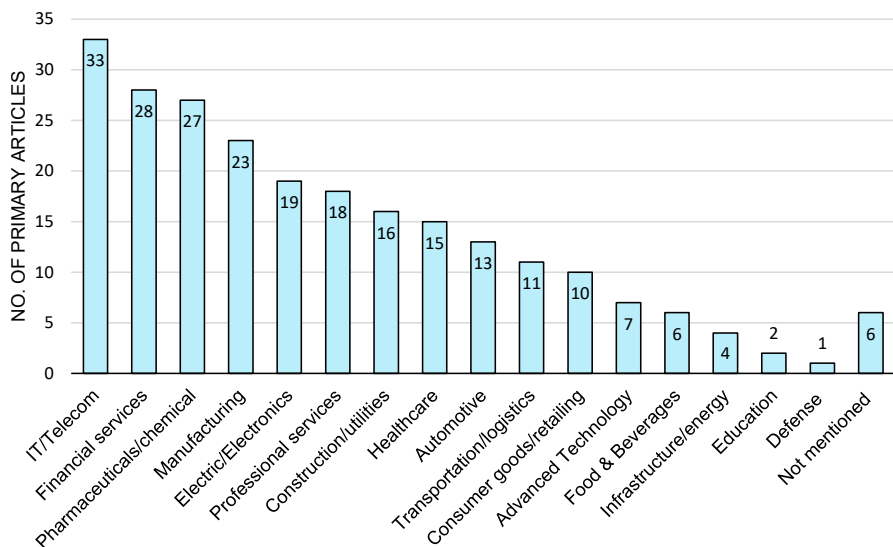


Figure 3. Targeted industries in the reviewed articles ($N = 58$). Source: Authors' own work

Figure 4 shows the distribution of quality scores for the final 66 articles. Scores range from 10 to 21, with a pronounced skew toward higher values: 43 articles (65.2%) scored 17 or above, and 25 articles achieved the maximum score for their category. Eight conceptual papers scored 11, i.e. the maximum achievable for conceptual studies, reflecting strong theoretical contributions. This distribution confirms a high-quality evidence base for the synthesis, while acknowledging that quality appraisal carries inherent subjectivity (Yang *et al.*, 2021).

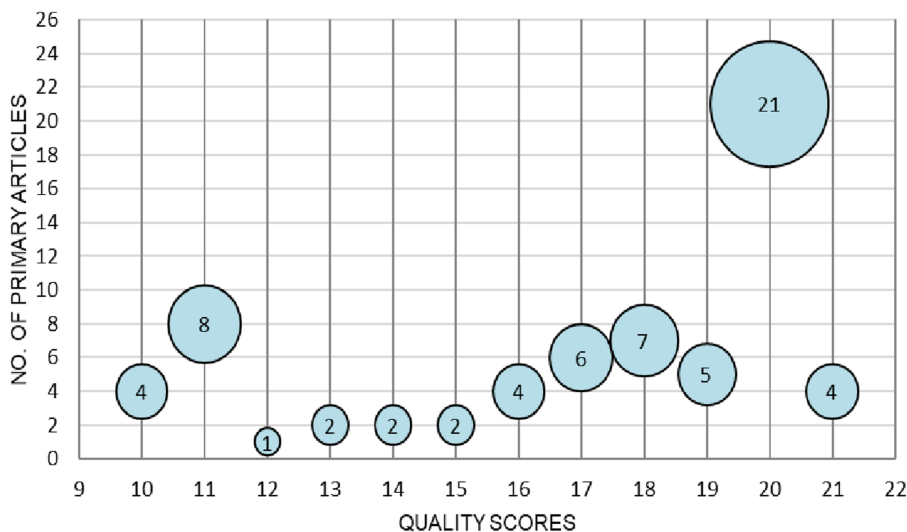


Figure 4. Quality score distribution of the reviewed articles ($N = 66$). Source: Authors' own work

4. Findings: success determinants as dynamic capabilities

Sections 4.1–4.3 present the sensing, seizing, and transforming SDs in turn; Section 4.4 addresses cross-cutting microfoundations; and Section 4.5 synthesizes all elements into the integrative framework. The reviewed literature underpinning this classification comprises 43 quantitative, 12 qualitative, 8 conceptual, and 3 multimethod studies, collectively providing both statistical effect estimates and process-level explanations for how each SD operates within the capability system. Table 5 provides a consolidated reference for all 26 SDs, classifying each by DC domain, analytical role, and established interactions with other SDs, and can be read alongside the findings subsections or used independently for navigation.

This mechanism-view logic mirrors the prevailing DC view that capabilities rarely exert direct effects on performance but operate through indirect, developmental pathways (Baía and Ferreira, 2024; Teece, 2018). Antecedents are theorized to create enabling conditions; routines enact capability processes; mediators are theorized to generate adaptive states; and outcomes record realized performance. Empirical evidence shows that DCs influence results primarily by reconfiguring or renewing operational capabilities, thereby producing intermediate states that channel effects toward performance (Hung et al., 2010; Laaksonen and Peltoniemi, 2018; Schilke, 2014; Wilden et al., 2013).

Beyond this domain-based classification, several SDs serve as cross-cutting enablers spanning all three DC dimensions. These include stakeholder engagement, team empowerment and voice, project-manager influence, organizational culture, transformational leadership, and individual managerial traits. Such mechanisms form the relational and behavioral infrastructure that simultaneously sustains sensing, seizing, and transforming, facilitating information flow, trust, and alignment across portfolio levels. They are not stages in the capability chain, but conditions that co-evolve with it, amplifying or constraining how DCs operate in practice.

4.1 Sensing and opportunity recognition capabilities in PPM

Sensing denotes the organization's capacity to detect, interpret, and prioritize external and internal signals that justify portfolio adjustment. In our classification, sensing capability is configured around six determinants (SD1–SD6) whose roles jointly convert environmental turbulence into structured opportunity recognition.

Three determinants operate as antecedent enablers. EO (SD5) provides a forward-looking, risk-tolerant posture that motivates exploration of emerging technologies and market shifts, furnishing the cognitive readiness for early opportunity identification (Kaufmann et al., 2021; Kock and Gemünden, 2020). This SD is consistently associated with proactive scanning and experimentation in portfolio contexts (Kaufmann et al., 2020; Kock et al., 2016; Zaman et al., 2020). Kock and Gemünden (2020) show that EO dimensions, specifically innovativeness and risk-taking, positively moderate the relationship between managerial practices and portfolio performance, confirming EO as a boundary condition that amplifies sensing effectiveness. Information availability (SD6) complements that posture by ensuring the transparency, accessibility, and reliability of decision-relevant data across governance layers, thereby reducing information asymmetry and enabling the timely interpretation of weak signals (Martinsuo and Lehtonen, 2007; Spieth and Lerch, 2014; Urhahn and Spieth, 2014).

The third antecedent, Voice behavior (SD4) functions as an antecedent that creates the enabling conditions through which environmental signals surface and are channeled into portfolio interpretation. Kaufmann et al. (2020), using a multi-informant sample of 135 portfolios, explicitly position voice behavior as an organizational precondition, alongside EO, that drives portfolio agile capabilities. The disposition to raise concerns and suggestions shapes whether sensing routines receive the frontline intelligence they require. This effect is itself reinforced by cultural and empowerment conditions, as organizational context determines how freely individuals voice observations and how reliably those signals reach portfolio decision-makers (Kaufmann et al., 2020; Kock et al., 2024). Together with the antecedent conditions of EO and information availability, these practices convert dispersed

Table 5. Classification of success determinants under DC dimensions and analytical roles

