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Internal and external design integration, launch strategy proficiency, and new product development performance: The contingent role of market dynamism

Nikolaos Kyriakopoulos *, Erik Jan Hultink, Euiyoung Kim, Sicco Santema

Department of Design, Organization, and Strategy, Delft University of Technology, the Netherlands

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ABSTRACT

Design capabilities have been recognized as drivers of innovation, yet the distinction between internal and external design integration remains largely underexplored, as do the ways through which these integration types contribute to new product development (NPD) performance. Drawing on the dynamic knowledge management view, this study conceptualizes internal and external design integration as distinct loci of market-facing knowledge generation that are associated with launch strategy proficiency and, in turn, with NPD performance. Survey data from 247 U.S. firms show an indirect association between both types of design integration and NPD performance through launch strategy proficiency. Market dynamism reveals a capability reversal. Under stable market conditions, internal design integration is positively associated with launch strategy proficiency, whereas external design integration becomes negatively associated with it at very low levels of dynamism. Under dynamic market conditions, external design integration is positively associated with launch strategy proficiency, whereas the association between internal design integration and launch strategy proficiency is attenuated. The findings connect the design and marketing research streams and offer guidance for decision-makers on aligning the locus of design integration with the level of market dynamism.

1. Introduction

Among innovation processes, design capabilities have attracted growing attention in recent years (e.g., Cai et al., 2025; Magistretti et al., 2021a). Once confined to studios, these capabilities, including user-centeredness, problem reframing, visualization, iteration, prototyping, and diversity of perspectives, have become recognized as important drivers throughout organizations' value chains (Cai et al., 2023). This elevated view reflects a shift toward more strategic deployment of these capabilities (Magistretti et al., 2022; Micheli et al., 2018). Leading organizations such as IBM have broadened the scope of design capability adoption, moving from siloed departmental practices to firm-wide integration to strengthen innovation outcomes. By integrating these capabilities across the organization, IBM claims to have substantially improved user understanding and enhanced the ability to identify new market opportunities (Forrester Consulting, 2023). Beyond internal integration, firms have also opened design capabilities externally. For example, the health technology multinational Royal Philips collaborated with external institutions and other private organizations to develop new healthcare solutions that combine technological advancement with user-centered approaches (Philips News Center, 2016). These examples illustrate the two focal concepts of this study: *internal* and *external design integration*. The former refers to the extent to which non-design employees from diverse departments contribute to the firm's design capabilities, and the latter refers to the extent to which external organizations, institutions, and individuals contribute to these capabilities.

Despite these real-world developments, the innovation management literature has paid little attention to the implications of integrating design capabilities across both internal and external organizational boundaries. Adjacent research streams have examined how firms transfer and coordinate knowledge across functions and boundaries (e.g., Chesbrough and Bogers, 2014; Song and Montoya-Weiss, 2001; Zahra and George, 2002), but they have not addressed how design capabilities generate market-facing knowledge. The most proximate research stream on the collaboration between marketing and (a) internal design

* Corresponding author. Department of Design, Organization, and Strategy, Delft University of Technology, Landbergstraat 15, 2628 CE, Delft, the Netherlands.
E-mail addresses: n.kyriakopoulos@tudelft.nl (N. Kyriakopoulos), h.j.hultink@tudelft.nl (E.J. Hultink), e.y.kim@tudelft.nl (E. Kim), s.c.santema@tudelft.nl (S. Santema).

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functions (e.g., Beverland, 2005; Beverland et al., 2016) and (b) external design specialists (e.g., Hemonnet-Goujot et al., 2019) has linked such interfunctional collaboration to product success (Ernst et al., 2010). However, little is known about the mechanism by which collaborative knowledge derived from design capabilities is translated into launch strategy decisions.

Furthermore, studies examining design capabilities have identified innovativeness (Nakata and Hwang, 2020), as well as radical (Dell'Era et al., 2026) and incremental innovation outcomes that stem from design-driven insights (Cai et al., 2025). Nevertheless, this body of work has treated these outcomes as endpoints, without investigating the pathway through which design-generated knowledge becomes strategic choices during product launch. There is also scant evidence on how the participation of internal vs. external firm actors in design capabilities generates qualitatively different types of knowledge (tacit, firm-specific vs. peripheral, boundary-spanning) and how each type may matter differently under varying market conditions.

This study intends to contribute to this body of research by answering two research questions: (1) Through what mechanisms are internal and external design integration linked to new product development (NPD) performance? (2) How do contextual market conditions shape the associations between internal and external design integration and launch strategy proficiency? To address the first research question, we draw on the dynamic knowledge management framework (Li et al., 2025), which amalgamates dynamic capabilities (e.g., Teece et al., 1997) and the knowledge-based view (e.g., Grant, 1996). Through this theoretical lens, we argue that the locus of participation matters because internal and external design integration generate distinct types of knowledge. We also theorize that this knowledge is translated into strategic action through *launch strategy proficiency*, which refers to the firm's ability to engage in segmentation, targeting, and positioning and to formulate a growth strategy for its product offerings (Langerak et al., 2004). We focus on launch strategy proficiency because the market-facing insights generated through design capabilities (i.e., user needs, problem definitions, and value propositions) are not strategic per se; they require a mechanism that converts them into strategic decisions. Stated differently, we position launch strategy proficiency as opening the "black box" between design integration and NPD performance.

The second research question addresses the boundary conditions of design integration in today's business environments, which are characterized by shifting customer preferences and product standards, rapidly evolving technologies, and changing competitive strategies (Schilke, 2014). By adopting a contingency perspective, we investigate the moderating role of *market dynamism* in the relationship between design integration and launch strategy proficiency. In dynamic business environments where the half-life of existing organizational knowledge is shortening (Lyu et al., 2020), understanding how market dynamism shapes the relationships between internal and external design integration and launch strategy proficiency offers important and potentially asymmetric insights into when and how these forms of design integration matter for innovating organizations.

2. Theoretical background and research hypotheses

2.1. Theoretical background and conceptual model

The dynamic knowledge management view provides a theoretical lens for explaining our conceptual model (Fig. 1). This framework extends traditional knowledge management by emphasizing how firms generate new knowledge through sensing, seizing, and transforming capabilities in order to adapt to changing environments (Li et al., 2025). Using this theoretical umbrella, our conceptual model couples the dynamic capabilities and knowledge-based views. Prior research has considered design-related capabilities, such as design thinking, as

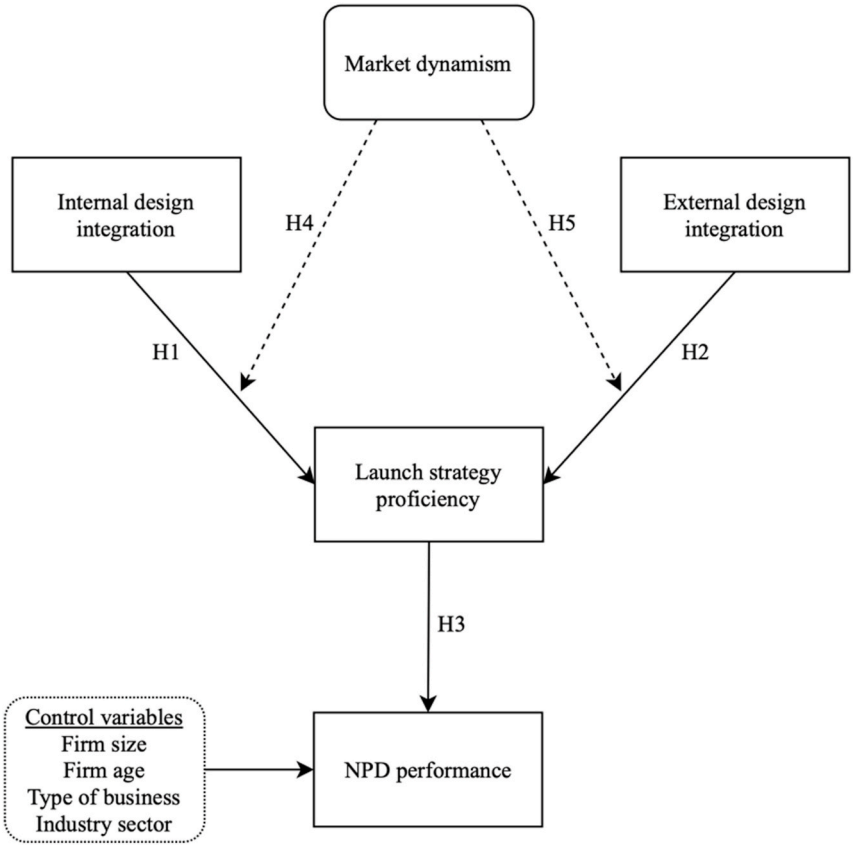


Fig. 1. Conceptual model.

dynamic capabilities (e.g., Magistretti et al., 2021a). Design capabilities also encompass knowledge-sharing processes. Specifically, when employees or other stakeholders engage in user understanding, problem reframing, prototyping, and iteration, they participate in knowledge exchange (Liedtka, 2020). We posit that internal and external design integration form the architecture of dynamic knowledge management, serving as the organizational loci through which the micro-routines of dynamic capabilities are enacted.

