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Acceleration Mechanisms and the Development of Dynamic Capabilities in Startups

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Abstract

Business accelerators are widely regarded as influential actors that provide essential support for startup development. Despite their growing relevance, limited empirical evidence exists on the specific acceleration practices through which they contribute to startups' success. This study aims to examine whether and how business accelerators facilitate the development of startups' dynamic capabilities and enhance their performance, as well as to identify the accelerator processes and organizational routines that act as key performance drivers. Grounded in the dynamic capabilities framework, this empirical study analyzes the effects of business acceleration programs on startups by employing canonical discriminant analysis. The analysis is based on data collected from 24 business accelerators operating in Spain. The results indicate that certain accelerator practices significantly contribute to the development of startups' dynamic capabilities. In particular, absorptive, integrative, and innovative capabilities positively affect startup performance, whereas market-sensing capability exhibits a negative relationship. These findings highlight which acceleration practices are most effective in improving startup performance outcomes. This study represents an initial effort to shed light on the "black box" of business acceleration and dynamic capabilities. Its cross-sectional design, reliance on survey data, and focus on a single country limit the generalizability of the results and may introduce potential bias. The findings provide actionable insights for accelerator managers and policymakers by identifying organizational mechanisms that can be leveraged to enhance the effectiveness of acceleration programs. This research offers one of the first empirical examinations of the link between business accelerator practices and the development of dynamic capabilities in startups.

Keywords: Business accelerators, Entrepreneurship, Startups, Dynamic capabilities

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Introduction

Business accelerators have emerged as key institutional actors within entrepreneurial ecosystems, aiming to enhance startups' developmental trajectories through structured learning environments and support mechanisms [1, 2]. Unlike traditional support initiatives, accelerators operate through cohort-based, time-limited programs that combine mentoring, training, and access to networks, with the objective of rapidly advancing startups toward critical strategic and operational milestones [3]. Prior research suggests that these interventions do more than provide resources; they actively shape venture evolution by influencing how startups organize, learn, and adapt [4]. Consequently, accelerators may function as catalysts for the development of dynamic capabilities—defined as the firm-level capacities that allow entrepreneurs to purposefully reconfigure internal and external resources in response to environmental demands [5].

For early-stage ventures, the ability to develop dynamic capabilities is widely recognized as a crucial determinant of survival and growth [6, 7]. These capabilities enable startups to interpret market signals, respond to uncertainty, and manage strategic or operational disruptions [8]. By doing so, they increase the likelihood of achieving sustained growth and long-term performance objectives [9]. Importantly, dynamic capabilities cannot be acquired instantaneously or transferred through markets; rather, they emerge gradually through learning processes, routines, and organizational experimentation [10, 11]. Prior studies also emphasize that such capabilities can be cultivated through deliberate managerial actions and structured learning environments [7, 12], suggesting a potential role for accelerators in their formation.

Despite growing interest in business accelerators, limited empirical evidence explains the mechanisms through which accelerator programs influence startup outcomes. In particular, the extent to which accelerator practices contribute to the development of startups' dynamic capabilities remains underexplored. Addressing this gap is essential for evaluating the often-cited "exceptional capacity" of accelerators to stimulate startup growth [13]. Accordingly, this study examines whether participation in business acceleration programs supports the emergence of dynamic capabilities in startups and identifies which program-level processes and organizational routines are most influential.

The paper proceeds as follows. First, a conceptual framework grounded in the dynamic capabilities perspective is developed, leading to a set of research hypotheses. Second, the research design and methodology are outlined. Third, empirical findings are presented using original survey data from 24 business accelerators operating in Spain, a country recognized for its rapidly expanding startup ecosystem [14]. The final section discusses the results, outlines study limitations, and proposes directions for future research.

This research contributes to entrepreneurship and innovation literature in several important ways. First, accelerator research continues to lack a unifying theoretical lens [2], while empirical studies identifying drivers of startup performance remain scarce [15, 16]. By applying the dynamic capabilities framework, this study offers a novel explanation of how accelerator interventions translate into performance outcomes. Specifically, it clarifies how accelerator-driven routines and processes support capability development that underpins superior startup performance. To our knowledge, this is the first empirical study to directly connect accelerator practices with the formation of dynamic capabilities.

Second, the study responds to calls for deeper investigation into the internal mechanisms of accelerator programs [17, 18]. The findings demonstrate that accelerators play an active role in shaping startups' learning and adaptive capacities, revealing a previously underexamined pathway through which accelerators contribute to venture success.

Third, this research extends dynamic capabilities theory into the startup context, which remains relatively underrepresented in the literature [6, 19]. By empirically examining capability development within accelerated ventures, the study enhances understanding of how dynamic capabilities operate in highly uncertain and resource-constrained entrepreneurial environments.