DC dimension	Success determinant (SD)	Analytical role	Logic for classification	Established interactions
Sensing	SD1. Learning orientation	Mediator	Classified as a mediator because learning orientation emerges from the interaction of sensing antecedents (EO, information availability) and routines (strategic recognition, voice behavior), and channels their combined effects into decision quality and adaptive responses. Killen et al. (2008a) show that cumulative learning investments institutionalize feedback and codification within portfolio governance; Kester et al. (2011) identify it as enabling effective portfolio decision-making	Enabled by SD5, SD6, SD24–SD25; supports SD7, SD10; feeds SD17
	SD2. Strategic recognition	Routine	Kaufmann et al. (2020) treat strategic recognition as a repeatable scanning and monitoring practice through which portfolio content is aligned with evolving corporate priorities. Hoffmann et al. (2020) operationalize it as structured review and realignment activities enacted through governance forums	Linked with SD4, SD5, SD17; informs SD18
	SD3. Customer relationship value	Routine	Voss (2012) conceptualizes customer integration as a set of repeatable PPM practices linking relationship portfolios to project portfolio decisions. Voss and Kock (2013) operationalize relationship value as the systematic consideration of customer relationship value in portfolio selection, i.e. a practice-based construct that directly and significantly predicts portfolio success	Enhances SD2, SD5; complements SD6
	SD4. Voice behavior	Antecedent	Kaufmann et al. (2020) explicitly position voice behavior as an antecedent of portfolio agile capabilities alongside EO, not as a routine enactment within them. Voice behavior creates the organizational conditions under which frontline signals surface and are channeled upward; a prerequisite enabling sensing routines to receive the intelligence they require	Supports SD2, SD8, SD17; enhanced by SD24
	SD5. Entrepreneurial orientation (EO)	Antecedent	Kaufmann et al. (2020) explicitly label EO as an antecedent of agile portfolio capabilities. Kock and Gemünden (2016) demonstrate that EO provides the risk-tolerant, proactive strategic posture that motivates scanning and experimentation. This is an enabling condition rather than a repeatable practice	Supports SD2, SD4, SD17; fosters SD10 and SD1
	SD6. Information availability	Antecedent	Classified as an antecedent because information availability represents a structural prerequisite, a state of data accessibility that must exist before sensing routines can function, rather than a repeatable practice itself. Martinsuo and Lehtonen (2007) and Spieth and Lerch (2014) operationalize it as an enabling condition whose presence or absence determines the quality of downstream decision-making	Enables SD7, SD8, SD9, SD13, SD21; feeds SD1

(continued)

Table 5. Continued

DC dimension	Success determinant (SD)	Analytical role	Logic for classification	Established interactions
Seizing	SD7. Decision-making effectiveness	Mediator	Kock and Gemünden (2016) model decision-making quality as the outcome of structural and cultural antecedents (formalized processes, clarity of strategic goals, innovation climate) that, in turn, drive portfolio agility. This is a mediating position in the causal chain. Kester et al. (2011) further identify decision-making effectiveness dimensions as direct antecedents to portfolio SCs, confirming its intermediate role	Linked with SD6, SD10, SD8; influences SD12, SD17; strengthened by SD1
	SD8. Management quality	Mediator	Teller et al. (2012) explicitly model PPM quality as fully mediating the relationship between formalization and portfolio success: formalization improves success by increasing management quality, not directly. Jonas et al. (2013) demonstrate the prognostic relevance of management quality as an intermediate predictor, positioning it between governance antecedents and portfolio outcomes	Reinforces SD6, SD10, SD7, SD13; enabled by SD24
	SD9. Project management efficiency	Mediator	Martinsuo and Lehtonen (2007) explicitly find a mediating role for project management efficiency between single-project factors (goal setting, information availability, systematic decision-making) and PPM performance, confirming that PM efficiency channels the effects of seizing routines into portfolio-level outcomes rather than acting as an independent driver	Enabled by SD6, SD8, SD12; supports SD13, SD23
	SD10. Formalized PPM processes	Routine	Cooper et al. (1999, 2001) identify systematic portfolio processes, i.e. project evaluation, selection, and prioritization, as the core practices of best-performing firms. Teller et al. (2012) operationalize formalization as the degree to which governance procedures are clearly specified and applied, treating it as a repeatable organizational practice that improves portfolio success through management quality	Enabled by SD1, SD5, SD6, SD8
	SD11. Front-end planning	Routine	Kock et al. (2015) conceptualize ideation PPM, comprising ideation strategy, process formalization, and creative encouragement, as distinct, repeatable practices that independently and significantly contribute to front-end success, which in turn mediates portfolio success	Supported by SD10, SD7; foundational for SD19
	SD12. Project goal setting	Routine	Martinsuo and Lehtonen (2007) operationalize goal setting as a systematic, single-project management practice and find it to be positively related to PPM performance. Aghajani et al. (2023a) identify project goal-setting as a repeatable governance practice that links project-level objectives to strategic portfolio priorities	Linked to SD7, SD9, SD18
	SD13. Systematic PM process	Routine	Systematic PM process enables consistent monitoring, control, and knowledge transfer across projects, providing transparency and comparability, which strengthen governance and support decision-making at the portfolio level (Martinsuo and Lehtonen, 2007)	Reinforced by SD8, SD9; contributes to SD20
	SD14. PPMIS application	Routine	Kock et al. (2020) operationalize the PPMIS application as a six-item practice scale measuring whether dedicated software supports project selection, resource allocation, risk identification, and portfolio performance monitoring, a repeatable organizational practice whose effect on portfolio success is fully mediated by management quality	Enables SD6; supports SD8 and SD10
	SD15. Portfolio visualization	Routine	Killen et al. (2020) describe visualization techniques as organizational routines, i.e. repeatable practices for generating, collecting, and exchanging portfolio information, that dynamically adapt to environmental changes and enhance collective sensemaking and decision alignment	Enhances SD10, SD7; supports SD6
	SD16. PPMO contributions	Antecedent	Kock et al. (2024) model PPMO contributions as an antecedent to management quality, which in turn relates to business success, thereby confirming PPMO as a structural enabling condition. Unger et al. (2012a) show that PPMO coordinating and controlling roles are governance preconditions that enable portfolio management to function effectively	Supports SD4, SD8; facilitates SD7

(continued)

Table 5. Continued

DC dimension	Success determinant (SD)	Analytical role	Logic for classification	Established interactions
Transforming	SD17. Portfolio agility	Mediator	Bechtel et al. (2023) explicitly demonstrate that portfolio agility mediates the relationship between dynamic capabilities and portfolio success. Kock and Gemünden (2016) show that decision-making quality drives agility, positioning agility as an emergent capability state that converts upstream sensing and seizing inputs into adaptive portfolio reconfiguration	Depends on SD1, SD5, SD2, SD4, SD7; enables SD10, SD18
	SD18. Project lineage management	Routine	Kock and Gemünden (2019) describe proactive lineage (planning project roadmaps) and reactive lineage (using past project learnings) as distinct organizational practices, both independently and significantly related to portfolio success, confirming lineage management as a repeatable routine rather than an enabling condition	Linked to SD1, SD10, SD13; supports SD2
	SD19. Real options reasoning (ROR)	Routine	Kaufmann et al. (2021) operationalize ROR as a behavioral decision-making practice, i.e. the staged commitment and selective continuation of innovation projects, whose positive effect on portfolio success is mediated by portfolio innovativeness. ROR is enacted through repeated investment and abandonment decisions, confirming its status as a routine rather than a fixed enabling condition	Aligned with SD5; dependent on SD10 and SD11. Combine with SD18
	SD20. Structural alignment	Antecedent	Hoffmann et al. (2020) and Kaiser et al. (2015) identify governance structure alignment (reporting lines, resource ownership, decision hierarchies) as the organizational preconditions enabling PPM to adapt and reconfigure without friction. Structural alignment creates the adaptive governance architecture within which transformation routines can operate, functioning as an antecedent condition rather than a practice itself	Informed by SD2, SD12, SD17; supports SD7, SD21
Cross-cutting microfoundations	SD21. Stakeholder engagement	Routine	Beringer et al. (2012, 2013) operationalize stakeholder engagement as recurring behavioral patterns of involvement in PPM processes, showing that intensity of stakeholder engagement in portfolio governance significantly predicts portfolio success across multiple DC dimensions	Supports SD6, SD7, SD18; complements SD22
	SD22. Team empowerment and voice	Routine	Jonas (2010) conceptualizes empowerment as repeated managerial practices, e.g. granting authority, clarifying roles, supporting participation, that translate antecedent conditions (leadership, culture) into capability enactment. Unger et al. (2012a) show that empowerment practices directly improve management quality	Facilitated by SD4, SD7, SD24; enhances SD21
	SD23. Project manager's influence	Routine	Beringer et al. (2013) and Patanakul and Milosevic (2009) describe project managers' coordination and influence as practiced behaviors, i.e. the repeated exercise of authority and discretion across interdependent projects, through which strategic intent is translated into adaptive portfolio execution	Works through SD8, SD9, SD18; linked to SD25
	SD24. Organizational culture	Antecedent	Kester et al. (2011) identify organizational culture (shared goals, values, and trust) as an enabling condition that shapes how portfolio decision-making processes function across all DC dimensions. Rank et al. (2015) demonstrate that cultural dimensions (willingness to cannibalize, proactiveness, riskiness) moderate the relationship between management quality and portfolio success, confirming culture's role as a background enabling condition rather than a practice	Shapes SD2, SD10, SD7, SD17; supports SD1
	SD25. Transformational leadership	Antecedent	Kester et al. (2011) find that transformational leadership, through trust, shared vision, and open dialog, creates the enabling conditions under which effective portfolio decision-making processes across all five dimensions of portfolio success operate. Zaman et al. (2020) confirm its positive relationship to PPM performance, positioning leadership as a precondition rather than a repeatable practice	Enables SD1, SD5, SD4, SD8, SD17, SD22
	SD26. Individual managerial traits	Antecedent	McNally et al. (2013) explicitly frame manager dispositions (need for cognition, leadership style, risk perceptions) as antecedents to NPD PPM dimensions, showing they predict portfolio decision-making processes rather than constituting practices themselves. Patanakul (2020) identifies integrative complexity as a cognitive attribute of PPM committee members that enables balanced decision-making under uncertainty	Supports SD6; influenced by SD24

Source(s): Authors' own work

observations into validated strategic intelligence and tighten the coupling between environmental change and portfolio sensemaking.