Through ethnographic research, empathy mapping, and other user understanding practices (Carlgren et al., 2016), employees or external collaborators enact *sensing* routines, uncovering latent needs that would otherwise be overlooked. Visualization, iteration, and prototyping represent *seizing* routines that allow firms to test alternative strategic positions before committing substantial resources (Magistretti et al., 2025). Through problem reframing and iterative questioning of assumptions, employees enact *transforming* routines. By doing so, firms transform their understanding of both problems and solutions and address shifting market needs (Magistretti et al., 2021a). See Appendix 1 for a detailed theoretical mapping.

Although design integration generates market-facing insights, translating these insights into strategic decisions requires a distinct mechanism. Design integration expands the problem and solution spaces the firm considers (Liedtka, 2020) by generating reframed problems (Beverland et al., 2015), alternative user understandings (Liedtka, 2015), and novel value propositions (Dell'Era and Verganti, 2010), but these insights are not strategic per se. We suggest that launch strategy proficiency converts these broad design-generated insights into strategic decisions regarding segmentation, targeting, positioning, and growth strategy. Illustratively, two firms with similar design integration capabilities may achieve markedly different NPD performance depending on their ability to deploy this knowledge during the launch stage.

Other constructs that could plausibly mediate the relationship between design integration and NPD performance do not capture this translation function. For example, product innovativeness reflects the novelty and utility of a product (Nagaraj et al., 2020) but not the strategic pathway through which it reaches the market. Customer responsiveness and market orientation both capture how firms react to existing market signals, whether through speed of response to expressed customer needs (Krush et al., 2015) or, correspondingly, through the generation, dissemination, and response to market intelligence (Jaworski and Kohli, 1993), but neither converts the diverse insights into strategic action. By contrast, launch strategy proficiency operates at the level of strategic synthesis, and we therefore theorize it as the mechanism by which design-generated insights become relevant to NPD performance.

In dynamic markets, characterized by frequent changes in customer preferences, technological shifts, product standards, and marketing strategies, firms must adapt their strategic product decisions accordingly to succeed (Jung et al., 2024). Under such conditions, the firm's ability to synthesize and leverage insights generated through the participation of internal and external stakeholders in design capabilities becomes a source of competitive advantage (Cruz-González et al., 2015). From a contingency perspective, we examine the moderating role of market dynamism in the relationships between internal and external design integration and launch strategy proficiency.

2.2. Design integration and adjacent concepts

Table 1 positions internal and external design integration in relation to adjacent concepts in the literature. Absorptive capacity, cross-functional integration, and open innovation share a common emphasis on the transfer, coordination, or exploitation of existing knowledge, whether sourced externally (Cohen and Levinthal, 1990; Zahra and George, 2002), internally across functions (Song and Montoya-Weiss, 2001), or across organizational boundaries (Chesbrough and Bogers, 2014).

Although these concepts may involve knowledge recombination, their theoretical core remains the transfer, coordination, or flow of existing knowledge. The raison d'être of design integration, by contrast, is knowledge generation through design capabilities. Non-design employees or external collaborators who engage in user understanding, problem reframing, prototyping, and iteration participate in knowledge generation activities, thereby producing new insights that did not previously exist. This generative mechanism provides the theoretical foundation for our hypotheses. An important aspect of our hypotheses is the locus of participation in design capabilities. Internal design integration generates largely tacit, firm-specific knowledge, whereas external design integration tends to generate peripheral, boundary-spanning knowledge. Table 1 summarizes these distinctions.

2.3. Design integration and launch strategy proficiency

Unlike the approach of confining design within independent departments and silos, internal design integration involves engaging non-

Table 1
Comparison of design integration with adjacent constructs.

Construct	Definition	Knowledge process	Primary theoretical focus	Knowledge characteristics
Absorptive capacity	"The firm's ability to recognize, assimilate, transform, and exploit external knowledge" (Cohen and Levinthal, 1990; Zahra and George, 2002)	Acquisition, assimilation, transformation, and exploitation of external knowledge	Leveraging external knowledge for competitive advantage	Existing external knowledge; primarily codified; emphasis on exploitation
Cross-functional integration	"The interaction, communication, information sharing, coordination, and the joint involvement across functions in innovation activities" (Song and Montoya-Weiss, 2001)	Interaction and communication, information sharing, coordination, and the joint involvement across functions	Overcoming knowledge silos through integration	Existing internal knowledge; mix of tacit and codified; specialized/ domain-specific
Open innovation	"A distributed innovation process based on purposively managed flows of knowledge across organizational boundaries, utilizing both monetary and non-monetary mechanisms in line with the organization's business model" (Chesbrough and Bogers, 2014)	Inside-out, outside-in, and coupled open innovation modes	Managing distributed innovation processes	External knowledge flows; varies in tacitness; peripheral and diverse
Internal design integration (this study)	The extent to which non-design employees from diverse departments contribute to the firm's design capabilities	Generation of new knowledge through cross-functional engagement in design capabilities	Knowledge generation through design capabilities	Specialized (functional expertise); largely tacit (embedded in shared mental models and organizational memory); firm-specific
External design integration (this study)	The extent to which external organizations, institutions, and individuals contribute to the firm's design capabilities	Generation of new knowledge through boundary-spanning engagement in design capabilities	Knowledge generation through design capabilities	Peripheral (capturing weak market signals); novel (unconstrained by path dependencies); boundary-spanning

design employees in design capabilities such as user understanding, problem reframing, prototyping, and iteration. These capabilities enact the micro-routines of dynamic knowledge management, namely, sensing, seizing, and transforming. Engagement in these design capabilities produces new knowledge rather than merely exchanging existing expertise. This knowledge is specialized because it is shaped by functional expertise and is often tacit, as it is embedded in shared mental models and organizational memory (Cannon-Bowers and Salas, 2001). It is also firm-specific because it is grounded in the strategic constraints and prior market experience of the firm (Grant, 1996).

To illustrate the generation of knowledge through internal design integration, we present the following examples. When a marketing manager and a finance manager collaborate on user empathy mapping, they not only transfer existing customer knowledge but also generate new knowledge by uncovering latent customer needs. This sensing micro-routine enables firms to refine market segmentation by identifying customer groups based on unexpressed needs and preferences. In a similar vein, when an operations manager engages in visualization and prototyping, they enact seizing and generate insights about feasibility that would not emerge from functional knowledge alone but from the actual act of making (Meinel et al., 2020). Such insights enable firms to test alternative product positioning options before committing substantial resources. Furthermore, employees from different functions who engage in problem reframing employ transforming routines (Sahakian and BenMahmoud Jouini, 2023), challenging established assumptions about target markets and growth trajectories. By integrating customer knowledge from marketing with feasibility constraints from operations and technical possibilities from R&D, these routines enable firms to generate strategic configurations that cannot emerge from a structurally insulated approach (Beverland et al., 2015). Thus, we hypothesize.

H1. Internal design integration is positively associated with launch strategy proficiency.

Whereas internal design integration leverages firm-specific knowledge, external design integration enables knowledge generation from the periphery of the firm through boundary-spanning participation in design capabilities. External actors engage in design capabilities not merely as sources of transferable industry knowledge but as active participants who challenge existing problem frames (Beckman, 2020). The tension between their cognitive frames and existing internal knowledge unveils possibilities that may be unknown or inaccessible to internal NPD teams (Nooteboom et al., 2007). External consultants, agencies, and other firms often operate in multiple industries and organizational contexts. This breadth allows them to generate novel combinations of knowledge by drawing analogies between new design problems and solutions they have encountered elsewhere (Hargadon and Sutton, 1997).