Finally, the results offer practical insights for accelerator managers and policymakers by identifying which program components most effectively foster startup capability development. These insights can inform the design of accelerator programs and support mechanisms aimed at improving startup outcomes and maximizing the impact of public and private acceleration initiatives.

Theoretical framework and hypotheses

To explain how business accelerators influence the development and outcomes of the startups they support, this study adopts the dynamic capabilities perspective [7, 11, 20]. This framework emerged as a response to limitations in the traditional Resource-Based View (RBV), which has been criticized for its static treatment of firm resources and its limited ability to account for how organizations adapt strategically to changing environments [12, 21, 22]. While RBV emphasizes the possession of valuable resources, the dynamic capabilities approach shifts attention toward the processes through which firms renew, transform, and redeploy those resources over time.

By extending RBV, the dynamic capabilities view highlights the evolutionary nature of organizational capabilities and their role in responding to environmental turbulence [23]. This perspective enables the identification of firm-level processes that are central to organizational adaptation, long-term development, and value creation [24]. Within this framework, dynamic capabilities are understood as learned and accumulated abilities that allow firms to purposefully integrate, build, and reconfigure internal and external resources in ways aligned with entrepreneurial judgment [5]. These capabilities are embedded in organizational routines and managerial practices, shaped by learning processes, path dependencies, and complementary assets, and enable firms to create and sustain competitive advantage in volatile contexts [11, 12]. Prior research has consistently shown that dynamic capabilities are closely linked to firm performance outcomes [25].

In entrepreneurial settings, the early development of dynamic capabilities is particularly critical. Startups typically operate under conditions of uncertainty, resource scarcity, and limited legitimacy, making their ability to adapt and learn essential for survival and growth [8]. Studies suggest that startups that successfully develop dynamic capabilities are better positioned to overcome early-stage challenges, sustain growth trajectories, and achieve strategic objectives [7, 9]. Empirical evidence supports this view. For example, Wu [26] demonstrates that the availability, integration, and reconfiguration of resources play

a decisive role in enhancing high-technology startup performance. Similarly, Macpherson *et al.* [27] show that dynamic capabilities underpin innovation and growth by enabling startups to expand their resource base through network development and to respond flexibly to customer demands and emerging opportunities. Collectively, this body of research suggests that startups that actively deploy dynamic capabilities are more likely to improve their performance and maximize entrepreneurial outcomes [25].

Against this backdrop, business accelerators have gained prominence as key actors within contemporary startup ecosystems [18]. Accelerators typically offer structured, cohort-based, and time-constrained programs that combine mentoring, monitoring, training, and networking activities [1, 28]. Through these programs, accelerators coordinate resources, implement strategic interventions, and connect startups to relevant markets and institutions, with the overarching aim of accelerating venture development and increasing the likelihood of success [2, 18].

Given their mission to enhance startup development and performance [2, 4, 29], business accelerators may play a crucial role in fostering the dynamic capabilities of participating startups. By structuring learning processes, facilitating access to external knowledge, and encouraging strategic experimentation, accelerators can create conditions conducive to capability development. From this perspective, supporting the emergence of dynamic capabilities may represent a central mechanism through which accelerators achieve their intended performance outcomes. Accordingly, this study assumes a direct relationship between participation in business accelerator programs, the development of startups' dynamic capabilities, and subsequent performance improvements.

Although prior research provides evidence that accelerators can positively influence startup performance (e.g., Battistella *et al.* [30]; Hallen *et al.* [3]; Shankar & Shepherd [31]; Smith & Hannigan [16]), the specific practices and processes through which these effects occur remain insufficiently understood [18]. Addressing this gap requires a theoretical lens capable of capturing how organizational interventions translate into capability development.

The dynamic capabilities framework offers such a lens. Hackett and Dilts [32] argue that dynamic capabilities provide a robust foundation for examining how support organizations build and allocate venture development resources and facilitate the transformation of early-stage firms into value-creating entities. While their work focuses on business incubators, the parallels between incubators and accelerators—both of which aim to support startups during formative stages—suggest that this framework is equally applicable to the study of accelerator programs. Indeed, both organizational forms are widely recognized by policymakers, investors, corporations, and scholars as effective instruments for fostering new firm creation and addressing early-stage venture needs [2, 33].

Building on recent empirical studies [25, 34, 35], this research adopts a multidimensional view of dynamic capabilities. Specifically, we focus on four interrelated capabilities: market sensing, absorption, integration, and innovation. We argue that the resources, routines, and processes embedded within business accelerator programs contribute to the development of these capabilities among accelerated startups.