On this foundation, two routinized practices institutionalize scanning and interpretation. Strategic recognition (SD2) systematizes the ongoing alignment of portfolio content with evolving corporate priorities through structured monitoring and review, turning awareness into a repeatable sensing routine (Hoffmann *et al.*, 2020; Kaiser *et al.*, 2015). Kaufmann *et al.* (2020) operationalize SD2 as the portfolio's intensity of applying agile practices in recognizing and acting on emerging strategic signals. Customer relationship value (SD3) extends the sensing boundary outward by embedding client interactions and feedback loops into portfolio deliberations, translating external preferences and market signals into inputs for selection and termination decisions (Voss, 2012; Voss and Kock, 2013).

Learning orientation (SD1) serves as the interpretive core of the sensing system, transforming informational diversity into collective cognition. It represents the organization's capacity to acquire, assimilate, and reframe knowledge into actionable portfolio insights from weak signals. It is classified as a mediator rather than an antecedent because learning orientation is not simply a fixed enabling condition but an emergent capability state that arises from the interaction of sensing antecedents (EO, information availability, voice behavior) and routines (strategic recognition, customer relationship value) and that, in turn, channels their combined effects into decision quality and adaptive portfolio responses. Empirical work shows that this capability is cultivated through cumulative learning investments that institutionalize feedback, codification, and cross-project reflection within portfolio governance (Killen *et al.*, 2008a). In decision contexts, it operates as a higher-order information-integration mechanism that reconciles technological, market, and experiential inputs, thereby enhancing the coherence and timeliness of portfolio interpretation (Kester *et al.*, 2011). Quantitative evidence further confirms that absorptive and adaptive learning capabilities heighten environmental sensitivity and strengthen the link between scanning and reconfiguration performance (Biedenbach and Müller, 2012). Collectively, these studies position learning orientation as a mediating DC that conditions the translation of sensing antecedents into responsive portfolio adaptation.

The reviewed studies consistently show that sensing antecedents and routines exert their strongest effects on portfolio outcomes indirectly, through improved decision quality (SD7) and portfolio agility (SD17), rather than directly, underscoring the mediating architecture that connects sensing to performance (Bechtel *et al.*, 2023; Kock and Gemünden, 2016).

4.2 Seizing and execution capabilities in PPM

Seizing capabilities articulate how organizations translate interpretive insights from sensing into strategic commitment and coordinated execution. In PPM, seizing captures the collective ability to evaluate, prioritize, and resource opportunities in ways that convert potential value into realized outcomes. As summarized in Table 5, this capability comprises ten interdependent determinants (SD7–SD16) that together define the decision, managerial, and structural conditions through which opportunities are enacted to achieve portfolio success (SC1–SC5).

Within the seizing configuration, PPMO contributions (SD16) serve as the principal antecedent that institutionalizes the governance and methodological backbone of portfolio decision making. Acting as an organizational integrator, the PPMO coordinates information flows, enforces methodological discipline, and sustains cross-level communication between strategic and operational actors (Kock *et al.*, 2024; Unger *et al.*, 2012a). By embedding resource allocation logic and standardizing reporting and oversight, the PPMO establishes the structural legitimacy that enables subsequent decision and execution routines to operate coherently across the project portfolio.

Formalized PPM processes (SD10) embody the structural discipline through which seizing is enacted, such as stage-gate reviews, prioritization boards, and monitoring cycles that align

investments with strategic priorities and risk posture (Bechtel *et al.*, 2023; Kock *et al.*, 2020; Kock and Gemünden, 2016). These processes govern project selection and prioritization, ensuring that portfolio composition reflects both opportunity potential and organizational constraints. Teller *et al.* (2012), across a cross-industry sample of 134 portfolios, show that PPM formalization positively and significantly predicts PPM quality, which in turn fully mediates its relationship with portfolio success, confirming that formalized processes operate as a seizing routine whose performance benefits are channeled through intermediate capability states rather than realized directly. This mediating effect strengthens under higher portfolio complexity: portfolios with greater project interdependency derive greater success benefits from formalization, underscoring its role as a structural coordination mechanism precisely when the demands of seizing are highest. Kopmann *et al.* (2017) further show that strategic control activities embedded in formalized processes not only foster deliberate strategy implementation but also surface emerging strategic patterns, with both positively influencing portfolio success.

They are reinforced by front-end planning (SD11), which structures early evaluation and scoping to ensure that only strategically coherent initiatives enter the portfolio pipeline (Heising, 2012; Kock *et al.*, 2015, 2016). Project goal setting (SD12) anchors each initiative in measurable, strategically aligned objectives, enabling monitoring and adaptive correction when strategic drift occurs (Aghajani *et al.*, 2023a; Martinsuo and Lehtonen, 2007).

The systematic PM process (SD13) extends this logic into execution, enabling consistent project-level control, knowledge transfer, and comparability across initiatives (Dietrich and Lehtonen, 2005; Patanakul and Milosevic, 2009). In contrast to formalized PPM processes that emphasize governance and selection, systematic PM processes ensure disciplined delivery and integration within the broader portfolio.

The PPMIS application (SD14) integrates dispersed data into a unified decision environment. Kock *et al.* (2020), in the first empirical study of PPMIS performance effects, show that PPMIS application is positively associated with portfolio success, with its effect fully mediated by management process quality, confirming PPMIS as a routine whose benefits depend on the maturity of surrounding governance practices. Portfolio visualization tools (SD15) translate complexity into accessible insights, improving alignment between portfolio decisions and strategic goals (Killen *et al.*, 2020). Collectively, these routines establish an institutional architecture through which opportunity recognition becomes a repeatable and data-informed decision process embedded in organizational practice.

Three determinants, decision-making effectiveness (SD7), management quality (SD8), and project management efficiency (SD9), emerge as mediating capabilities that channel seizing routines into portfolio-level performance. SD7 captures the organization's ability to reach timely, high-quality decisions by integrating analytical evidence with experiential judgment (Kester *et al.*, 2011, 2014; Kock and Gemünden, 2016; Zaman *et al.*, 2020). SD8 reflects the cognitive and relational competence of portfolio managers who reconcile divergent stakeholder perspectives and maintain strategic coherence during execution (Jonas, 2010; Jonas *et al.*, 2013; Kock *et al.*, 2020, 2024). In the source studies, SD8 is operationalized as a four-dimensional second-order construct, comprising information quality, collaboration quality, resource allocation quality, and termination quality. The fourth dimension, introduced by Unger *et al.* (2012b) and adopted by Kock *et al.* (2024), captures the ability to enforce project termination when strategic fit is lost. It reflects the capacity to abort projects that have ceased to add value, decoupled from individual managers' personal attachment to them. This confirms that freeing resources from strategically obsolete projects is not a separate governance practice but an integral component of the managerial competence that SD8 captures. SD9 represents the operational capability that converts strategic intent into deliverables through disciplined coordination and optimal resource utilization (Biedenbach and Müller, 2012; Martinsuo and Lehtonen, 2007; Teller *et al.*, 2014). Empirical evidence consistently links these mediators to improvements across the full range of portfolio SCs (SC1–SC5). Critically, Jonas *et al.* (2013) demonstrate the prognostic relevance of

management quality using a longitudinal design, showing that management quality measured at T1 significantly predicts portfolio success at T2, establishing a temporal causal direction that cross-sectional studies cannot capture. [Teller et al. \(2012\)](#) confirm that this mediating role is robust: the relationship between formalization and portfolio success is fully mediated by management quality, with no significant direct effect of formalization once management quality is controlled.