For example, when external partners participate in capabilities such as identifying user pain points, they employ sensing routines that scan the periphery of the firm and detect weak market signals that internal teams may overlook due to adherence to entrenched mental models and local search bias (Liedtka, 2015). This peripheral sensing helps firms to identify emerging customer segments before their competitors (Day and Schoemaker, 2004). Similarly, external collaborators who engage in prototyping and experimentation enact seizing routines that are unconstrained by internal feasibility assumptions or sunk cost considerations (Yang et al., 2023). Their cognitive freedom enables them to assess which product configurations warrant investment and, in turn, evaluate positioning options that internal teams may overlook. Furthermore, external actors who engage in problem reframing workshops for a focal firm enact transforming routines, and through this participation, challenge path dependencies or confirmation biases (Liedtka, 2015). This process opens new problem spaces that were previously cognitively constrained (Dorst, 2011) and reveals novel growth trajectories for a firm's launch strategy. Building on the foregoing discussion, we hypothesize.

H2. External design integration is positively associated with launch strategy proficiency.

2.4. Launch strategy proficiency and NPD performance

Launch strategy proficiency comprises the core elements of marketing strategy, such as segmentation, targeting, and positioning, as well as the formulation of a growth strategy when developing new products (Morgan, 2012). Without an effective launch strategy, innovative products may not address consumer needs or reach the appropriate segments and may ultimately fail in the market (Di Benedetto, 1999). Extant research has shown that a firm's ability to make launch strategy decisions drives performance (e.g., Evanschitzky et al., 2012; Vorhies et al., 2009). Within these decisions, market segmentation and targeting enable firms to identify and prioritize attractive market opportunities and to focus on the most valuable customer segments, thereby reducing the risk of market-product misalignment (Hultink et al., 1997, 2000). Firms also implement product positioning and formulate growth strategies, both of which are important as they enable firms to adapt to competitive moves and, in turn, achieve superior market and financial outcomes (Hultink et al., 1997). Prior research is complemented by practitioner evidence indicating that 66% of new products that met or exceeded their performance targets were launched by firms with a rigorous launch strategy (Fabiszak, 2025). Drawing on prior research and practitioner evidence, we hypothesize.

H3. Launch strategy proficiency is positively associated with NPD performance.

2.5. The moderating role of market dynamism

In markets where technology, product standards, and customer preferences are relatively stable and predictable, non-design employees who participate in design capabilities generate tacit and firm-specific knowledge that becomes embedded in routines aligned with existing market conditions. Specifically, internal actors engaged in design capabilities such as user research and empathy mapping generate knowledge about customer needs and preferences by drawing on relatively stable and proven customer archetypes (Magistretti et al., 2021b). This knowledge is attuned to established customer preferences and supports segmentation and targeting decisions. Employees participating in prototyping and experimentation generate knowledge that reflects the firm's feasibility constraints (e.g., production capabilities, resource endowments, and technical infrastructure) and the solution spaces it has already explored (Magistretti et al., 2025). When internal actors engage in problem reframing, they generate knowledge that is shaped by organizational memory (Sahakian and BenMahmoud Jouini, 2023). Under stable conditions, such knowledge is valuable because it enables firms to identify opportunities that build cumulatively on established market positions, which the market continues to reward.

In dynamic markets, by contrast, the value of internally generated knowledge for launch strategy proficiency is expected to diminish. In such markets, the user understanding generated internally reflects a market reality whose value is rapidly depreciating. Internal actors who conduct user research may develop a tacit understanding that is based on prior experience, which can lead to cognitive entrenchment (Dane, 2010) and make them more likely to confirm existing customer segments but less likely to detect emerging ones. The knowledge generated internally through prototyping and visualization is similarly constrained because it embeds feasibility assumptions that often lead to design fixation (Viswanathan and Linsey, 2013) and may limit the firm's ability to anticipate and develop positioning alternatives outside its existing trajectory. Although reframing generally suggests the exploration of alternative solutions, when enacted internally, it is constrained by the firm's prior experience. The resulting problem frames are likely to yield incremental extensions rather than the discontinuous departures that

are required to address rapidly changing market conditions (Tripsas and Gavetti, 2000). These issues can be intensified by time pressure, which leads firms to engage in design capabilities in a procedural manner (Liedtka, 2015) and limits their ability to synthesize design insights into launch strategy decisions. Based on this line of reasoning, we hypothesize.

H4. *Market dynamism negatively moderates the positive association between internal design integration and launch strategy proficiency*.

When markets are relatively stable, the peripheral and boundary-spanning knowledge that external actors generate through participation in design capabilities may yield limited additional value, as it is characterized by cognitive distance from existing knowledge structures (Nooteboom et al., 2007). This cognitive distance creates integration costs that, under stable conditions, may counterbalance the strategic value this knowledge provides for launch strategy decisions (Laursen and Salter, 2006). Specifically, through user research and empathy mapping, external actors generate peripheral knowledge about emerging customer needs and preferences that are not yet salient in a stable market. The translation of these insights into segmentation and targeting decisions may require substantial effort and resources without delivering proportionate strategic value. The knowledge generated by external collaborators through prototyping and experimentation reflects analogical thinking that is drawn from other industries and client contexts (Kalogerakis et al., 2010). Such knowledge, however, must be woven with the firm's established capabilities and positioning frameworks. Under stable conditions, this may lead the firm to make major positioning changes with limited corresponding benefit, given that its existing positioning remains relatively effective. Although external actors generate boundary-spanning knowledge through problem reframing, they also introduce alternative problem definitions that must be weighed against existing strategic assumptions (Carlile, 2004). In such contexts, this can incur coordination costs that may impair decisions regarding growth strategy (Stettner and Lavie, 2014).

However, when markets are dynamic, the cognitive distance that is embedded in externally generated knowledge becomes a strategic asset, as market signals become noisy and short-lived (Day, 2011) and the firm's existing knowledge becomes obsolete. When external actors engage in user-centric approaches, they are not anchored to pre-existing and firm-specific customer archetypes. The generated knowledge is less tied to prior customer categories, which quickly become obsolete, and is therefore more informative for identifying emerging segments and revising targeting decisions (Day and Schoemaker, 2004). Through prototyping and experimentation, external actors draw on product configurations from diverse industries and organizational contexts (Kalogerakis et al., 2010) and are unencumbered by sunk-cost attachment to the firm's prior prototyping investments (Viswanathan and Linsey, 2013), enabling them to explore positioning alternatives that internal actors may filter out. The boundary-spanning knowledge that external actors generate through problem reframing introduces alternative problem definitions drawn from different organizational and industry contexts (Carlile, 2004). Under conditions of high market dynamism, where the firm's existing problem frames are becoming quickly outdated, the same alternative problem definitions that incurred negotiation costs under stability reveal novel problem spaces (Dorst, 2011) and growth trajectories that internally focused knowledge cannot access. Thus, at high levels of market dynamism, the positive association between external design integration and launch strategy proficiency is expected to be more pronounced. Hence, we hypothesize.

H5. Market dynamism positively moderates the positive association between external design integration and launch strategy proficiency.

3. Research methodology

3.1. Sample and data collection

We conducted this study on U.S.-based firms that had developed new products during the preceding three years. Given that more than 700,000 U.S. firms engage in design activities (National Center for Science and Engineering Statistics, 2025), this sampling frame increases the likelihood of obtaining a sizeable and relevant sample. To identify and recruit key respondents from U.S. firms for the purpose of our study, we collaborated with a well-established market research firm that targeted managers in NPD and innovation roles. The market research firm implemented respondent verification procedures, such as identity verification and IP address matching. Following the methodological recommendations of Homburg et al. (2012), we administered a prescreening survey to assess the eligibility of informants. Respondents qualified for participation in the main survey only if they reported high involvement in and knowledge of their firm's design and NPD activities and held positions at the middle-management level or above. Finally, we included two attention-check questions in the survey instrument to identify and exclude inattentive respondents.

