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FROM EFFORTS TO OUTCOMES: A CONCEPTUAL FRAMEWORK FOR UNDERSTANDING INNOVATION INTENSITY IN SMEs.

– **AUTHOR 1 :** KOURA Abdelghani,

(1) : Doctor of Economics and Management, Laboratory of Research in Economics and Management of Organizations (LAREMO), National School of Business and Management, University Sultan Moulay Slimane.

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Abstract

This study proposes a conceptual framework to better understand what drives innovation intensity in small and medium-sized enterprises (SMEs), by exploring how internal capabilities, public support, and managerial attributes interact to shape innovation outcomes. Anchored in the Resource-Based View and Dynamic Capabilities theory, the framework addresses a pressing reality: many SMEs struggle to consistently transform their innovation efforts into meaningful results. This challenge stems from four persistent gaps—limited internal resources to initiate innovation (effort gap), misalignment or weak reach of public support programs (support gap), a lack of leadership commitment to innovation (leadership gap), and a disconnect between efforts made and outcomes achieved (translation gap). The framework clarifies the difference between innovation efforts—the strategic investments and actions taken to foster innovation—and innovation intensity—the depth, frequency, and scope of actual innovation results. It brings together key determinants across three pillars: firm characteristics, public support and the managerial qualities of SME managers. This contribution aims not only to enrich academic discourse, but also to guide policymakers in crafting more effective support tools, and to help SME leaders build the right conditions internally for innovation to thrive.

Keywords: Innovation Intensity; Product Innovation; Process Innovation; Technological Innovation; Public support; managerial attributes; Dynamic Capabilities; Resource-Based View.

1 Introduction

Small and medium-sized enterprises (SMEs) are the backbone of most economies, serving as critical engines of employment, innovation, and inclusive growth. Their agility, proximity to local markets, and capacity to absorb and adapt knowledge position them as key contributors to economic resilience and social cohesion. Whether through job creation, supply chain integration, or the revitalization of underserved regions, SMEs play a pivotal role in driving both economic dynamism and structural transformation. However, unlike large firms, SMEs operate with limited buffers—fewer financial reserves, leaner workforces, and restricted access to strategic resources. They often lack dedicated departments for research, market intelligence, or long-term planning, making it harder to anticipate and respond to disruption.

In an era marked by rapid change and relentless competition, innovation is no longer a luxury or a supplementary asset for SMEs—it has become a vital condition for their sustained growth and resilience. It allows firms to stay in step with evolving market dynamics, shifting consumer expectations, and the continuous march of technological progress (Almeida, 2021; Quintero Sepúlveda & Zúñiga Collazos, 2023; Visnjic et al., 2016). When embraced strategically, innovation enhances how businesses operate; from improving internal efficiencies (Doan et al., 2023) to enabling the creation of new products, services, and pathways into previously untapped markets (Salah & Ayyash, 2024). Its benefits also extend inward, helping organizations streamline administrative processes, reduce transaction-related burdens, foster more engaging and motivating work environments, and minimize operational costs tied to supply and logistics (Fernandes Rodrigues Alves et al., 2018). At its core, innovation equips firms not only to compete but to adapt and thrive in uncertain times.

The high interest attributed to innovation was brought into sharp focus during the COVID-19 pandemic; where businesses worldwide faced unprecedented challenges, with disruptions to supply chains, shifts in consumer behavior, and the rapid need for digital solutions (Galanakis et al., 2021; Oe et al., 2022). Firms that could innovate quickly and effectively managed to navigate the crisis more successfully, often emerging stronger and more resilient(Caballero-Morales, 2021). Arguably, the post-pandemic world has only deepened the need for innovation in all forms, with businesses now required to be more adaptable than ever. Small and medium-sized enterprises (SMEs), in particular, have felt this pressure. While innovation has the potential to be a game-changer for these firms, many of them find it to keep pace with the demands of an increasingly digital and competitive market (Farissi et al., 2021; Valdez-Juárez et al., 2022).

In light of these persistent challenges, governments around the world have taken on a more active and supportive role (Koura et al., 2024b, 2024a, 2025a; Meissner & Kergroach, 2021). Their interventions now go well beyond short-term fixes. Increasingly, the focus is on building lasting capacity—empowering firms not just to innovate occasionally, but to embed innovation as part of their ongoing development. Through a combination of targeted funding, knowledge-sharing initiatives, and ecosystem-building programs, public support aims to create the right conditions for innovation to take root and grow. Yet, as many scholars point out, external support is only one part of the story. Whether firms take full advantage of these opportunities often depends on who is at the helm. It is the mindset, vision, and strategic orientation of SME leaders that shape how firms respond to change, manage uncertainty, and translate support into results (Akjou & Idrissi Fakhreddine, 2024; Naushad, 2022; Nisula et al., 2023; Shah et al., 2021).