4.3 Transforming and reconfiguring capabilities in PPM

Transforming in PPM is shaped by four interdependent SDs (SD17–SD20), which together convert sensing and seizing outputs into sustained portfolio adaptability. Of the three DC domains, transforming is the least empirically developed in the reviewed literature, because proportionally fewer studies operationalize reconfiguration mechanisms as SDs relative to governance and decision-quality determinants in the seizing domain. The reviewed articles identify a critical distinction between two levels of transforming in PPM. The first and more frequently studied level concerns reconfiguring portfolio content, reprioritizing, reallocating resources, and terminating projects whose strategic relevance has diminished. The second and less studied level concerns reconfiguring the PPM process itself: improving how the portfolio is managed, not just what it contains. [Bechtel et al. \(2023\)](#) operationalize this second-order dimension directly, measuring whether organizations continuously improve their portfolio management processes, adapt their decision-making routines in response to environmental change, and reconfigure governance mechanisms as the business context evolves. [Killen and Hunt \(2010\)](#) provide the operational content of this second-order reconfiguring through three deliberate learning mechanisms: 1) tacit experience accumulation, through which portfolio practitioners develop richer process intuitions over successive governance cycles; 2) knowledge articulation, through which portfolio reviews surface and disseminate emerging insights across management levels; and 3) knowledge codification, through which governance procedures and lessons learned are formalized and made reusable across future portfolio decisions. These mechanisms enable the PPM capability to be renewed rather than merely exercised, instantiating [Winter's \(2003\)](#) higher-order capability logic at the portfolio level.

At the antecedent level, structural alignment (SD20) provides the governance foundation that allows reconfiguration to occur without organizational friction. Empirical studies show that adaptive governance structures with clear reporting lines, defined resource ownership, and responsive decision hierarchies support strategic coherence while preserving flexibility for change ([Hoffmann et al., 2020](#); [Kaiser et al., 2015](#)). Continuous alignment ensures that portfolio governance mechanisms evolve alongside strategic priorities, enabling adjustments to oversight and coordination structures as contexts shift. This alignment operates as a dynamic condition sustained through deliberate realignment of authority, resource allocation mechanisms, and review forums to maintain legitimacy during portfolio adaptation ([Hoffmann et al., 2020](#)). [Kaiser et al. \(2015\)](#) document that organizations undertaking PPM adoption introduce extensive structural changes, such as centralization of PMO functions, resource management, procurement, and human resource development, driven by the information requirements that effective portfolio selection creates, confirming that structural alignment is itself a reconfiguration event continuously induced by PPM demands. [Aghajani et al. \(2023a\)](#) extend this finding to agile portfolio contexts, identifying agile projects and PPM synchronization as the continuous adaptation of governance structures to accommodate agile project delivery, as a critical factor, further confirming that structural alignment must evolve alongside changing operational realities rather than remaining a fixed architectural precondition.

Project lineage management institutionalizes the systematic capture and reuse of knowledge from completed initiatives to inform future portfolio choices. [Kock and Gemünden \(2019\)](#) show that both proactive lineage (planning future project roadmaps) and reactive lineage (systematically reusing learnings from past projects) are independently and positively related to portfolio success in a cross-industry sample. Through lessons-learned

reviews, repositories, and debriefs, organizations translate experiential insights into design inputs for subsequent projects, ensuring that exploration and exploitation remain linked. ROR (SD19) complements this by embedding flexibility into investment logic, allowing staged commitments and sequential experimentation under uncertainty (Kaufmann *et al.*, 2021). Kaufmann *et al.* (2021), using a multi-informant sample of 137 innovation portfolios, demonstrate that ROR positively relates to portfolio innovativeness, which in turn mediates its relationship to portfolio success, and that this effect is strengthened by EO and innovation climate, confirming that ROR requires enabling cultural antecedents to reach its full transformative potential.

The mediating function of portfolio agility (SD17) connects these enabling structures and routines to portfolio-level outcomes. Agility denotes the capacity to sense, respond, and adapt quickly while maintaining alignment between strategic intent and execution (Bechtel *et al.*, 2023; Kock and Gemünden, 2016). Functioning as an emergent capability state, agility channels sensing and seizing outputs, particularly strategic recognition and decision-making quality, into timely portfolio reconfiguration. Bechtel *et al.* (2023), using a multi-informant sample of 135 portfolios, explicitly demonstrate that portfolio agility mediates the relationship between dynamic capabilities and portfolio success, and notably that at least two of the three DC dimensions must be strongly present to positively enhance agility, underscoring the interdependence of sensing, seizing, and transforming in sustaining adaptive performance. Saeed *et al.* (2021) corroborate and extend this finding by demonstrating that strategic flexibility (the capacity to create new capabilities in response to environmental variation) and operational portfolio flexibility (the capacity to reallocate resources across the active project mix) independently relate to portfolio success, constituting complementary dimensions of the agility construct that operate at the strategic and operational levels, respectively. The absence of transforming capacity carries a documented cost. Hoffmann *et al.* (2020) identify the “rigidity trap” as when portfolio governance is anchored in annual budget cycles and static formalization structures, organizations lose reconfiguration capacity, and projects that have lost strategic legitimacy persist in consuming resources. This failure mode suggests that portfolio agility, and the transforming domain theorized to produce it, is not merely a by-product of sensing and seizing; its absence is associated with degraded strategic alignment.

4.4 Cross-cutting microfoundations in PPM

DCs in PPM operate through a set of enduring social and behavioral mechanisms that cut across sensing, seizing, and transforming. These cross-cutting microfoundations constitute the relational, cognitive, and cultural infrastructure through which the capability system is enacted. We identified six SDs (SD21–SD26) that jointly sustain the conditions enabling dynamic adaptation. Rather than representing discrete capabilities, they form the micro-level routines, values, and cognitive orientations that enable sensing, seizing, and transforming to function as an integrated whole (Barbosa and Carvalho, 2024; Teece, 2007).

At the organizational level, organizational culture (SD24) and transformational leadership (SD25) provide the normative and interpretive scaffolding for all DCs. A collaborative, learning-oriented culture (SD24) establishes shared values that promote transparency, experimentation, and responsiveness (Aghajani *et al.*, 2023a; Kester *et al.*, 2011; Rank *et al.*, 2015), thereby amplifying the quality of sensing, decisiveness in seizing, and openness to reconfiguration in transforming. Rank *et al.* (2015), across a four-country survey of 165 portfolios, demonstrate that culture dimensions (e.g. willingness to cannibalize, proactiveness, and riskiness) significantly moderate the relationship between management quality and portfolio future preparedness (SC4), confirming that culture shapes the conditions under which governance routines generate adaptive outcomes. Within this cultural context, transformational leaders (SD25) articulate vision, model trust, and inspire commitment to collective goals, translating shared purpose into coordinated portfolio behavior (Kester *et al.*, 2011; Zaman *et al.*, 2020). Kester *et al.* (2011), through in-depth qualitative case research

across multiple industries, identify transformational leadership style as influencing all five dimensions of portfolio decision-making effectiveness, with trust and shared vision enabling the open dialog and critical reflection that distinguish high-performing portfolio decision processes. Organizational culture supplies the shared norms that legitimate adaptive action, while leadership mobilizes those norms into system-wide engagement and learning.

At the individual–cognitive level, individual managerial traits (SD26) form the personal microfoundations through which DCs are enacted. Traits such as analytical reasoning, integrative complexity, and calibrated risk perception shape how portfolio managers process information and make trade-offs under uncertainty (McNally *et al.*, 2013; Patanakul, 2020). Patanakul (2020), through multiple case study research, identifies integrative complexity, the cognitive ability to simultaneously differentiate and integrate multiple dimensions of a problem, as a critical attribute of PPM committee members that determines whether portfolio decisions reflect genuine strategic synthesis or mere compromise. Similarly, competence in coordinating multiple projects and exercising discretion across interdependent initiatives enhances the ability to translate strategic intent into coherent execution (Patanakul and Milosevic, 2009). These cognitive orientations, reinforced by role clarity and influence within the PPM system (Beringer *et al.*, 2013; Jonas, 2010), determine whether formal governance routines become vehicles for reflection and adaptation or degenerate into rigid compliance. In this way, managerial cognition functions as a latent integrator that connects sensing, seizing, and transforming behaviors across the project portfolio.