Although empirical research directly linking accelerator practices to dynamic capability development remains scarce, existing studies provide strong support for the positive relationship between these four capabilities and firm performance (e.g., Bastanchury-López *et al.* [36]; Blanco-Callejo & De Pablos-Heredero [37]; De Pablos Heredero *et al.* [38]; De Pablos Heredero *et al.* [39]; De Pablos-Heredero & López Berzosa [40]). This literature reinforces the argument that startups must develop these capabilities—potentially through structured acceleration processes—to compete effectively and succeed in dynamic markets.

In the following sections, we examine how business accelerator programs influence startup development through these four dynamic capabilities and analyze their respective effects on startup performance.

Market-sensing capability

Entrepreneurial opportunities vary significantly in quality and feasibility, and only a subset can be transformed into viable business ventures [41]. Consequently, the capacity to recognize, evaluate, and prioritize promising opportunities is widely considered a core entrepreneurial competence [42]. Once an opportunity emerges, entrepreneurs must interpret new technological developments, assess shifting market conditions, and determine which customer segments to serve [43]. Converting these signals into actionable strategies requires more than intuition; it depends on the systematic development of market-sensing capability [44].

Market-sensing capability refers to a firm's ability to continuously identify, interpret, and evaluate opportunities and threats within its external environment [45, 46]. This capability involves ongoing engagement with markets and customers to uncover latent needs, track industry evolution, and anticipate competitor and supplier responses [47]. Importantly, access to information alone does not ensure effective sensing. Firms must establish organizational processes that enable them to collect, filter, and interpret information from diverse internal and external sources [43]. Prior research indicates that strong sensing capability contributes to higher levels of innovation, faster commercialization, and improved performance in new ventures [44, 48].

Startups, however, often struggle to develop this capability due to limited experience, information asymmetries, and restricted interaction with external markets [49]. Their early assumptions about customer needs or market potential are frequently inaccurate, requiring iterative adjustment and learning over time [50]. These challenges make external support mechanisms particularly relevant during the early stages of venture development.

Business accelerator programs compel startups to confront the viability of their business models by systematically refining value propositions and product–market fit [18, 33, 51, 52]. Accelerator structures encourage ventures to engage deeply with customer problems, validate technological solutions, and reassess market assumptions through continuous feedback and experimentation [18]. By promoting disciplined opportunity evaluation and market learning, accelerators may strengthen startups' market-sensing capability.

Accordingly, participation in accelerator programs is expected to enhance startups' ability to identify and exploit market opportunities, ultimately improving performance outcomes. Based on this reasoning, we propose the following hypothesis:

H1: *Participation in a business accelerator moderates the relationship between a startup's market-sensing capability and its performance.*

Absorptive capability

Knowledge constitutes a critical resource for organizational competitiveness, yet its value depends on a firm's ability to recognize its relevance and transform it into actionable insights [53]. Absorptive capability—defined as the ability to identify, acquire, assimilate, and apply external knowledge—has therefore been identified as a key driver of firm survival and performance [54, 55]. Firms with stronger absorptive capability are better equipped to leverage external knowledge sources to strengthen their competitive position [56-58].

For startups, absorptive capability is particularly crucial. Early-stage ventures often operate with narrow knowledge bases, limited routines, and constrained learning capacity, which heightens their dependence on external sources of expertise [53]. Absorptive capability enables startups to compensate for these limitations by facilitating the transformation of externally sourced knowledge into firm-specific learning and commercially valuable outcomes. This process involves recognizing relevant knowledge, acquiring it, assimilating it internally, and applying it in ways that support venture development [54, 57]. The presence of structured routines for accessing, storing, and sharing knowledge significantly enhances a startup's absorptive capability [53].

Business accelerators are explicitly designed to intensify learning processes through structured education, frequent interaction, and continuous monitoring [2]. Educational components often include expert-led sessions focused on key entrepreneurial challenges, such as venture management, strategy, and scaling [18]. In addition, accelerators facilitate learning through mentorship, peer interaction, and engagement with external stakeholders [4]. Mentorship, in particular, has been identified as a critical success factor for startups, offering guidance, feedback, and problem-solving support [59].

These mentoring and advisory mechanisms—delivered through individual coaching, group sessions, and milestone-based evaluations—allow startups to reflect on failures, learn from peers, and refine strategic decisions [2, 60]. Such interactions also enable accelerator managers and mentors to track progress and tailor support accordingly. Through repeated exposure to expert knowledge and stakeholder feedback, startups are encouraged to process and apply new information more effectively [61, 62].