Despite the growing recognition of innovation as a cornerstone of SME competitiveness, the literature often treats its drivers in isolation, overlooking the complexity of their interplay (Odriozola-Fernández et al., 2019). While financial barriers and the role of public support have been widely examined, less attention has been given to how these factors intersect with internal firm dynamics. More critically, the distinction between innovation effort (the resources and capabilities mobilized) and innovation intensity (the depth and consistency of innovation outcomes) remains conceptually blurred. This study addresses this gap by proposing an integrative framework that brings together these dimensions, grounded in the Resource-Based View (Kim et al., 2015; Naila et al., 2025; Terziovski, 2010) and Dynamic Capabilities theory (Deyassa, 2023; Fernandes et al., 2024; Hermawati, 2020) to offer a more comprehensive understanding of what truly drives innovation within SMEs.

The remainder of this article unfolds as follows. The next section provides a focused review of the literature, clarifying the core dimensions of innovation and its main forms—product, process, and technological. It also introduces the theoretical lenses that guide this study, namely the Resource-Based View and Dynamic Capabilities framework. The third section turns to the key factors that shape innovation within SMEs, organized around three interconnected pillars: firm-specific characteristics, public support mechanisms, and managerial attributes. Drawing on these foundations, the fourth section presents the proposed conceptual framework, which illustrates how these elements interact to influence innovation efforts and, ultimately, determine the intensity of innovation outcomes in SMEs.

2 Connecting Innovation Efforts with Innovation Intensity: Exploring the Dynamic Linkages

Innovation can be conceptualized as an evolving and inherently creative process, where unique combinations of resources continuously drive what Schumpeter famously described as "creative destruction" (Schumpeter, 2003). In this perpetual cycle, fresh ideas consistently emerge, reshaping markets and industries by displacing established technologies, products, and practices. Arguably, scholars have yet to establish a universally accepted classification of innovation due to its inherently context-dependent and fluid nature, shaped by industry-specific factors and organizational particularities.

However, scholars commonly highlight three principal forms: product, process, and technological innovation (Sanchis-Llopis, 2019; Doan et al., 2023; Visnjic, Wiengarten & Neely, 2016; Quintero Sepúlveda & Zúñiga Collazos, 2023). Product innovation involves developing and introducing new goods or services tailored to evolving consumer demands, opening untapped markets, or providing superior solutions to existing challenges (Angelmar, 1990; Fritsch & Meschede, 2001). Process innovation entails significant improvements or transformative changes in production methods and service delivery approaches (Helmer et al., 2021; Fritsch & Meschede, 2001). Lastly, technological innovation refers specifically to enhancements that significantly elevate a product or process through advanced technological features, distinguishing new iterations substantially from previous versions (Godin, 2016; Coccia, 2021).

It should be noted that product, process, and technological innovation are closely linked, each influencing the other (koura et al., 2025). For instance, when a new product is developed, it often relies on the latest technology to make it better or more efficient. This technology not only shapes the product itself but also changes how it's made, leading to process innovations that improve production. In turn, these new processes can inspire further technological advancements, creating a cycle where each type of innovation supports and enhances the others.

A nuanced understanding of how innovation unfolds within SMEs necessitates a clear distinction between *innovation efforts* and *innovation intensity*, two closely related but conceptually distinct dimensions of the innovation process (Hervás-Oliver et al., 2021). Innovation efforts refer to the deliberate and strategic investments firms make to foster innovation potential—such as allocating resources to R&D, investing in employee training, adopting digital technologies, and forging external collaborations (Hervas-Oliver et al., 2021; Grimpe & Sofka, 2009). These efforts reflect a firm's proactive commitment to building the

internal capabilities needed to support innovation. However, while essential, such efforts represent only the inputs to the innovation process. Their presence does not, on its own, guarantee that innovation will occur or endure.

By contrast, *innovation intensity* captures the concrete outcomes of these efforts. It reflects the frequency, scope, and consistency with which a firm generates innovations across products, processes, or technologies. In this sense, innovation intensity serves as a practical manifestation of the firm's innovation capability; it demonstrates its ability to transform investments into sustained, value-generating outcomes (Koura et al., 2025b). Especially in the case of SMEs, which often face limited scale and constrained resources, the effectiveness with which innovation efforts are mobilized becomes a decisive factor (Oudgou, 2021).

This relationship is well captured by the complementary perspectives of the Resource-Based View (RBV) and Dynamic Capabilities (DC). RBV emphasizes the role of firm-specific resources—financial, human, and organizational—that are valuable, rare, and difficult to imitate (Barney, 1991). In SMEs, such resources are often embedded in structural characteristics like firm size, age, ownership model, or sectoral positioning.

Yet the RBV alone falls short in explaining how firms navigate rapidly changing environments or technological disruption. Here, the DC perspective becomes indispensable. As Teece et al. (1997) argue, dynamic capabilities reflect a firm's ability to integrate, build, and reconfigure internal and external competencies in response to evolving conditions—a capacity particularly vital in smaller firms, where agility often substitutes for scale (Block et al., 2020).