At the behavioral and relational level, stakeholder engagement (SD21), team empowerment and voice (SD22), and project manager's influence (SD23) institutionalize participatory sensemaking and decision-making (Beringer *et al.*, 2012, 2013; Unger *et al.*, 2012b). Stakeholder engagement (SD21) embeds diverse perspectives in governance, enhancing information quality, decision legitimacy, and alignment. Beringer *et al.* (2013), in an empirical study of 197 project portfolios, show that the intensity of stakeholder engagement significantly predicts portfolio success, though with important nuances: engagement of project portfolio managers and project managers generates the strongest positive effects, while excessive involvement of senior managers can produce inverted-U-shaped relationships, highlighting the importance of calibrated rather than indiscriminate engagement. Team empowerment and voice (SD22) transform this inclusiveness into distributed agency: empowered teams act as local sensing nodes and adaptive decision units that detect weak signals, initiate rapid adjustments, and sustain feedback across organizational levels (Beringer *et al.*, 2013; Kaufmann *et al.*, 2020; Unger *et al.*, 2012b). Jonas (2010) proposes that formal empowerment of portfolio managers, through role clarity, authority, and reduced intervention, directly improves PPM performance, while Unger *et al.* (2012b) demonstrate empirically that senior management involvement has a significant but inverted-U-shaped relationship with portfolio outcomes, confirming that appropriately calibrated empowerment rather than unlimited involvement is the operative mechanism. Project manager's influence (SD23) extends this agency vertically by bridging project experience and portfolio governance; through relational credibility and informal influence, project managers advocate for alignment and innovation, translating strategic intent into operational change (Beringer *et al.*, 2013; Patanakul and Milosevic, 2009).

By embedding trust, openness, and participative sensemaking into portfolio governance, these six microfoundations sustain the conditions (e.g. shared values, cognitive flexibility, and inclusive decision processes) under which sensing routines generate actionable intelligence, seizing routines convert it into disciplined commitments, and transforming routines renew the capability base for the next cycle of adaptation. Their value lies not in any single domain, but in the coherence they impose across all three, making the DC system self-reinforcing rather than merely additive.

The reviewed studies also reveal specific psychological and social mechanisms underlying each enabler at the individual behavioral level. Voice behavior (SD4) operates through a two-stage calculus of perceived effectiveness and perceived safety; both must be met for promotive

voice to occur (Kaufmann *et al.*, 2020; Kock *et al.*, 2024). Organizational culture (SD24) operates through interpersonal trust, suppressing political behavior and enabling cross-functional collaboration (Kester *et al.*, 2011), and psychological safety, enabling upward disclosure of problems (Aghajani *et al.*, 2023a). Transformational leadership (SD25) operates through five behavioral pathways: building collective ambition, enabling critical thinking, facilitating intuition transfer, encouraging market immersion, and modeling shared purpose (Kester *et al.*, 2011). Individual managerial traits (SD26) operate through need for cognition, risk perception, and process-directive style as distinct information-processing mechanisms (McNally *et al.*, 2013), with integrative complexity determining whether decisions reflect genuine strategic synthesis (Patanakul, 2020). Stakeholder engagement (SD21) operates through role-based social legitimacy, with role clarity determining whether engagement generates coordination or interference (Beringer *et al.*, 2012, 2013). Project manager's influence (SD23) operates through authority-legitimacy calibration within governance structures (Beringer *et al.*, 2013; Petro and Gardiner, 2015). How these individual-level mechanisms aggregate to produce collective portfolio capability remains unaddressed and constitutes a priority for future investigation.

4.5 Integrative framework: dynamic capability system for portfolio success

The integrative framework (Figure 5) conceptualizes portfolio success as the emergent outcome of a dynamic, self-renewing DC system, not a static inventory of practices, comprising interdependent sensing, seizing, and transforming domains that continuously condition one another through mutual feedback, supported by cross-cutting microfoundations. This design mirrors the empirically validated triad of antecedents, routines, and mediators driving outcomes (Eriksson, 2014; Laaksonen and Peltoniemi, 2018). Bidirectional arrows ($\leftrightarrow$) between the three domains represent mutual conditioning, sensing insights inform seizing decisions; seizing outcomes shape transforming capacity; transforming generates renewed sensing capacity, consistent with the simultaneous-operation view of DC dimensions established in Section 2.3. Dashed arrows mark feedback and learning loops discussed below, and thin vertical arrows ($\uparrow$) denote the continuous enabling influence of cross-cutting microfoundations across all three capability dimensions.

In line with Teece (2007, 2018) and Eisenhardt and Martin (2000), the framework views DCs as higher-order capacities that sense opportunities, seize them through coordinated commitment, and transform organizational structures to sustain strategic fit. Empirical evidence across DC research shows these are enacted through repeatable processes and knowledge mechanisms rather than singular acts of change (Eriksson, 2014; Laaksonen and Peltoniemi, 2018). The capability system culminates in multidimensional outcomes (strategic alignment, value realization, balance, preparedness, and economic performance) that reflect the system's integrative efficacy (Bechtel *et al.*, 2023; Meskendahl, 2010).

Consistent with Teece (2007) and Schilke *et al.* (2018), the bottom band of cross-cutting microfoundations in Figure 5 represents the enduring social, cognitive, and behavioral conditions that sustain all three capability domains simultaneously. Organizational culture (SD24) and transformational leadership (SD25) create the normative and interpretive infrastructure for adaptation, while individual managerial traits (SD26) anchor cognitive complexity and judgment (Beringer *et al.*, 2013; McNally *et al.*, 2013; Patanakul, 2020). Stakeholder engagement (SD21), team empowerment and voice (SD22), and project-manager influence (SD23) diffuse adaptive intent across structural boundaries, ensuring that sensing insights are translated into actionable and legitimate decisions (Beringer *et al.*, 2013; Jonas, 2010; Petro and Gardiner, 2015). These mechanisms act as upward channels ($\uparrow$), continuously shaping each capability domain by embedding participation, trust, and cognitive diversity.

The capability system culminates in multi-dimensional portfolio outcomes, i.e. value maximization, strategic alignment, balance, preparedness, and economic success (Bechtel *et al.*, 2023; Meskendahl, 2010). Consistent with Schilke *et al.* (2018) and Baía and Ferreira