A total of 1485 respondents entered the prescreening survey. Of these, 753 did not continue with the main survey because they did not meet the eligibility or sampling criteria. A further 485 respondents were excluded for failing attention checks, straight-lining, or speeding. This procedure resulted in 247 usable responses. The sample included firms operating in sectors such as manufacturing, healthcare, information, retail, finance, transportation, and construction (Table 2). We assessed non-response bias by comparing early and late respondents. The *t*-tests on all variables revealed no significant differences, suggesting that non-response bias is unlikely to threaten our findings. Although we assessed non-response bias by comparing early vs. late respondents, this does not address potential selection bias introduced by the extensive screening process. Respondents who were not eligible or terminated during the survey did not provide complete responses and, thus, cannot be compared with the retained sample on the study variables.

3.2. Measures

To assess internal and external design integration, we adopted a twofold measurement approach. First, we adapted the measure from Krush et al. (2015), which originally captured marketing capabilities, to

Table 2
Sample characteristics.

Firm characteristics	n	%	Respondent characteristics	n	%
Industry sector			*Seniority level*		
Manufacturing	48	19.4	Owner/Executive/C-Level	79	32.0
Healthcare	12	4.9	Senior management	120	48.6
Information	26	10.5	Middle management	48	19.4
Retail	26	10.5	*Functional role*		
Finance	24	9.7	General management	71	28.7
Transportation	11	4.5	Product design and development	95	38.5
Construction	38	15.4	Project management	53	21.5
Other	62	25.1	Commercial and marketing	28	11.3
Firm size (employees)					
0-250	79	32.0			
251-1000	123	49.8			
1001+	45	18.2			
Primary market					
Business-to-Consumer (B2C)	54	21.9			
Business-to-Business (B2B)	46	18.6			
Both B2B and B2C	147	59.5			

capture the locus and extent of participation in design capabilities. Second, we operationalized design capabilities through the dimensions of design thinking from Carlgren et al. (2016) and Klenner et al. (2022), as these represent the primary elements through which organizations enact design capabilities. Respondents evaluated the extent to which (a) non-design employees within their organization (internal design integration) and (b) external actors such as consultants, agencies, and partner firms (external design integration) contribute to each design thinking dimension (1 = not at all, 7 = to a very great extent). Furthermore, we specified both constructs as formative because the items represent distinct and defining dimensions, are not interchangeable, and act as causal indicators. To ensure content validity, experts in innovation management and design reviewed the adapted items and confirmed their clarity and relevance. We also conducted a post hoc redundancy analysis using an independent sample ($n = 112$) drawn from a population comparable to that of the main study. Specifically, we measured global items capturing the overall essence of each construct and estimated path models linking the formative indicators to these global items (e.g., Hair et al., 2022). The resulting path coefficients were 0.78 for internal design integration and 0.92 for external design integration, exceeding the recommended threshold of 0.708 and providing supportive evidence of convergent validity. Full details of this analysis, including the wording of the global items, are reported in Appendix 2.

We measured launch strategy proficiency by adapting the scale from Langerak et al. (2004) to capture how well a firm undertakes market segmentation, selects the positioning of new products, formulates a growth strategy, and chooses target customer groups when developing new products (1 = very poorly, 7 = excellently). Although launch strategy proficiency may overlap conceptually with broader constructs of marketing strategy-making, we operationalize it as the core strategic decisions made during the launch stage. For NPD performance, we adapted the measure from Kroh et al. (2018) and Griffin and Page (1993), which reflects the impact of NPD activities on profitability, revenue, market share, product/service quality, product/service functionality, and customer satisfaction. We measured the moderating variable, market dynamism, by adapting the measure from Sarin and Mahajan (2001), which captures the rate of change in customer preferences, technology, product standards, and marketing strategies within the market in which the firm operates. We also controlled for (a) firm size (number of employees), (b) firm age (years in operation), (c) type of business (i.e., business-to-consumer [B2C], business-to-business [B2B], or both), and (d) industry sector.

3.3. Common method bias assessment

To address potential common method bias, we followed established guidelines (Hulland et al., 2018; Podsakoff et al., 2003) and implemented both *ex ante* procedural remedies and *ex post* statistical assessments. First, we guaranteed respondents' anonymity and confidentiality and stated that no responses were right or wrong. Second, we implemented a physical separation of the constructs within the survey instrument and used different response anchors for the independent and dependent variables. We also implemented three analytical steps to assess potential method bias in partial least squares structural equation modeling (PLS-SEM). First, a full multicollinearity test (Kock, 2017) showed that all inner variance inflation factor (VIF) values were lower than the conservative cutoff of 3.3. Second, we used a theoretically unrelated marker variable to implement the approach outlined by Chin et al. (2013) for formative constructs. Including the social desirability scale (Hays et al., 1989) as a marker variable had minimal impact on the significance of the β coefficients and R^2 values. Third, we applied the confirmatory factor analysis (CFA) marker-variable technique in SPSS AMOS to the reflective block of our model (Williams et al., 2010). We first estimated a CFA model that included the substantive constructs and the marker variable (i.e., social desirability) to obtain the factor loadings and the error variances of the marker variable. In subsequent models, we fixed these values to establish the meaning of the marker. We compared a baseline model, in which the marker was uncorrelated with the substantive constructs (i.e., launch strategy proficiency and NPD performance), with a model in which the marker loaded equally on all reflective indicators (Method-C model). The chi-square difference test was non-significant ($\Delta\chi^2 = 3.48$, $\Delta df = 1$, $p > 0.05$), indicating that common method variance does not meaningfully account for shared variance among constructs. Model fit also changed minimally (ΔCFI = 0.002; ΔRMSEA = 0.001). Furthermore, the correlation between launch strategy proficiency and NPD performance changed marginally ($r_{\text{baseline}} = 0.698$ vs. $r_{\text{Method-C}} = 0.703$). Together, these three procedures indicate that common method variance is not a substantive issue for the validity of our results.

3.4. Endogeneity assessment

Following best practices for survey-based research examining theorized relationships among variables (Hult et al., 2018), we assessed potential endogeneity using the Gaussian copula approach. We first applied the Kolmogorov-Smirnov test with Lilliefors correction to the standardized scores of internal and external design integration and launch strategy proficiency. The results show that these constructs do not have normally distributed scores, allowing us to proceed with the Gaussian copula approach. In the first model, launch strategy proficiency served as the dependent variable, with internal and external design integration as independent variables. The copulas for both internal ($p > 0.05$) and external ($p > 0.05$) design integration were non-significant, and their bias-corrected confidence intervals (BCCIs) included zero. In the second model, with NPD performance as the dependent variable and launch strategy proficiency as the independent variable, the copula for launch strategy proficiency was non-significant ($p > 0.05$), and its BCCIs included zero. The non-significant results of the Gaussian copulas of our model indicate that endogeneity is unlikely to bias our estimates.

4. Analysis and results

4.1. Measurement model assessment

We employed PLS-SEM to test the hypotheses using SmartPLS v.4.1.0.7, given the presence of both formative and reflective constructs and the complexity of the research model (Hair et al., 2019). First, we assessed the loadings, internal consistency (Cronbach's α, Rho_A, and composite reliability), and corrected item-total correlations (CITC) of the reflective measures. Following established methodological guidelines (Hair et al., 2022), we dropped the "market share" item from the NPD performance measure because it had the lowest factor loading (0.63) and the lowest CITC value (0.43). Removing this item increased the average variance extracted (AVE) of the NPD performance measure from 0.48 to 0.53. The other reflective constructs, namely launch strategy proficiency and market dynamism, exhibited satisfactory factor loadings, internal consistency, CITC, and AVE values (Table 3). We also examined discriminant validity using the heterotrait-monotrait (HTMT) ratio. All HTMT values were below the conservative threshold of 0.85, ranging from 0.55 to 0.70, and none of the BCCIs included 1 (Table 4), thereby confirming that the constructs are empirically distinct.

Second, we examined the formative constructs of internal and external design integration. All VIF values, both inner and outer, were below 3.3, indicating that multicollinearity is not a concern. We also assessed the outer loadings of the formative constructs and retained all items because their outer loadings exceeded the 0.5 threshold (Table 5), even when their outer weights were not statistically significant (Hair et al., 2022).

Table 3
Reflective measurement model results.