By structuring intensive knowledge exchanges and fostering close interaction with diverse actors, accelerator programs facilitate the acquisition, interpretation, and application of external knowledge. These routines enhance startups' absorptive capability, thereby increasing their capacity to translate learning into improved performance outcomes. On this basis, we advance the following hypothesis:

H2: *Participation in a business accelerator moderates the relationship between a startup's absorptive capability and its performance.*

Integration capability

As startups evolve from initial ideas toward more clearly defined ventures, they must continuously adapt their configurations through experimentation and market validation [63]. Venture creation is therefore inherently non-linear, characterized by repeated cycles of adjustment and reconfiguration rather than a sequential progression [64]. These iterative processes depend on a startup's ability to combine newly acquired resources—particularly external knowledge—with existing internal assets in order to revise routines, practices, and strategic choices [45].

Integration capability refers to a firm's capacity to synthesize diverse resources into coherent and value-creating organizational competences that are aligned with environmental demands [65]. For startups, this capability is essential because isolated resources or fragmented knowledge cannot generate competitive advantage unless they are systematically combined and embedded into operational routines.

Mentorship represents a central mechanism through which business accelerators support the development of integration capability [30]. Mentoring within accelerator programs typically involves sustained learning and coaching relationships

between startups and experienced entrepreneurs or domain experts [18, 66]. These interactions are structured around frequent feedback exchanges that encourage reflection, problem-solving, and continuous refinement of entrepreneurial decisions [67]. Through such feedback loops, startups learn to merge new insights with prior knowledge to address challenges more effectively and respond to emerging uncertainties.

The intensity of mentor–startup interactions fosters repeated cycles of evaluation and adjustment, enabling startup teams to test alternative solutions, reconfigure their business models, and align their operational practices with market realities. This ongoing process supports the systematic integration of knowledge into action, accelerating learning and reducing the time required to resolve strategic ambiguities.

In addition to mentoring, accelerator management teams routinely monitor startup progress through milestone reviews, follow-up meetings, and evaluation sessions [10, 68]. These mechanisms create strong incentives for startups to demonstrate continuous advancement—an effect sometimes described as "shame avoidance," whereby ventures are motivated to learn and adapt in order to avoid displaying stagnation [60]. Such structured oversight encourages startups to internalize feedback rapidly and incorporate learning into their daily routines.

Through these tightly coupled mentoring and monitoring practices, accelerator programs enhance startups' ability to integrate knowledge and resources within compressed timeframes. This leads to the following hypothesis:

H3: *Participation in a business accelerator moderates the relationship between a startup's integration capability and its performance.*

Innovation capability

Innovation capability has long been recognized as a critical determinant of firm survival and competitive success [69, 70]. While innovation is often associated with specific outputs—such as new products, services, or business models—it also reflects a broader organizational capacity that encompasses strategy, processes, and behavior [65, 71]. From this perspective, innovation capability refers to a firm's ability to consistently transform ideas into commercially viable outcomes by aligning innovative orientations with effective implementation mechanisms.

Innovation capability is inherently multidimensional, spanning technological, organizational, and human elements [71, 72]. For startups, the development of this capability is shaped by the resources, routines, and learning environments they encounter throughout their early growth stages—particularly within business accelerator programs.

Entrepreneurs play a central role in initiating innovation [73], yet creativity alone does not guarantee success. Ideas must be refined, tested, and translated into viable business models to generate value. Because most entrepreneurial ideas lack commercial viability at inception, startups must engage in structured processes aimed at identifying sustainable market opportunities from the outset [74, 75]. The absence of such processes has been identified as a major contributor to startup failure [76], especially given the informal and often chaotic organizational structures typical of early-stage ventures [18].

Business accelerators actively promote an innovation-oriented mindset by emphasizing early validation, experimentation, and disciplined execution. Accelerator programs encourage startups to adopt structured management methodologies—such as iterative development and trial-and-error learning—that support the systematic refinement of products, services, and business models [76, 77]. These approaches enable startups to manage uncertainty, adapt to feedback, and progressively transform innovations into scalable and market-ready solutions [73].

In addition, accelerators frequently collaborate with external partners to provide startups with preferential access to technological tools, platforms, and services. Such partnerships reduce technical and financial constraints, allowing startups to accelerate product development and process innovation more effectively than they could outside accelerator environments.

Innovation capability is also reinforced through cultural and social dimensions. An open and collaborative environment that encourages risk-taking, idea exchange, and experimentation is essential for sustained innovation [78, 79]. Accelerator programs typically foster strong peer-to-peer interactions by embedding startups in shared workspaces and cohort-based learning environments [66, 80]. These settings promote knowledge sharing and mutual support, enhancing collective learning and innovative outcomes [81].