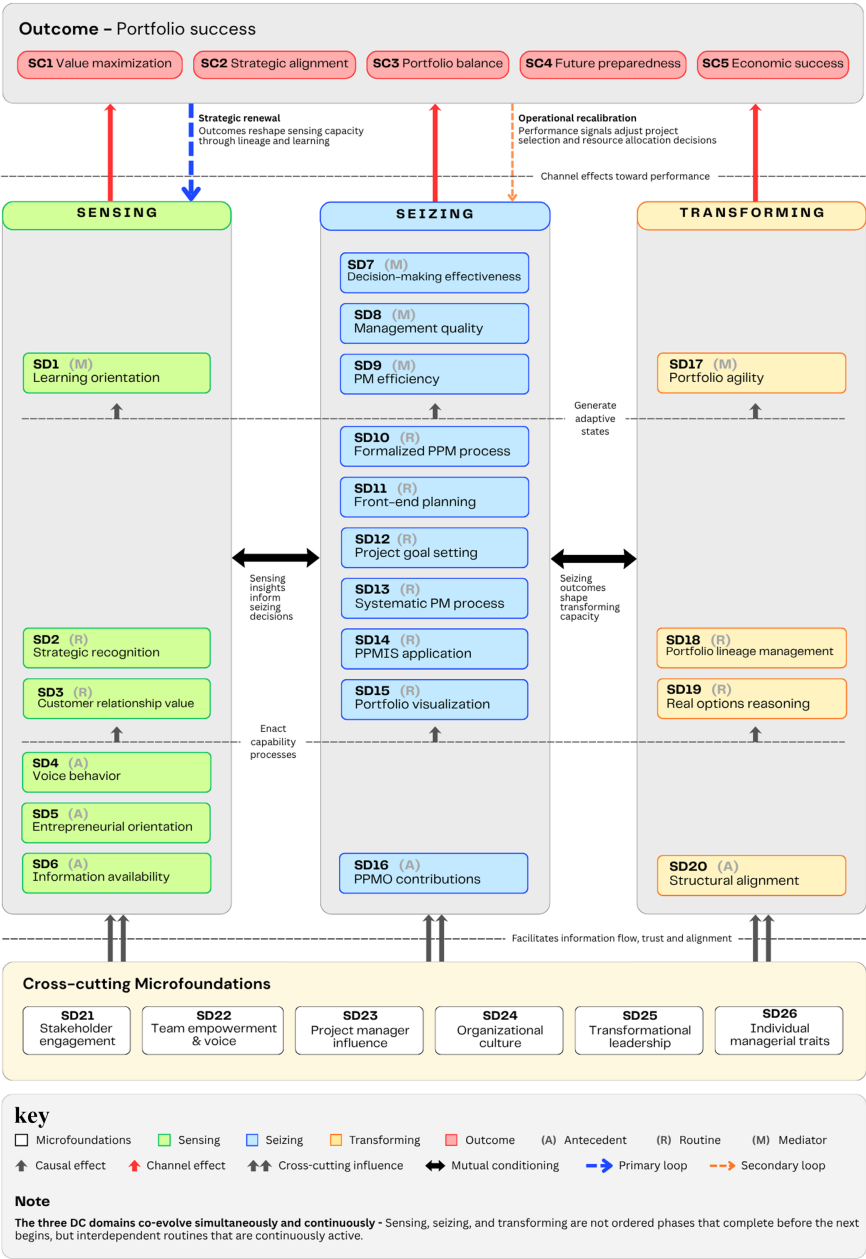


Figure 5. The integrative framework: dynamic capability system for portfolio success. Source: Authors' own work

(2024), the model recognizes that DCs rarely affect outcomes directly; they operate through proximate mediating states, such as learning orientation (SD1), decision-making effectiveness (SD7), management quality (SD8), PM efficiency (SD9), and portfolio agility (SD17), which

channel capability enactment into portfolio success. The classification of these five states as mediators rather than moderators reflects how each is positioned and tested in its source studies. A mediator is produced by upstream inputs and produces downstream outcomes; a moderator conditions the strength of a relationship without being caused by the independent variable (Baron and Kenny, 1986). Each mediating state satisfies the mediator definition empirically: SD1 is cultivated by sensing antecedents and channels their effects into decision quality (Kester *et al.*, 2011; Killen *et al.*, 2008a); SD8 fully mediates the formalization–success relationship, with no significant direct effect of formalization once it is controlled (Teller *et al.*, 2012); SD7 is explicitly designated the mediator between structural antecedents and agility (Kock and Gemünden, 2016); SD9 mediates between single-project factors and PPM performance (Martinsuo and Lehtonen, 2007); and SD17 fully mediates the DC–success relationship, with no significant direct effect of DCs once agility is included (Bechtel *et al.*, 2023). In each case the adaptive state is empirically caused by antecedents and routines and empirically causes portfolio outcomes, the structural signature of mediation rather than moderation.

The framework depicts two feedback pathways, each grounded in individually cited findings, through which portfolio outcomes re-enter and renew the capability system. The primary feedback loop (blue dashed arrow) connects outcomes back to the sensing domain. Evidence from the reviewed articles consistently shows that portfolio performance reshapes sensing capacity: Kock and Gemünden (2019) demonstrate that both proactive lineage (the forward-looking planning of future project roadmaps) and reactive lineage (the systematic reuse of knowledge from completed projects) independently predict portfolio success. This confirms that the feedback pathway from outcomes to sensing is itself a performance driver. Kopmann *et al.* (2017) show that strategic control at the portfolio level provides the sensing mechanism through which emerging patterns are recognized and responded to, grounding this loop in ongoing strategy–portfolio interaction. Killen and Hunt (2010) demonstrate that PPM capabilities co-evolve through learning mechanisms, such as tacit experience accumulation, knowledge articulation, and codification, activated by regular portfolio reviews. Such learning mechanisms continuously update how the organization senses and interprets its environment. In PPM, this primary feedback materializes through project lineage management (SD18) and learning orientation (SD1), and is grounded in Zollo and Winter's (2002) deliberate learning mechanisms operating continuously rather than episodically.

A secondary feedback loop (amber dashed arrow) connects outcomes back to the seizing domain through a shorter, operationally oriented cycle. Portfolio reviews, business case monitoring, and reprioritization routines translate performance signals into adjusted project selection and resource allocation decisions, updating seizing routines without necessarily triggering broader capability renewal (Cooper *et al.*, 1999, 2001; Kopmann *et al.*, 2017). This loop operates at a faster cadence than the primary loop: where the primary loop reshapes the organization's interpretive and sensing capacity over time, the secondary loop recalibrates resource commitments and prioritization criteria within the existing governance architecture. Together, these two feedback pathways sustain the recursive, self-renewing character of the DC system (Schilke *et al.*, 2018; Teece *et al.*, 2016), and their relative under-representation in empirical studies of PPM represents an important direction for future longitudinal research.

Notably, our analysis yields no evidence of a direct feedback pathway from portfolio outcomes to the transforming domain. While transforming capabilities drive portfolio reconfiguration, this reconfiguration is consistently triggered by renewed sensing signals and adjusted seizing priorities rather than by outcomes looping directly back into structural alignment or governance renewal processes. More broadly, feedback dynamics remain among the most under-researched mechanisms in PPM, representing fertile ground for future longitudinal and process research into how portfolio outcomes propagate through (and progressively reshape) the full capability system.

5. Discussion

5.1 Theoretical contributions

This review reframes PPM as a cyclic, co-evolving DC system rather than a collection of discrete SDs. Drawing on DC theory (Eisenhardt and Martin, 2000; Teece, 2007, 2018), the framework positions sensing, seizing, and transforming as simultaneously and continuously operating domains rather than sequential stages, a distinction supported by Killen and Hunt (2010), Petit (2012), and Barbosa and Carvalho (2024), consistent with the simultaneous-operation view established in Section 2.3. Portfolio success is as an emergent property of interdependent sensing, seizing, and transforming routines that continuously interact, adapt, and renew one another through feedback loops. SDs operate not as linear inputs but as mutually conditioning elements within a self-reinforcing cycle where antecedents, routines, and mediators co-evolve toward adaptive outcomes (Pitelis et al., 2024; Schilke et al., 2018; Wilden et al., 2013). In contrast to static, practice-oriented views, this synthesis specifies how structural, informational, and behavioral antecedents translate into proximate capability states, decision effectiveness, management quality, and portfolio agility, whose outcomes are theorized, in turn, to reshape the routines that produced them (Bechtel et al., 2023; Kock and Gemünden, 2020).

From practices to recursive mechanisms. One contribution lies in demonstrating how mediating and feedback mechanisms connect portfolio structures and outcomes within an ongoing learning loop. Formalized processes, PPMIS, and PPMO functions influence portfolio success primarily through process quality — timeliness, transparency, and coherence of decision and resource flows (Kock et al., 2020; Teller et al., 2012). These mediating states subsequently modify antecedent conditions, creating a closed cycle in which governance structures and behavioral enablers are recalibrated through experience. The framework further identifies two distinct feedback pathways: a primary loop in which portfolio outcomes reshape sensing capacity through lineage management (SD18), learning orientation (SD1), and emerging strategy recognition (Kock and Gemünden, 2019; Kopmann et al., 2017); and a secondary loop through which portfolio reviews and business case monitoring recalibrate seizing routines at a shorter operational cadence (Cooper et al., 1999, 2001; Kopmann et al., 2017). Together, these loops position portfolio routines not as static templates but as temporally unfolding mechanisms of renewal (Laaksonen and Peltoniemi, 2018; Schilke et al., 2018).

Complementarities among evolving success determinants. Another contribution is the identification of dynamic complementarities among SDs that collectively sustain adaptation. The interactions documented in Table 5 are of two kinds: some are empirically confirmed within the same source study. For example, the SD10→SD8→portfolio success chain (Teller et al., 2012), the SD6/SD12→SD9 pathway (Martinsuo and Lehtonen, 2007), and the SD7→SD17 relationship (Kock et al., 2016), while others are theoretically inferred complementarities derived through integrative synthesis across separate studies. As shown, portfolio success emerges from the synergy of interdependent determinants rather than isolated configurations. Learning orientation (SD1) strengthens decision-making effectiveness (SD7) and management quality (SD8); information availability (SD6) enhances formalized processes (SD10) and visualization (SD15), which in turn feed back to enrich sensing capacity. Management quality (SD8) co-evolves with systematic PM processes (SD13), while stakeholder engagement (SD21) and team empowerment (SD22) form adaptive feedback systems translating legitimacy and voice into timely change. Structural enablers such as PPMO contributions (SD16), organizational culture (SD24), and transformational leadership (SD25) stabilize yet renew capability linkages. These interdependencies portray PPM as a self-adjusting system where feedback, complementarity, and temporal renewal jointly sustain performance (Arndt et al., 2022; Schilke et al., 2018).