Reflective constructs and items	Mean (SD)	CITCs	Loadings
Launch strategy proficiency (Cronbach's α = 0.78; Rho_A = 0.78; CR = 0.86; AVE = 0.61)			
Segmenting the market.	5.78 (1.06)	0.52	0.74
Selecting new products' positioning.	5.91 (1.01)	0.57	0.76
Formulating the growth strategy.	5.88 (0.97)	0.63	0.81
Selecting target customer groups.	5.87 (1.05)	0.63	0.80
NPD performance (Cronbach's α = 0.77, Rho_A = 0.78; CR = 0.85, AVE = 0.53)			
Profitability	6.10 (0.86)	0.55	0.72
Revenue	6.25 (0.82)	0.48	0.66
Market share[a]	-	-	-
Product/service quality	6.12 (0.92)	0.60	0.75
Product/service functionality	6.13 (0.83)	0.55	0.74
Customer satisfaction	6.30 (0.79)	0.56	0.76
Market dynamism (Cronbach's α = 0.73; Rho_A = 0.73; CR = 0.83; AVE = 0.55)			
In our kind of business, marketing strategies change very frequently.	5.74 (1.09)	0.46	0.71
In our kind of business, product standards change very frequently.	5.65 (1.23)	0.51	0.78
In our kind of business, customer preferences in product features change very frequently.	5.67 (1.26)	0.58	0.75
In our kind of business, the technology changes very frequently.	5.81 (1.12)	0.52	0.73

[a] Item was deleted.

Table 4
HTMT criterion.

	1	2	3
1. Launch strategy proficiency	-		
2. NPD performance	0.70 [0.560, 0.827]	-	
3. Market dynamism	0.68 [0.523, 0.827]	0.55 [0.391, 0.682]	-

Note: HTMT values are shown with BCCIs in brackets. HTMT is not applied to formative constructs.

Table 5
Formative measurement model results.

Formative construct and items	Outer loading	VIF
Internal design integration		
To what extent do non-design employees within your organization contribute to:		
understanding of users, including their needs and pain points.	0.74	2.14
defining and reframing problems to explore alternative perspectives and solutions.	0.67	2.15
making ideas visual through sketches, drawings, prototypes, mock-ups or other representations.	0.68	1.90
experimenting and iterating, testing solutions, and refining prototypes in cycles of fast and continuous improvement.	0.83	1.76
engaging in collaboration to integrate diverse perspectives and expertise.	0.87	1.59
External design integration		
To what extent do external organizations, institutions, and individuals, such as consultants, agencies, and others that collaborate with your firm, contribute to:		
understanding of users, including their needs and pain points.	0.73	2.02
defining and reframing problems to explore alternative perspectives and solutions.	0.73	2.12
making ideas visual through sketches, drawings, prototypes, mock-ups or other representations.	0.82	2.41
experimenting and iterating, testing solutions, and refining prototypes in cycles of fast and continuous improvement.	0.89	2.07
engaging in collaboration to integrate diverse perspectives and expertise.	0.87	2.19

4.2. Structural model assessment

Structural model assessment includes the examination of the in- and out-of-sample predictive power (Guenther et al., 2023). The R^2 values for launch strategy proficiency ($R^2 = 0.53$) and NPD performance ($R^2 = 0.32$) indicate moderate in-sample predictive power (Hair et al., 2022). To assess the out-of-sample predictive power of our model, we conducted PLSpredict analysis using a 10-fold cross-validation procedure with 10 repetitions. The results show that Q^2predict values are positive, 0.47 for launch strategy proficiency and 0.13 for NPD performance, indicating out-of-sample predictive relevance. Furthermore, the prediction errors (i.e., root mean square error [RMSE] and mean absolute error [MAE]) of the PLS-SEM model are lower than those of the linear model benchmark for all indicators of launch strategy proficiency and NPD performance. This indicates high predictive power (Shmueli et al., 2019). Finally, we evaluated model fit using the standardized root mean square residual (SRMR). The SRMR (0.074) falls below the 0.08 threshold, indicating satisfactory model fit. We then estimated the structural model with 5000 bootstrap samples, two-tailed tests, and 95% BCCIs.

4.3. Hypotheses testing

Table 6 presents the results of the PLS-SEM path analysis. Regarding the direct paths, internal design integration is positively and significantly associated with launch strategy proficiency ($\beta = 0.40$, $p < 0.001$), supporting H1. The association between external design integration and launch strategy proficiency is also positive and significant ($\beta = 0.19$, $p = 0.027$), providing support for H2. In support of H3, launch strategy proficiency is positively associated with NPD performance ($\beta = 0.52$, $p < 0.001$). Because H3 involves a relationship between reflective constructs, we also assessed this hypothesis using consistent PLS (PLSc) with 5000 bootstrap samples. The results further support H3, indicating that the association between launch strategy proficiency and NPD performance is positive and significant ($\beta = 0.61$, $p < 0.001$). We also assessed the effect sizes (f^2) to examine the substantive contribution of each independent variable. The f^2 values for internal and external design integration in relation to launch strategy proficiency are moderate (0.13) and small (0.03), respectively, and the f^2 value for launch strategy proficiency in relation to NPD performance is moderate (0.22).

Our analysis also examined the indirect paths linking internal and external design integration to NPD performance through launch strategy proficiency. The indirect associations between internal and external design integration and NPD performance through launch strategy proficiency are positive and significant ($\beta = 0.21$, $p < 0.001$ and $\beta = 0.10$, $p = 0.044$, respectively). Following Zhao et al.'s (2010) typology, these are indirect-only mediations, in light of the non-significant associations of internal design integration with NPD performance ($\beta = 0.09$, $p = 0.498$) and of external design integration with NPD performance ($\beta = -0.02$, $p = 0.879$).

Regarding moderating effects, the interaction between market dynamism and internal design integration is negative and significant ($\beta = -0.28$, $p = 0.002$), consistent with H4. A visualization using simple slope analysis (Fig. 2) shows that when market dynamism is high (+1 SD), there is a flatter slope compared to the steeper slope when dynamism is low (−1 SD). As predicted by H5, there is a positive interaction term between market dynamism and external design integration on launch strategy proficiency ($\beta = 0.23$, $p = 0.010$). Fig. 3 illustrates a steeper slope at high levels of market dynamism (+1 SD) and a flatter slope at low levels of market dynamism (−1 SD). The interaction effect sizes (f^2) are 0.07 for the interaction between internal design integration and market dynamism and 0.06 for the interaction between external design integration and market dynamism. These are deemed large effect sizes for interaction effects according to methodological guidelines (Hair et al., 2021).

To further explore the moderating role of market dynamism, we conducted Johnson-Neyman analyses (Spiller et al., 2013) to identify the values of the moderator at which the conditional effects of internal and external design integration on launch strategy proficiency are statistically significant. We extracted the latent variable scores from the PLS-SEM analysis and used them as inputs in the PROCESS macro to

Table 6
PLS-SEM results.

Paths	β	*t*-value	*p*-value	BCCI	f^2
Internal design integration → Launch strategy proficiency (H1)	0.40***	4.89	< 0.001	[0.238, 0.558]	0.13
External design integration → Launch strategy proficiency (H2)	0.19*	2.22	0.027	[0.003, 0.334]	0.03
Launch strategy proficiency → NPD performance (H3)	0.52***	5.95	< 0.001	[0.351, 0.687]	0.22
Internal design integration → NPD performance	0.09	0.68	0.498	[−0.174, 0.330]	0.00
External design integration → NPD performance	−0.02	0.15	0.879	[−0.203, 0.182]	0.00
Internal design integration → Launch strategy proficiency → NPD performance	0.21***	4.21	< 0.001	[0.125, 0.326]	-
External design integration → Launch strategy proficiency → NPD performance	0.10*	2.01	0.044	[0.012, 0.194]	-
Market dynamism → Launch strategy proficiency	0.28***	4.78	< 0.001	[0.177, 0.402]	0.12
Market dynamism × Internal design integration → Launch strategy proficiency (H4)	−0.28**	3.03	0.002	[−0.541, −0.157]	0.07
Market dynamism × External design integration → Launch strategy proficiency (H5)	0.23*	2.57	0.010	[0.107, 0.490]	0.06
Market dynamism × Internal design integration → Launch strategy proficiency→ NPD performance	−0.14**	2.72	0.007	[−0.300, −0.075]	-
Market dynamism × External design integration → Launch strategy proficiency → NPD performance	0.12*	2.59	0.010	[0.062, 0.265]	-
Firm size (control) → NPD performance	−0.02	0.40	0.693	[−0.144, 0.089]	0.00
Firm age (control) → NPD performance	−0.08	1.14	0.256	[−0.202, 0.060]	0.01
B2C (control) → NPD performance	−0.31*	2.20	0.028	[−0.603, −0.046]	0.02
B2B (control) → NPD performance	−0.13	0.80	0.423	[−0.448, 0.198]	0.00
Manufacturing (control) → NPD performance	0.12	0.69	0.489	[−0.208, 0.482]	0.00
Healthcare (control) → NPD performance	−0.12	0.41	0.685	[−0.708, 0.448]	0.01
Information (control) → NPD performance	−0.32	1.48	0.139	[−0.751, 0.096]	0.01
Retail (control) → NPD performance	−0.20	0.99	0.324	[−0.604, 0.185]	0.00
Finance (control) → NPD performance	−0.20	0.95	0.341	[−0.573, 0.227]	0.00
Transportation (control) → NPD performance	0.31	1.05	0.292	[−0.228, 0.943]	0.01
Other (control) → NPD performance	−0.05	0.28	0.782	[−0.363, 0.318]	0.00