By combining structured innovation processes, access to enabling resources, and collaborative learning environments, business accelerators create conditions that support the development of startups' innovation capability. Accordingly, we propose the following hypothesis:

H4: *Participation in a business accelerator moderates the relationship between a startup's innovation capability and its performance.*

Materials and Methods

Sample and data collection

This study adopts an empirical research design focusing on business accelerators operating in Spain. Spain was selected as the empirical context due to its recognition as one of Europe's most prominent startup ecosystems [14, 82]. Because no official

or comprehensive registry of Spanish business accelerators exists, the sampling frame was constructed using a well-established secondary source, *El Referente* (Guía de Inversión para Startups, 2018–2019).

Identifying eligible accelerators required careful screening, as a wide range of organizations self-identify as accelerators despite lacking defining characteristics. To ensure consistency, only organizations meeting widely accepted criteria were included: programs had to be cohort-based, operate within a fixed time frame, offer structured mentoring and educational activities, and conclude with a public pitch or demo day [66, 83]. Based on these criteria, the total population consisted of 29 accelerators, of which 24 participated in the study, representing a response rate of 82.75%.

Data collection took place between July 2019 and January 2020 using structured questionnaires administered directly to accelerator representatives. The survey instrument comprised 19 items designed to capture accelerator practices related to four dynamic capabilities: market sensing, absorptive capacity, integration capability, and innovation capability.

Identification of dynamic capability indicators

Given the limited prior research connecting business accelerators with dynamic capabilities, a Delphi methodology was employed to identify appropriate indicators [84]. The Delphi technique is a qualitative, iterative, and consensus-based approach frequently applied in social science research to explore underdeveloped topics [85-89].

The Delphi process was conducted between January and March 2019 and involved 16 experts, including startup founders, accelerator managers, and professionals with extensive experience in entrepreneurship and acceleration programs. Their role was to identify and validate specific accelerator routines likely to influence the development of the four dynamic capabilities examined in this study.

In the initial stage, a preliminary list of accelerator practices was compiled based on an extensive review of the literature (e.g., Hallen *et al*. [3]; Teece [43]; Pavlou & El Sawy [45]; Barrehag *et al*. [77]). This process resulted in 29 preliminary items, organized into four groups corresponding to the four dynamic capabilities. Each section also included an open-ended question to allow experts to propose additional practices.

Subsequently, experts evaluated the relevance of each item through a series of iterative questionnaires administered via interviews conducted by telephone, email, or face-to-face meetings. After the first round, participants received a summary of the group responses and were invited to reassess their evaluations and consider newly suggested items. This second round enabled convergence of opinions and refinement of the measurement framework.

Final item selection was based on both importance and consensus criteria. Items were rated on a five-point Likert scale, where 1 indicated low relevance and 5 indicated high relevance. To be retained, items were required to meet two thresholds: a mean score above 3.5 and a median score above 3. In addition, consensus was established when at least 75% of expert ratings fell within the top two scale points (4 or 5) or, alternatively, when the standard deviation did not exceed 0.90. Applying these criteria resulted in a final set of 19 accelerator practices, selected from the original 29 items and 12 additional practices proposed during the Delphi process.

Statistical analysis

Four groups of variables were defined, corresponding to the four dynamic capabilities examined in the study: market-sensing capability (Si), absorptive capability (Ai), integration capability (INTi), and innovation capability (INNi). **Table 1** presents these variables along with descriptive statistics.

Canonical discriminant analysis was employed to examine the relationships among the four sets of variables and to assess their joint contribution to startup performance. All statistical analyses were conducted using SPSS for Windows.

Results and Discussion

Table 2 reports the overall results of the canonical discriminant analysis conducted for the five estimated models: market-sensing capability (Si), absorptive capability (Ai), integration capability (INTi), innovation capability (INNi), and the combined model including all four capabilities (Si + Ai + INTi + INNi). The purpose of this analysis was to assess whether the variables included in each model effectively distinguish between accelerators whose startups achieved a financing rate above 50% (Group 2) and those that did not reach this threshold (Group 1).

The results indicate that statistically meaningful group discrimination is achieved in three of the five models. Specifically, the Wilks' lambda values associated with the Si, Ai, and combined models are statistically significant, suggesting that the variables included in these models successfully differentiate between the two groups of accelerators. In contrast, the models focusing solely on integration capability (INTi) and innovation capability (INNi) do not exhibit significant discriminatory power, as indicated by non-significant Wilks' lambda values ($p > 0.05$).

Regarding classification accuracy, the market-sensing capability model correctly classifies 79.2% of cases, while the absorptive capability model achieves a classification accuracy of 95.8%. The combined model, incorporating all four dynamic capabilities, correctly classifies 87.5% of the accelerators. Moreover, the discriminant functions associated with these three

models are statistically significant ($p < 0.05$), confirming their capacity to distinguish between accelerators with higher and lower startup financing outcomes.