The dynamic strategy–portfolio interface. This mechanism extends to the strategy–portfolio interface: portfolio systems interact recursively with strategy formation, extending DC theory to the strategy–execution nexus. Project portfolios both implement and, the

reviewed evidence suggests, shape strategy through iterative sensing, evaluation, and adaptation (Killen *et al.*, 2008a; Killen and Hunt, 2013; Kock *et al.*, 2020). The primary feedback loop developed in Section 4.5 is proposed as the underlying mechanism behind this interface: portfolio outcomes re-enter the sensing domain through lineage management and strategic recognition routines, reshaping enabling conditions and decision heuristics, and closing the evolutionary cycle between strategic intent and portfolio renewal (Kock and Gemünden, 2019; Kopmann *et al.*, 2017).

Multi-level co-evolution. A further contribution is to clarify how DCs unfold across nested levels of analysis, linking micro-behavioral enablers with macro-organizational performance. At the organizational level, PPMOs and digital infrastructures provide structural and informational capacity (Kock *et al.*, 2024); at the portfolio level, management quality and decision effectiveness operate as adaptive mediators (Kock *et al.*, 2020, 2024; Unger *et al.*, 2012b); and at the individual level, empowerment and voice serve as learning conduits (Beringer *et al.*, 2013; Jonas, 2010). This vertical coupling reflects the DC literature's call to model capability evolution across temporal and organizational scales (Pitelis *et al.*, 2024; Schilke *et al.*, 2018).

Repositioning PPM in the DC debate. Collectively, these insights reposition PPM within the broader DC discourse as a meso-level capability system linking microfoundations of individual and team behavior with macro-processes of strategic renewal. Empirically, portfolio performance differentials arise less from static governance design than from the quality of feedback, integration, and learning routines that sustain adaptive capacity (Bechtel *et al.*, 2023; Killen and Hunt, 2010; Killen and Kjaer, 2012). By rendering each SD independently observable before connecting it to performance (Section 2.3), the framework directly addresses the tautology risk (Arend and Bromiley, 2009; Priem and Butler, 2001) and is consistent with the design-science approach advocated by Sebrek *et al.* (2024, 2025). This constitutes a form of strategic orchestration (Cristofaro *et al.*, 2026): governance structures, behavioral enablers, and mediating states must be continuously rebalanced rather than optimized to a single fixed configuration.

Unresolved tensions in the evidence base. Most SDs reviewed here show a consistent direction of effect across studies: more of the determinant is associated with better portfolio outcomes. That pattern does not hold universally. Senior management involvement improves project termination quality only up to a point—the relationship is curvilinear, turning negative beyond an optimal degree of engagement (Unger *et al.*, 2012b). Stakeholder engagement helps under high role clarity but shows null or negative effects under low role clarity (Beringer *et al.*, 2013). Formalization's benefits strengthen with portfolio complexity (Teller *et al.*, 2012), yet the same study finds no clear guidance for portfolios that are both complex and highly innovative, since the two conditions pull in opposite directions. These examples show that several SDs treated as unconditionally beneficial instead operate under boundary conditions the primary studies themselves do not fully reconcile.

5.2 Managerial implications

The findings suggest that sustaining portfolio success requires ongoing orchestration rather than one-off configuration. Managers should view PPM as a living system of interdependent sensing, seizing, and transforming capabilities that continuously evolve through feedback and learning. Effective portfolio management, therefore, depends less on designing ideal structures than on maintaining the routines, data flows, and leadership practices that enable adaptation.

For sensing, managers need to invest in mechanisms that enhance information transparency, collective learning, and environmental scanning. Regular portfolio reviews, data integration through PPMIS, and open communication channels enable organizations to detect weak signals and identify early shifts in stakeholder priorities. These activities operationalize sensing by transforming dispersed insights into shared strategic foresight.

For seizing, the focus should be on strengthening structural and procedural alignment to translate insights into timely action. Formalized governance processes, prioritization routines, and resource-allocation mechanisms should be flexible enough to respond to uncertainty while maintaining coherence. Seizing thus depends on balancing disciplined decision-making with the agility to reallocate attention and resources as conditions change. However, two important tensions must be recognized. First, formalization without sufficient management quality produces bureaucratic rigidity rather than adaptive benefit. Organizations that invest in portfolio governance structures without simultaneously developing managerial competence may not realize the intended performance returns (Teller *et al.*, 2012; Teller and Kock, 2013). Second, EO amplifies sensing effectiveness but can destabilize portfolio performance if decision-making effectiveness is not developed in parallel, as the capacity to identify and pursue opportunities outstrips the ability to evaluate and act on them soundly (Kock and Gemünden, 2016).

For transforming, leadership and culture become the pivotal levers. Transformational leaders who model trust, experimentation, and open dialog can institutionalize learning behaviors that embed change readiness into the organization's culture. By cultivating psychological safety and participative voice, leaders ensure that lessons from portfolio outcomes feed back into sensing and seizing routines, closing the adaptive loop. A further tension operates here across time horizons: sensing and transforming require sustained investment in capability building, i.e. developing learning orientation, lineage practices, and cultural readiness, whereas seizing demands short-term resource commitment and execution discipline. Under conditions of high environmental turbulence or resource constraint, organizations face pressure to prioritize seizing at the expense of the longer-cycle investments that sensing and transforming require. Managers should resist this compression: Bechtel *et al.* (2023) quantitatively show that at least two DC dimensions must be strongly present to sustain portfolio agility, meaning that chronic underinvestment in both sensing or transforming will erode the adaptive capacity that seizing routines alone cannot restore.

In practice, portfolio governance should therefore emphasize continuous recalibration, i.e. adjusting structures, roles, and tools as new information emerges. This recalibration is not uniform across conditions: in stable environments, seizing routines and governance formalization carry the primary performance load; as turbulence increases, sensing and transforming investments are likely to become proportionally more critical, and the feedback loops connecting outcomes back to strategic recognition and lineage management become the primary levers of renewal (Kopmann *et al.*, 2017; Schilke, 2014). Portfolio managers, PPMO directors, and steering committees each engage different parts of this system. Portfolio managers operate primarily within sensing and seizing routines, while PPMO directors sustain the informational and governance infrastructure that enables seizing. Steering committees hold authority over the transforming decisions that reconfigure portfolio scope and governance architecture. Integrating the three DC dimensions into PPM enables firms to dynamically renew strategic alignment and performance capabilities, ensuring the portfolio remains both directionally stable and flexible in execution.

5.3 Future research directions

Building on the recursive view established above, future research can extend DC–PPM theorizing across four complementary streams.

Microfoundations of project portfolio adaptation. Further research should unpack the individual and relational mechanisms that enable dynamic capabilities in PPM. Managerial cognition, leadership style, and team interaction patterns influence how sensing, seizing, and transforming unfold in practice (Barbosa and Carvalho, 2024; Beringer *et al.*, 2013; Jonas, 2010). The present synthesis identifies review-grounded psychological and social mechanisms underlying all six cross-cutting microfoundations: the perceived effectiveness–safety calculus governing voice behavior (Kaufmann *et al.*, 2020; Kock *et al.*, 2024);

interpersonal trust and psychological safety as the substrate of organizational culture (Aghajani *et al.*, 2023a; Kester *et al.*, 2011); five behavioral pathways through which transformational leadership shapes decision quality (Kester *et al.*, 2011); need for cognition, risk perception, and integrative complexity underlying individual managerial traits (McNally *et al.*, 2013; Patanakul, 2020); role-based social legitimacy calibrating stakeholder engagement (Beringer *et al.*, 2012, 2013); and authority-legitimacy calibration governing project manager's influence (Petro and Gardiner, 2015). How these individual-level mechanisms aggregate across people and roles to produce collective portfolio capability remains unaddressed and constitutes the priority frontier for future multilevel research. Of particular priority are five SDs whose performance relevance is theoretically established, but whose quantitative evidence base remains limited: learning orientation (SD1), strategic recognition (SD2), structural alignment (SD20), transformational leadership (SD25), and individual managerial traits (SD26). Large-scale multi-industry quantitative studies are needed to verify whether the effects of these SDs generalize across portfolio contexts, and mediation analyses would clarify the pathways through which they operate within the capability chain. A specific priority is understanding what converts sensing outputs into seizing commitments in practice — that is, how and when accumulated environmental intelligence becomes a resource mobilization decision. This question requires longitudinal and process-based designs that track portfolio governance in real time and lies beyond what cross-sectional survey data can address.