Note: Bootstrap estimates (5000 resamples, two-tailed, 95% BCCI). *p < 0.05; **p < 0.01; ***p < 0.001.

calculate the conditional effects (Hayes, 2022). Below a standardized value of 0.79, the conditional effect of internal design integration on launch strategy proficiency is positive and significant and is stronger at lower values of the moderator. For values above 0.79, the effect is non-significant. Regarding external design integration, the Johnson-Neyman analysis reveals two boundary values at standardized dynamism levels of −1.71 and −0.17. At low levels of dynamism (≤−1.71), external design integration is significantly and negatively associated with launch strategy proficiency, with coefficients ranging from $\beta = -0.54$ ($p = 0.003$) to $\beta = -0.21$ ($p = 0.05$). At values of market dynamism between −1.71 and −0.17, the association is non-significant. However, at higher levels of dynamism (≥−0.17), external design integration is significantly and positively associated with launch strategy proficiency, with coefficients ranging from $\beta = 0.15$ ($p = 0.05$) to $\beta = 0.53$ ($p < 0.001$). Detailed Johnson-Neyman regions of significance are reported in Appendix 3 (Tables A3.1 and A3.2).

Finally, we examined the conditional indirect associations. Market dynamism (a) negatively moderates the indirect association between internal design integration and NPD performance through launch strategy proficiency ($\beta = -0.14$, $p = 0.007$) and (b) positively moderates the indirect association between external design integration and NPD performance through launch strategy proficiency ($\beta = 0.12$, $p = 0.010$). The inclusion of control variables did not materially affect the parameter estimates or the significance of the hypothesized relationships.

4.4. Supplementary analysis

We assessed the potential complementarity between internal and external design integration in relation to launch strategy proficiency. Both integration types are positively and significantly associated with launch strategy proficiency ($\beta_{\text{internal design integration}} = 0.52$, $p < 0.001$; $\beta_{\text{external design integration}} = 0.31$, $p < 0.001$), and their interaction is also positive and significant ($\beta = 0.17$, $p = 0.023$). This suggests that although both integration types are positively associated with launch strategy proficiency individually, they are more strongly associated with it in combination. We then tested whether this complementarity varies across levels of market dynamism. However, owing to insufficient statistical power for the three-way interaction, we report the complementarity and moderation analyses in separate models. When estimated in separate models, the statistical power for H4 and H5, and the complementarity interaction term, exceeds the 0.80 threshold in each case (Cohen, 1992).

4.5. Robustness checks

We conducted additional analyses to assess the robustness of our findings. First, we performed a sensitivity analysis by respecifying NPD performance as two sub-constructs: (a) market outcomes (i.e., profitability, revenue, and market share) and (b) product outcomes (i.e., product/service quality, product/service functionality, and customer satisfaction). For the market outcomes construct, we estimated the model with the market share item included. The item loads satisfactorily on the three-item specification (0.77) and was therefore retained in the sensitivity analysis. Composite reliability (0.79) and AVE (0.55) exceed the recommended thresholds, while Cronbach's α (0.60) and Rho_A (0.60) are below 0.70. These values can be deemed acceptable, given the exploratory nature of this sensitivity check (Hair et al., 2022). The product outcomes sub-construct exhibits satisfactory measurement quality, with Cronbach's α (0.71), Rho_A (0.71), composite reliability (0.84), and AVE (0.63) all above the recommended thresholds. The results reveal (a) positive and significant indirect associations of internal design integration with market outcomes ($\beta = 0.24$, $p < 0.001$) and product outcomes ($\beta = 0.22$, $p < 0.001$) through launch strategy proficiency and (b) positive and significant indirect associations of external design integration with market outcomes ($\beta = 0.12$, $p = 0.031$) and product outcomes ($\beta = 0.11$, $p = 0.032$) through launch strategy

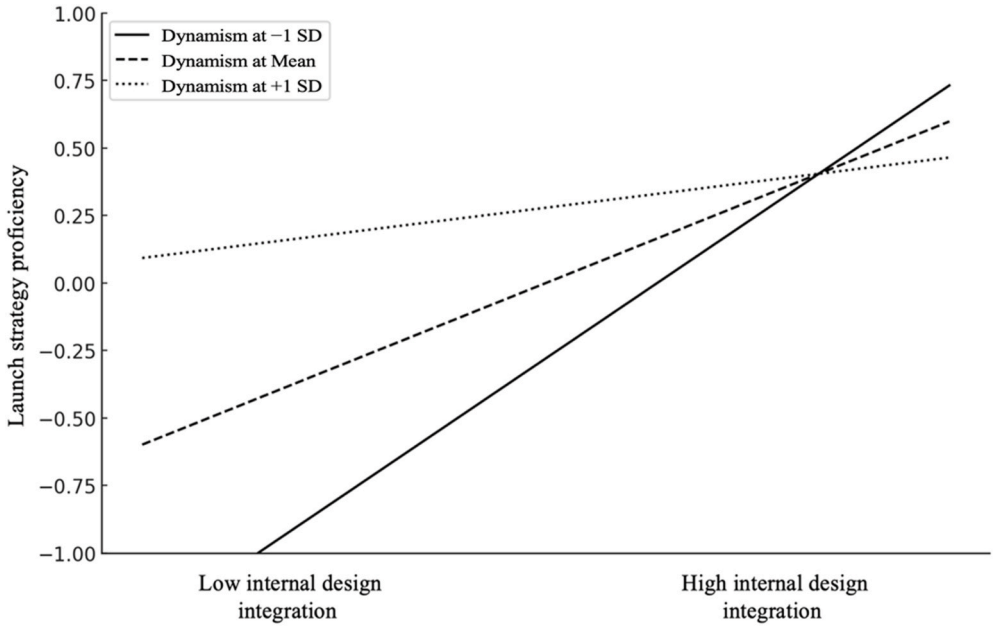


Fig. 2. Simple slope analysis for H4.

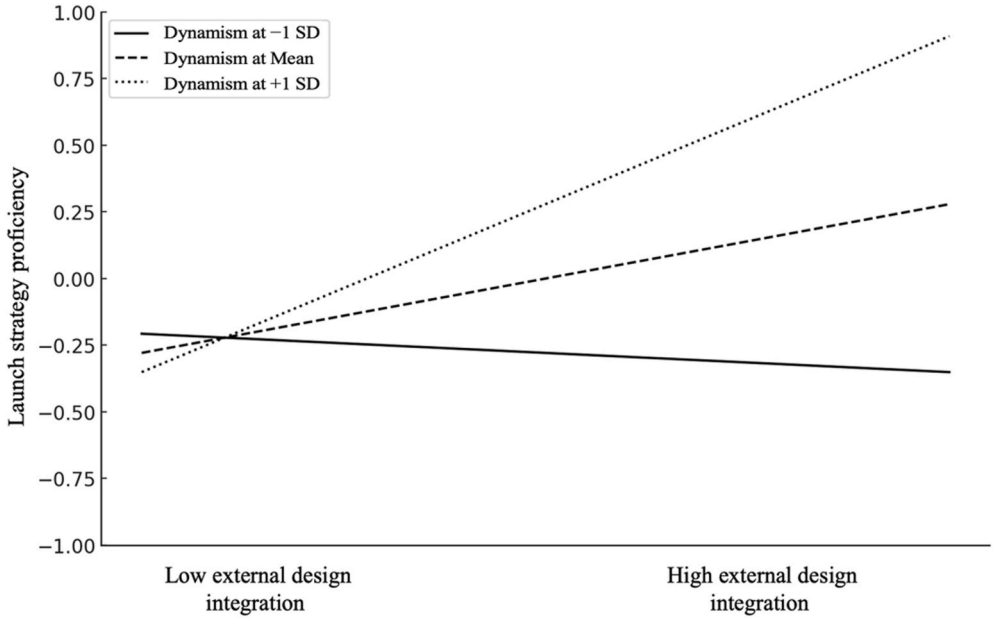


Fig. 3. Simple slope analysis for H5.

proficiency. The pattern of results remains consistent for both sub-constructs, supporting the robustness of our findings.