Table 1. Results of canonical discriminant analyses

Model (n)	Eigen value	Can. Corr	Wilks' lambda	Chi-square	gl	p	Correct
Sensing the market variables (S_i)	0.997	0.707	0.501	13.491	5	0.019	79.2
Absorption variables (A_i)	1.828	0.804	0.354	19.229	7	0.008	95.8
Integration variables (INT_i)	0.131	0.340	0.884	2.523	3	0.471	66.7
Innovation variables (INN_i)	0.29	0.121	0.972	0.611	1	0.434	70.8
All mean variables (S_i+A_i+INT_i+INN_i)	0.954	0.699	0.512	13.398	4	0.009	87.5

In addition to the overall discriminant statistics, standardized canonical coefficients (SCCs) and the structure matrix were examined to identify which variables contributed most strongly to group separation. **Table 3** presents these results for the estimated discriminant functions. SCCs indicate the relative importance of each predictor in the discriminant function, with higher absolute values reflecting stronger discriminatory power.

For the market-sensing capability model (Si), the item *"teaching entrepreneurs how to identify and monitor metrics and KPIs"* (S4) emerged as the most influential predictor. The second most relevant variable was *"instilling the importance of acquiring in-depth knowledge of target markets and customers"* (S2), which displayed an inverse sign, indicating an opposite relationship with the discriminant function.

Within the absorptive capability model (Ai), the strongest contribution came from *"individual mentoring sessions for entrepreneurs"* (A6), again with a negative coefficient. This was followed in importance by *"reviewing results and metrics with entrepreneurs to support interpretation and decision-making"* (A7).

In the combined model (Si + Ai + INTi + INNi), the overall market-sensing capability (Si) showed the highest discriminating power, also with a negative coefficient. Integration capability (INTi) and absorptive capability (Ai) were the next most influential predictors.

Variables exhibiting larger standardized coefficients therefore play a dominant role in predicting whether an accelerator belongs to the group with more than 50% of startups funded—our proxy for accelerator performance. The remaining variables contributed less to group differentiation.

While SCC magnitudes indicate the strength of each variable's contribution, their signs reflect the direction of the relationship. To correctly interpret this direction, it is necessary to examine group centroids **(Table 6)**. Observations are classified into the group whose centroid they are closest to. Across all three significant models, accelerators in Group 1 (less than 50% of startups funded) consistently displayed positive centroid values, whereas Group 2 (more than 50% funded) was associated with negative centroid values.

This pattern implies that, in the Si model, Group 1 is primarily characterized by variables S1, S3, S4, and S5, while Group 2 is defined mainly by S2. In the Ai model, Group 1 is associated with A1, A3, A5, and A7, whereas Group 2 is distinguished by A2, A4, and A6. In the combined model, Group 1 is driven largely by market-sensing capability (Si), while Group 2 is characterized by absorptive (Ai), integration (INTi), and innovation (INNi) capabilities.

Consequently, when accelerator practices such as *"emphasizing deep understanding of target customers"* (S2), *"providing individualized mentoring sessions"* (A6), *"facilitating direct contact with potential clients or relevant communities"* (A4), or routines related to integration and absorptive capabilities are implemented more frequently than the average, accelerators are more likely to be classified in Group 2.

Conversely, higher-than-average emphasis on practices such as *"training entrepreneurs to monitor KPIs"* (S4), *"reviewing metrics and results with entrepreneurs"* (A7), *"organizing workshops tailored to entrepreneurial needs"* (A1), or routines predominantly related to market-sensing capability tends to be associated with accelerators classified in Group 1.

Further insight is provided by the structure matrix, which reports the correlations between each predictor and the discriminant function. All variables exhibit meaningful loadings, indicating that each is related to accelerator performance, although some demonstrate stronger associations than others. In the Si model, the most strongly correlated variables include S4, S5 (*"help entrepreneurs define and track KPIs"*), and S3 (*"use of structured methodologies to guide entrepreneurs"*). In the Ai model, the strongest loadings are observed for A6 and A7. Finally, in the combined model, variables related to market-sensing and absorptive capabilities show the highest correlations with the discriminant function.

Overall, while all examined routines contribute to differentiating accelerator performance, market-sensing and absorptive capability–related practices emerge as the most influential predictors.