Transforming domain development. The transforming domain is the least empirically developed of the three DC dimensions in the portfolio success research, with three specific gaps defining its research frontier. First, while Bechtel *et al.* (2023) empirically operationalize second-order reconfiguring, i.e. improving how portfolios are managed rather than what they contain, no study tests whether this process-level reconfiguration produces performance outcomes distinct from first-order portfolio content reconfiguration. Future research should examine whether the two levels operate as substitutes, complements, or sequential dependencies. Second, the mechanisms through which portfolios deliberately disrupt entrenched routines and resource commitments are absent as operationalized constructs, despite being indirectly evidenced through escalation of commitment (Unger *et al.*, 2012b), the PPM capability success trap (Killen and Hunt, 2010), and structural rigidity (Hoffmann *et al.*, 2020). Primary research connecting these phenomena to the broader DC literature on organizational unlearning (Zollo and Winter, 2002) would directly address this gap. Third, the conditions triggering governance reconfiguration, its temporal cadence, and the factors distinguishing renewal from instability remain unexamined and represent productive directions for longitudinal process research.

Temporal dynamics and feedback cycles. The two feedback pathways identified in this study (the primary loop from outcomes back to sensing through lineage management and strategic recognition, and the secondary loop from outcomes to seizing through portfolio reviews and reprioritization) remain among the most under-researched mechanisms in PPM. We found no study employing a design capable of tracing how these loops operate across portfolio lifecycles, the cadence at which they activate, or whether their relative strength varies by industry context or portfolio complexity. A related open question concerns the temporal dynamics of capability activation: what determines the relative intensity of sensing, seizing, and transforming at a given point in portfolio time, and under what conditions does managerial attention shift across domains? The simultaneous-operation architecture documented in this review leaves this question for future longitudinal investigation. Longitudinal process studies, event-sequence analysis, and simulation modeling are needed to move from the cross-sectional associations documented in current research toward causal and temporal accounts of how outcomes propagate through (and progressively reshape) the full capability system (Bechtel *et al.*, 2023; Killen *et al.*, 2008a).

Contextual and ecosystem interactions. Future research should explore how DCs extend beyond firm boundaries to include interorganizational, institutional, and ecosystem-level

interactions. Sustainability-oriented portfolios, public–private partnerships, and cross-sector programs provide opportunities to test how external stakeholders co-shape sensing and transforming routines (Pitelis *et al.*, 2024; Wilden *et al.*, 2013). Comparative and multi-level designs could examine how contextual pressures (e.g. regulation, legitimacy demands) influence capability orchestration within and across portfolios. More broadly, integrating complementary theoretical lenses — including absorptive capacity (Biedenbach and Müller, 2012), organizational learning (Killen and Hunt, 2010; Zollo and Winter, 2002), and ambidexterity (implicit in the exploration–exploitation tension across sensing and transforming) — with the DC framework represents a productive direction for subsequent theoretical development, potentially enriching the mechanism-view account offered here.

Methodological pluralism and integration. The recursive nature of DCs calls for multi-method approaches that combine configurational, process, and network perspectives. Multimethod designs, digital trace data, and simulation modeling can complement traditional surveys and case studies, providing richer explanations of capability evolution (Schilke *et al.*, 2018). Future work could also integrate computational text analysis to map how DC constructs and their empirical operationalizations evolve across the PPM literature over time.

Diagnostic playbook and capability maturity model. A practitioner-oriented diagnostic playbook, including domain-specific capability audit checklists, leading/lagging metrics per DC dimension, and a phased maturity model, would translate the 26-SD framework into actionable tools. Framing these as conditional rather than universally beneficial (following the contingency logic of this review) is critical, and design-science methods are well suited to this development agenda.

Overall, advancing DC–PPM research requires designs that empirically capture co-evolution and feedback, examine the interplay between structure and agency, and bridge micro–macro levels of analysis. The 26-SD framework developed here, with its dual classification by DC domain and analytical role, provides a directly testable structure: the antecedent-routine-mediator chain maps onto mediation models, and the five unvalidated SDs constitute a targeted, first-priority empirical agenda.

6. Conclusion

This review reconceptualizes PPM as a cyclic, co-evolving DC system rather than a set of isolated SDs. Integrating evidence from 66 peer-reviewed studies spanning over 25 years, it identifies 26 SDs, classifies each by DC domain and analytical role, and demonstrates how sensing, seizing, and transforming routines interact recursively through mediating capability states, i.e. decision effectiveness, management quality, and portfolio agility, to generate sustained portfolio success, consistent with DC theory’s recent reorientation toward strategic orchestration (Cristofaro *et al.*, 2026).

Three contributions stand out. First, the paper presents a unique integrative synthesis of PPM SDs within a DC framework, building on prior fragmented catalogs with an architecture that specifies how governance structures, behavioral enablers, and mediating states are theorized to combine toward performance. Second, it identifies two feedback pathways, each grounded in individually cited findings: a primary loop from outcomes back to sensing through lineage management and strategic recognition, and a secondary loop that recalibrates seizing through portfolio reviews, advancing PPM from a static governance model toward a self-renewing learning system. Third, it clarifies how the PPM capability system operates across organizational, portfolio, and individual levels simultaneously, linking microfoundations of empowerment, leadership, and culture to macro-processes of strategic renewal.

For managers, the practical implication is direct: sustaining portfolio performance requires investing in the quality of feedback, learning, and integration routines rather than in governance structures alone. The three DC dimensions are not independent; at least two must be strongly present to sustain portfolio agility (Bechtel *et al.*, 2023). When short-term pressure

mounts, portfolio managers, PPMO directors, and steering committees must coordinate to resist this compression, the displacement of sensing and transforming investment by short-term seizing demands.

The framework carries several boundary conditions that should be acknowledged. As [Figure 3](#) and [Appendix C](#) document, the empirical base is concentrated in large and medium-sized organizations operating primarily in financial services, pharmaceuticals and chemicals, information technology (IT) and telecommunications, and manufacturing contexts; its applicability to small and medium-sized enterprises (SMEs) or to sectors underrepresented in the reviewed studies, including defense, education, and public administration, remains an open empirical question that the current evidence base cannot resolve. Under high-turbulence, volatile, uncertain, complex, and ambiguous (VUCA) and brittle, anxious, non-linear, and incomprehensible (BANI) conditions, [Schilke's \(2014\)](#) contingency logic, already embedded in [Section 2.3](#), cautions that the value of DCs weakens at high dynamism, while our framework suggests that sensing and transforming investments become proportionally more critical and that seizing routines alone are insufficient to sustain portfolio agility ([Bechtel et al., 2023](#)). Also, no reviewed study was conducted under acute crisis conditions, and hence, our framework's behavior under extreme environmental discontinuity is empirically untested.

As [Section 5.1](#) details, the reviewed literature does not speak with one voice on several SDs. Stakeholder engagement, for example, shows null or negative effects under low role clarity ([Beringer et al., 2013](#)); formalization's benefits for portfolios that are simultaneously complex and highly innovative remain theoretically unresolved ([Teller et al., 2012](#)); senior management involvement shows a curvilinear, inverted-U effect that turns negative beyond an optimal degree of engagement ([Unger et al., 2012b](#)); and the benefits of managerial practices depend on firms' EO ([Kock and Gemünden, 2020](#)), reinforcing the framework's contingency logic rather than an unconditionally positive reading of any SD.

More broadly, this synthesis also sets a clear agenda for the field going forward: five success determinants are now well positioned for large-scale quantitative verification, the feedback pathways identified here invite longitudinal tracing beyond the cross-sectional evidence available today, and the predominance of survey-based designs points to process-oriented methods as the natural next step for testing the mechanisms this review proposes.

Declaration of AI use in the writing process

During the preparation of this manuscript, the authors used ChatGPT-4o (OpenAI) to support language refinement, including proofreading and improving sentence clarity. All content was subsequently reviewed and edited by the authors, who take full responsibility for the integrity and accuracy of the final submission.

Supplementary material

The supplementary material for this article can be found online.

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Corresponding author

Masoud Aghajani can be contacted at: m.aghajani@ecu.edu.au