Second, we conducted finite mixture partial least squares (FIMIX-PLS) analysis to test for unobserved heterogeneity that might threaten the validity of our structural model results. Following established guidelines (Sarstedt et al., 2022), we assessed each solution using the corrected Akaike information criterion (CAIC), Akaike Information Criterion with factor 3 (AIC3), entropy (EN), and segment sizes. Although the two-segment solution yielded a marginally lower CAIC (1209.65) than the single-segment solution (1212.08), its entropy of 0.36 fell below the 0.50 threshold, indicating high levels of fuzziness in segment separation. Furthermore, the five-segment solution showed the lowest AIC3 value (1138.57). However, all solutions with three or more segments had higher CAIC values than the single-segment baseline and contained at least one segment representing less than 6% of the sample, making them unsuitable for further analysis. Collectively, these results provide no evidence of substantive unobserved heterogeneity.

Third, we examined an alternative model ordering, given the possibility that high-performing firms may invest more extensively in design integration. We estimated a reversed structural model in which NPD performance serves as the exogenous construct predicting launch strategy proficiency, which in turn predicts internal and external design integration, with market dynamism moderating the paths from launch strategy proficiency to both integration types. The results show that the reversed model performed less well across multiple evaluation criteria. First, it explained less variance in launch strategy proficiency ($R^2 = 0.30$ vs. 0.53 in the theorized model), and the SRMR of the estimated model (0.127) exceeded the 0.08 threshold. Second, the interaction terms of market dynamism and launch strategy proficiency on internal design integration ($\beta = 0.02$, $p = 0.730$) and external design integration

($\beta = 0.02$, $p = 0.698$) were non-significant, indicating that the theorized moderating pattern was not recovered under the alternative ordering. Third, PLSpredict analysis revealed that the reversed model lacks out-of-sample predictive relevance for the core mediating construct. Specifically, the Q^2predict value for launch strategy proficiency was negative (−0.022) and the RMSE for the launch strategy proficiency indicators exceeded those of the linear model benchmark. These results are consistent with the theorized model ordering and the sequencing of activities in the NPD process. Because both specifications were estimated on the same cross-sectional data, we consider this analysis suggestive. It cannot rule out reverse causality, and we address the corresponding limitations in Section 5.3.

Fourth, because we collected data through a market research firm, we assessed whether multiple responses originated from the same firm. To address this, we matched cases based on shared firm-level characteristics (e.g., industry sector, firm size, firm age, primary market, and the presence of a design department). We then re-estimated the structural model after retaining one respondent per matched profile. To assess the sensitivity of this procedure, we varied the matching criteria. The pattern of results remained consistent across all specifications in terms of coefficient direction and magnitude, while precision weakened in the smallest sample ($n = 174$), where the p-values for the association between external design integration and launch strategy proficiency (0.077) and for its interaction with market dynamism (0.055) were above the 0.05 level. Although matching on observable characteristics may over- or under-identify respondents from the same firm, the consistency of estimates across all matching specifications mitigates this concern. We report the full sensitivity table in Appendix 4.

5. Discussion

This study develops and tests a model that examines (a) the mechanisms through which internal and external design integration are linked to NPD performance and (b) how market dynamism shapes the sign and strength of the associations between design integration and launch strategy proficiency. Our findings show that internal and external design integration are indirectly associated with NPD performance through launch strategy proficiency. Supplementary analysis also suggests that internal and external design integration have a stronger association with launch strategy proficiency when employed in combination.

Our findings point to the contingent role of market context. Importantly, the sign and strength of the two associations with launch strategy proficiency vary with market dynamism, suggesting a capability reversal. Internal design integration is positively associated with launch strategy proficiency in relatively stable market conditions characterized by predictable customer preferences, technology, product standards, and marketing strategies. By contrast, external design integration is negatively associated with it at very low levels of market dynamism. In dynamic markets, however, this pattern reverses. The association between external design integration and launch strategy proficiency is positive, whereas that between internal design integration and launch strategy proficiency is weaker and not statistically significant.

5.1. Theoretical implications

Our study makes several theoretical contributions to the innovation management, design, and new product marketing literature. Our findings show that the integration of design capabilities at different loci (internal and external) is positively associated with launch strategy proficiency, which, in turn, is positively associated with NPD performance. Recent empirical studies have examined how design capabilities, such as design thinking, drive different types of product innovation (Cai et al., 2025) and how experimentation in design thinking contributes to innovation performance (Magistretti et al., 2025). Drawing on the dynamic knowledge management perspective, our study contributes to these investigations by unpacking how the locus of participation in design capabilities is associated with launch strategy proficiency, and how market dynamism shapes the sign and strength of this association for each locus of integration.

From an internal perspective, we extend research on the firm-wide integration of design capabilities (e.g., Wrigley et al., 2020). We argue that as non-design employees engage in design capabilities, firms generate knowledge that is largely tacit, specialized, and firm-specific. We also offer an external perspective on the locus of participation in design, which has been conceptualized in prior research (e.g., Carlgren et al., 2016), but empirical investigations are still limited. Our findings suggest that a competitive advantage derives not only from specialized design expertise (e.g., Sahakian and BenMahmoud Jouini, 2023) but also from the ability of the firm to integrate design capabilities across its external network and generate knowledge that is peripheral, unconstrained by path dependencies, and boundary-spanning.

Prior research has identified positive outcomes associated with design capabilities, including product innovativeness (e.g., Nagaraj et al., 2020), project success (e.g., Loderer and Kock, 2025), and NPD performance (e.g., Nakata and Hwang, 2020). However, these studies do not explain how design-generated insights inform strategic launch decisions. By opening the "black box" between design integration and NPD performance, we show that design integration has an indirect association with NPD performance through launch strategy proficiency, which translates market-facing insights into strategic decisions about segmentation, targeting, positioning, and growth strategy.

We also enrich the contingency perspective on the effectiveness of integrating design capabilities across functions and boundaries. Whereas most prior research emphasizes design capability intensity (e.g., Cai et al., 2025; Nakata and Hwang, 2020), our findings suggest that the value of each design integration locus (internal vs. external) varies with market dynamism, revealing a capability reversal. In stable markets, the firm-specific knowledge generated through internal participation in design capabilities becomes institutionalized in routines. Under such conditions, internal actors who engage in design capabilities, such as user understanding and iterative prototyping, deepen and refine the firm's existing knowledge base (Liedtka, 2020). The shared mental models that emerge from this iterative participation underpin the translation of design-generated insights into launch strategy decisions. In dynamic markets, however, the efficiency gains from internal design integration are accompanied by reduced sensitivity to radical market changes, since this knowledge is relatively narrow and local.

Although external design integration has generally been associated with positive firm outcomes (e.g., Abecassis-Moedas and Rodrigues Pereira, 2016; Hemonnet-Goujot et al., 2019), this association has not been examined in relation to market conditions. Our findings reveal that, at very low levels of market dynamism, external design integration is negatively associated with launch strategy proficiency. When external actors engage in design capabilities such as user understanding and problem reframing, they introduce alternative problem frames that challenge the firm's existing assumptions about its customers and markets (Beckman, 2020). However, under stable conditions, these assumptions are useful because they are attuned to market needs that remain valid for longer. Externally generated problem reframing may uncover new opportunities, but it can also introduce conflicting interpretations of customer segments and value propositions (Carlile, 2004), which may disrupt established strategic frames. At very low levels of dynamism, this can function as interpretive noise, impairing decisions on segmentation, targeting, positioning, and growth strategy. Moreover, the cognitive distance that external collaborators bring to design capabilities may generate friction without proportionate strategic value when existing market knowledge remains valid.