Table 2. Standardized canonical coefficients (SCC) and Structure matrix

Variable	SCC	Structure matrix
Sensing the market variables (S_i)		
S_1, Mentors of the accelerator help / guide the entrepreneurs in the development and testing of business hypotheses.	0.399	0.268
S_2, Inculcate entrepreneurs the importance of gaining real knowledge of their target market / customers	-0.543	0.093
S_3, Use of a methodology that help them and guide entrepreneurs during the process	0.503	0.313
S_4, Teach entrepreneurs about the identification and monitoring of metrics and KPIs	0.85	0.75
S_5, Help entrepreneurs to define and track their metrics and KPIs.	0.222	0.672
Absorption variables (A_i)		
A_1, Organize workshops to meet the needs / abilities of entrepreneurs	1.012	-0.02
A_2, Organize sessions between entrepreneurs and stakeholders	-0.063	-0.057
A_3, Facilitate the contact of the entrepreneurs with experts	0.051	0.131
A_4, Facilitate the contact of the entrepreneurs with potential clients and / or specific communities	-0.486	-0.17
A_5, Entrepreneurs have individual sessions with experts	0.705	0.167
A_6, Entrepreneurs have individual sessions with mentors in their program.	-1.529	-0.275
A_7, Review the results and metrics with each entrepreneur to help them interpret and make decisions.	1.238	0.314
All groups (S_i+A_i+INT_i+INN_i)		
Sensing the market variables (S_i)	1.43	0.716
Absorption variables (A_i)	-0.365	0.174
Integration variables (INT_i)	-0.801	0.05
Innovation variables (INN_i)	-0.083	-0.011

Table 3. Functions at group centroids

	1	2
Sensing the market variables (S_i)	0.552	-1.656
Absorption variables (A_i)	0.747	-2.242
All group	0.54	-1.62

Conclusion

This study conceptualizes business accelerator programs as mechanisms that facilitate the development of dynamic capabilities in startups. Using empirical evidence from Spanish business accelerators, the research examines how accelerator practices contribute to the formation of dynamic capabilities and how these capabilities, in turn, affect accelerator performance, measured by the proportion of portfolio startups that secure external financing.

The findings demonstrate that accelerator routines play a meaningful role in shaping startups' dynamic capabilities and influence performance outcomes. However, the effects of these capabilities are not uniform, underscoring the importance of examining dynamic capabilities as distinct dimensions rather than as a single construct [25, 90]. Specifically, this study proposed that accelerator routines contribute to the development of market-sensing, absorptive, integration, and innovation capabilities, with differentiated effects on startup financing outcomes.

With regard to market-sensing capability, the empirical results indicate that routines related to structured methodologies, guidance mechanisms, and the monitoring of business objectives—such as defining KPIs and tracking performance metrics—emerge as particularly influential. Surprisingly, a higher intensity of these practices is associated with weaker performance in terms of startup financing. Accelerators that emphasize systematic evaluation of business viability and uncertainty resolution appear to strengthen startups' market-sensing capability while simultaneously reducing the likelihood of subsequent funding. This pattern suggests that such practices may accelerate the identification of unviable business ideas, leading to earlier termination rather than continuation.

These findings align with prior research suggesting that accelerators that promote discovery - and validation-driven approaches help startups rigorously test market and technological assumptions at early stages [91-94]. While this process enhances learning and reduces uncertainty, it may also increase early failure rates by revealing fundamental weaknesses in business models that would otherwise persist longer. In this sense, poorer financing outcomes may reflect more efficient selection rather than underperformance.

Another possible explanation is that startups may struggle to balance the demands of structured methodologies imposed by accelerator programs with their ongoing operational needs. Given their limited resources, early-stage ventures may lack the

capacity to simultaneously comply with formal evaluation processes and manage day-to-day business activities effectively, potentially constraining performance outcomes.

In contrast, the results related to absorptive capability highlight mentorship as a central driver of performance differentiation. Intensive mentoring emerges as the most influential factor distinguishing accelerators with higher startup financing success. This finding reinforces existing evidence on the critical role of mentors in accelerator programs [80, 95] and their contribution to knowledge acquisition and learning [17, 30, 68, 96-98].

Consistent with prior studies, the results suggest that mentorship facilitates the development of dynamic capabilities by enabling startups to access, interpret, and apply external knowledge more effectively [25, 99-101]. Despite the inherent difficulties associated with transferring tacit knowledge in early-stage ventures [83, 102], mentors appear to play a critical role in overcoming these barriers by providing guidance, experience-based insights, and access to relevant networks. As a result, startups exposed to more intensive mentoring develop stronger absorptive capabilities, which increases their likelihood of securing external funding.