In dynamic markets, where existing knowledge depreciates quickly, the peripheral and boundary-spanning knowledge that external actors generate through participation in design capabilities is more valuable for launch strategy proficiency. External collaborators who engage in

design capabilities are unconstrained by pre-existing design commitments and cognitive frames. Their peripheral viewpoint may help them detect emerging customer segments, competitive threats, novel positioning alternatives, and growth trajectories that internal teams tend to overlook. The capability reversal finding extends Dell'Era and Verganti (2010) by revealing an asymmetry in the value of design knowledge derived from external actors. Specifically, the same peripheral and boundary-spanning knowledge that is negatively associated with launch strategy proficiency at very low levels of dynamism is positively associated with it as dynamism increases.

The moderated mediation analysis (Table 6) provides further evidence that the pathway from design integration to NPD performance through launch strategy proficiency is context dependent. The indirect association between internal design integration and NPD performance is stronger in stable markets, whereas the association between external design integration and NPD performance is stronger under high dynamism. Accordingly, the alignment between the design integration locus and market dynamism represents a boundary condition for the relationship between design capabilities and performance.

Although our supplementary analysis is exploratory due to limited statistical power and the omission of market dynamism as a moderator, it suggests that synergy between internal and external design integration may provide additional benefits. This may reflect the fact that the combination of depth of internal knowledge and breadth of external knowledge is associated with more informed launch strategy decisions than either type in isolation.

5.2. Managerial implications

Our study offers insights for managers with strategic decision-making responsibilities at the intersection of innovation management, design, and new product launch. First, managers should engage employees from various functions in design capabilities to bring diverse knowledge, rather than relying solely on design specialists or siloed approaches. To operationalize internal design integration, firms should ensure that members from non-design functions actively participate in design practices (e.g., user understanding, prototyping, and problem reframing), thereby generating knowledge that cross-functional coordination alone would not surface. Managers who oversee the engagement in design capabilities can assign specific responsibilities to each function within each design cycle. For example, marketing or commercial representatives can conduct customer interviews and empathy mapping, and synthesize their findings into recommendations for segmentation, targeting, and positioning. Engineering, R&D, and operations functions can co-create and iterate prototypes to test technical feasibility and scalability constraints through the act of making. The NPD team can then convene problem reframing sessions to challenge assumptions about customer needs, target markets, and growth trajectories.

In addition to integrating design internally, firms should also engage external actors such as consultants, agencies, research institutions, and industry partners in their design capabilities. By embedding them in project teams for iterative cycles of user-centered research, reframing workshops, and prototyping sessions, executives can create conditions for constructive tension that may arise when external and internal actors collaborate on design activities to inform launch strategy decisions. Selecting external partners is also of high importance. Firms can prioritize collaborators with diverse industry experience, as their ability to draw analogies across contexts can help identify customer segments and growth opportunities. The complementarity finding suggests that managers should structure design activities so that external collaborators challenge assumptions held by internal teams, while internal teams provide feasibility constraints that keep external knowledge connected to organizational capabilities. Firms should also consider strengthening their capacity to implement segmentation, targeting, and positioning decisions and to formulate a growth strategy in light of the positive association between launch strategy proficiency and NPD performance.

Another important consideration when deciding on the specific locus of design capabilities is the external environment. Managers should monitor market factors such as how frequently customer buying criteria change, the length of product lifecycles, the emergence of new competitors, and shifting technological standards. In stable environments, where these factors change slowly, firms can prioritize internal design integration by investing in training non-design employees in design capabilities. Given the slow rate of change, design knowledge generated outside the firm's boundaries may yield limited additional value relative to the costs of incorporating it. Firms that nonetheless engage external collaborators in design capabilities under such conditions may consider mitigation mechanisms to address the resulting friction. For example, they could select external partners whose knowledge complements existing strategic frames and assign boundary-spanning roles to individuals who can translate peripheral insights into the firm's strategy. Firms can also establish clear decision rights that specify when external input informs (but does not override) internal assumptions and calibrate the cadence of external involvement so that it supplements internal design work across different phases of the design process. However, in dynamic contexts where market factors change swiftly, our findings point to a prioritization of external design integration, which may help detect emerging market shifts and identify novel positioning alternatives that internal design teams overlook due to cognitive lock-in.

5.3. Limitations and future research

Although our study makes several theoretical and managerial contributions, it is subject to limitations that open opportunities for future research. The cross-sectional design relies on the perceptions of single key informants. Although our robustness checks are suggestive of the theorized model ordering, they do not establish temporal precedence and cannot rule out reverse causality. Multi-wave panel designs that measure design integration at one time point and launch strategy proficiency and NPD performance at later time points would allow for stronger inferences about the direction of the relationships in our model.

Methodologically, we conducted an additional post hoc test to assess the validity of the internal and external design integration formative constructs. As this analysis is supplementary and based on an independent sample, it does not replace construct validation in the main dataset. It would be methodologically valuable to further validate these constructs using *ex ante* procedures, such as redundancy analysis embedded in the main survey instrument. Relatedly, the formative outer weights reveal that the five design thinking dimensions do not contribute equally across integration types. For internal design integration, experimentation and collaboration have the largest and statistically significant weights, suggesting that they contribute most to the construct. For external design integration, experimentation also has the largest weight, but the remaining dimensions contribute relatively more than they do internally. These findings suggest that experimentation is central to both integration types, but the relative salience of other dimensions may vary across integration loci. Given the exploratory nature of this finding, future research could investigate this variation in greater depth.

Our sample is drawn from U.S. firms, a context that is shaped by U.S.-specific institutional and market characteristics. Further investigations could examine whether the contingent associations between internal and external design integration and launch strategy proficiency remain valid in other national or cultural settings, where collaboration norms, design ecosystem structures, and market dynamics may differ.

Our conceptualization of internal and external design integration focuses on established design thinking dimensions (e.g., Carlgren et al., 2016) but may not fully capture all aspects of design capabilities within an organization. Alternative conceptualizations of how design capabilities manifest within and across organizational boundaries, such as informal design practices that emerge through cross-functional collaborations (Carmeli et al., 2013), the presence of design leadership

(Gemser et al., 2023), or the underlying organizational culture (Elsbach and Stigliani, 2018), may influence how integration is realized in organizations. We did not examine appropriability strategies (Laursen and Salter, 2014), which may protect the intellectual property of firms against knowledge spillovers to external parties. Future studies could examine how design capabilities and formal (e.g., patents and trademarks) and informal appropriability strategies conflict or coexist during innovation.

Our measure of launch strategy proficiency captures the core strategic launch decisions of segmentation, targeting, positioning, and growth strategy formulation, but does not cover the full range of launch decisions identified in the broader literature, such as launch timing, market scope, or tactical launch elements (e.g., Langerak et al., 2004). Subsequent work could examine whether and how design-generated insights inform these additional launch decisions.

Owing to low statistical power, we could not empirically examine the interaction between the complementarity of internal and external design integration and market dynamism. Studies with larger samples could investigate whether the complementarity between internal and external design integration varies across levels of market dynamism or other contextual variables. They could also identify when complementarity outweighs the organizational complexity and coordination burden of managing both integration types simultaneously.

A promising future direction, focusing specifically on the external locus, is to examine how different types of external partners that contribute to design capabilities may generate distinctive knowledge characteristics and, in turn, influence launch strategy proficiency in different ways. External design integration could be disaggregated by partner category, such as consultancies, lead users, universities, and suppliers, each of which may possess different types of experience and peripheral and boundary-spanning knowledge. For example, the disruptive problem reframing that our findings associate with external design integration at very low levels of market dynamism may be more pronounced with certain types of actors (e.g., design consultancies operating across multiple industries) than with others (e.g., suppliers with deep knowledge of the focal firm's domain).

CRediT authorship contribution statement

Nikolaos Kyriakopoulos: Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Erik Jan Hultink:** Writing – review & editing, Supervision, Conceptualization. **Euiyoung Kim:** Writing – review & editing, Project administration, Conceptualization. **Sicco Santema:** Writing – review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.technovation.2026.103716.

Data availability

Data will be made available on request.

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