In addition, access to networking opportunities exhibits a moderately strong association with startup success. This finding reinforces prior evidence showing that accelerated startups benefit significantly from enhanced access to networks, including customers and other key stakeholders [91, 96, 103]. Similar to the role played by mentors, connections with customers and external stakeholders provide startups with access to valuable knowledge resources. In line with earlier research (e.g., Macpherson *et al.* [27]), the development of effective business networks facilitates both knowledge transfer and knowledge creation. Accordingly, when accelerators actively promote interactions between startups and potential customers or stakeholders, they strengthen the flow of external knowledge, thereby supporting the development of absorptive capability [53, 104].

These results highlight the importance of combining both strong ties—such as close mentor relationships—and weak ties—such as more distant connections with customers and stakeholders—in fostering startups' absorptive capability [105, 106]. This contrasts with the argument advanced by Zahra and George [55], who suggest that absorptive capacity is primarily driven by strong ties alone. Our findings instead indicate that frequent and intensive interactions with mentors, customers, and stakeholders constitute effective routines for acquiring external information, assimilating it within the startup, and identifying commercially viable applications of newly acquired knowledge. Accelerators that facilitate regular access to mentors and external actors therefore enhance both startups' absorptive capability and their likelihood of securing external funding.

By contrast, other learning mechanisms—such as expert consultations and formal seminars on management-related topics (e.g., legal, marketing, or accounting issues)—are found to exert a negative effect on startup performance. This result is consistent with prior evidence suggesting that hands-on, experiential learning may be more valuable for startups than formalized technical instruction [95]. Because experts often originate from academic or corporate backgrounds rather than entrepreneurial ones, their contributions tend to focus on explicit knowledge transfer [104]. Consequently, this type of knowledge may be less effective in strengthening startups' absorptive capability than experience-based learning derived from mentoring relationships [53, 107].

Regarding routines related to the *review of results and decision-making*, the analysis indicates that strong involvement by accelerator staff in these processes is negatively associated with startup performance. Although counterintuitive, this finding may suggest that excessive external intervention in startups' internal decision-making can limit their ability to appropriately evaluate, internalize, and exploit knowledge [106].

No statistically significant effects were identified when integration and innovation capabilities were analyzed independently. However, when all dynamic capability dimensions were examined jointly, the effects of these capabilities became apparent, indicating that their influence may materialize only when combined with other complementary capabilities. When considered together, absorptive and integration capabilities display a moderate and positive contribution to startup performance. This result aligns with earlier research highlighting the positive role of integration capability in venture outcomes [25, 108, 109].

These findings suggest that startups' integration capability is strengthened through intensive interaction with external actors—particularly mentors and accelerator staff—who impose structured pacing and outcome-oriented routines. Such practices facilitate internal knowledge sharing and shape communication processes within startups [108, 110, 111]. As accelerators intensify these routines, startups become better equipped to integrate knowledge, realign internal processes, and develop shared understanding across team members.

Innovation capability appears to exert only a limited direct effect on startup performance in this study. While this finding offers initial insights into how innovation capability may be developed within accelerator contexts, it also highlights the need for further empirical investigation to better understand its role and interaction with other dynamic capabilities.

This study is subject to several limitations that should be considered when interpreting its findings. At the same time, these limitations open up meaningful avenues for future research. First, the empirical analysis relies on data collected from a single national context and is based on self-reported survey responses. As a result, the findings may be affected by common-method bias and other limitations typically associated with perceptual measures. In addition, the cross-sectional nature of the data

constrains the ability to draw causal inferences and limits the generalizability of the results beyond the specific context examined.

Second, this research represents an early attempt to empirically link business accelerator practices with the development of dynamic capabilities in startups. While most of the measurement models demonstrate acceptable levels of statistical significance, dynamic capabilities and accelerator routines remain complex and multifaceted constructs that are not yet supported by fully standardized measures. Further conceptual refinement and empirical validation are therefore required to more accurately capture the mechanisms through which accelerator interventions influence capability development.

Despite these limitations, the study contributes initial evidence on which accelerator practices may be most influential in enhancing startups' likelihood of securing external financing. In this sense, the research constitutes a preliminary step toward opening the "black box" of business acceleration and dynamic capability development [45, 112].

Future research could build on these findings by adopting longitudinal designs that track startups and accelerators over time, thereby enabling stronger causal claims. In addition, expanding data collection to include multiple informants—such as startup founders, mentors, and other program stakeholders—would help reduce potential response biases and mitigate socially desirable reporting. Further studies may also deepen the investigation of accelerator routines that foster dynamic capabilities, refining both their conceptualization and measurement.

Finally, future work could move beyond ultimate performance indicators, such as follow-on funding, to incorporate intermediate outcomes—including talent acquisition, strategic decision-making, and organizational learning processes—in order to develop a more comprehensive understanding of how business accelerators influence startup development [92].

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