It should be noted that rather than treating RBV and DC as parallel lenses, we view them as sequentially coupled. RBV identifies the firm's VRIN (Valuable, Rare, Inimitable, Non-substitutable resources) resource base that anchors potential advantage, while DC comprise the higher-order routines that sense, seize, and transform those assets under change. Innovation intensity arises when DC repeatedly recombine and redeploy VRIN resources, converting endowments into sustained project portfolios and learning cycles. This intensification also renews the resource base, creating a reinforcing loop between resources and capabilities. In short, DC are resource-contingent, and RBV advantages are realized through capability orchestration (Barney, 1991; Peteraf, 1993; Teece, Pisano & Shuen, 1997).

The defining features and roles of these two constructs—*innovation efforts* and *innovation intensity*—are summarized in Table 1, which anchors them within the broader framework guiding this study.

Table 1. Innovation Efforts vs. Innovation Intensity: A Conceptual and Analytical Distinction

Dimensions	Innovation efforts	Innovation capability
Nature	Input / commitment	Output / results
Focus	What the firm does to innovate	What the firm achieves through innovation
Typical Metrics	R&D, training, collaboration, resource allocation	Number, scope, frequency of innovations
Role in the framework	Mediator between determinants and innovation output	Key dependent variable in innovation studies

Source: Author's work

3 Public support as a catalyst for SMEs innovation

Public support plays a pivotal role in shaping the innovation landscape for SMEs, which often face a web of structural constraints. These include not only internal limitations, but also external barriers, like restricted access to skilled labor, advanced technologies, and financial capital. In this context, public support mechanisms should be viewed not merely as funding instruments but as strategic enablers that help SMEs overcome systemic disadvantages and engage more confidently in innovation activities. The present conceptual framework supports a comprehensive approach that integrates three key levers: direct financial support, credit guarantees, and incubation programs (Koura et al., 2024a, 2024b; Koura et al., 2025a).

Subsidies and direct public aid are among the most widely implemented tools to alleviate financial constraints and reduce the costs associated with initiating R&D. Empirical studies show that such interventions can be particularly effective for smaller firms. For example, Eshima (2003) emphasizes how Japanese government subsidies help firms overcome market failures by reducing upfront costs and encouraging R&D engagement. Similar findings emerge in the Italian context, where Barbieri et al. (2020) report that public funding not only stimulates internal innovation but also fosters collaboration with external partners.

Xiang et al. (2021) further demonstrate that R&D intensity can act as a transmission channel between public subsidies and innovation output, reinforcing the idea that direct financial support can meaningfully enhance both the capacity and performance of innovative SMEs. However, the relationship is not always straightforward. In some cases, such as those explored by Shao and Wang (2023) in China, the impact of subsidies follows an inverted U-shaped curve: initial funding stimulates innovation, but excessive support may reduce efficiency or crowd out private initiative. This suggests the importance of balance in policy design. Other studies temper expectations further. Žampa and Bojnec (2017), for instance, find that while subsidies might improve financial outcomes, their influence on innovation is limited. Likewise, Kiman and

Jongmin (2022) observe a partial substitution effect in South Korea, where public subsidies displace rather than complement firms' own R&D investments, ultimately resulting in negligible gains in innovation intensity.

Another critical component of the public support ecosystem is access to external finance through credit guarantee schemes. While bank credit remains a preferred funding source for SMEs, many are unable to meet stringent lending criteria or collateral requirements. Guarantee mechanisms, by sharing risk with financial institutions, make credit more accessible and affordable. When implemented effectively, these schemes can enable firms to invest in technology upgrades, expand operations, and enhance their innovation capabilities. Wahab (2019) finds a significant link between improved credit access and process innovation, underlining the operational value of such support. Jang and Chang (2008) show that technology guarantee systems in Korea have had a marked effect on product innovation, though less so on process innovation. Nonetheless, not all experiences have been uniformly positive. In Malaysia, Boocock and Shariff (2005) highlight that credit guarantees have sometimes failed to achieve their developmental goals, particularly when funds are distributed inequitably or when support reaches firms with limited growth prospects instead of those with genuine innovation potential. These findings underscore the importance of careful targeting and robust implementation frameworks.

Beyond financial assistance, incubation programs have increasingly emerged as vital enablers of innovation. These initiatives go beyond offering physical infrastructure or shared services; they aim to cultivate environments where entrepreneurial experimentation and learning can flourish. University-based incubators, as discussed by Piterou and Birch (2014), are particularly effective in linking academic research to entrepreneurial endeavors, facilitating technology transfer, and encouraging firms to internalize innovation as a continuous process rather than a one-off outcome. Braun and Suoranta (2024) further emphasize the role of incubators in fostering business model innovation, often through tailored mentoring, networking opportunities, and psychological support. By bridging knowledge gaps and enabling trust-based collaboration, incubators help SMEs absorb external expertise and apply it to real-world challenges. Du and Wang (2019) demonstrate how these settings function as connectors across knowledge boundaries, especially in complex or uncertain markets—enabling firms not only to access new information but to translate it into competitive advantage. Taken together, these public support mechanisms—when thoughtfully coordinated—can serve as a powerful catalyst for strengthening innovation capacity across the SME sector.

4 Firm characteristics as determinants of innovation intensity

Innovation within SMEs is rarely accidental—it is shaped by who the firm is, how it operates, and the context in which it grows. These structural attributes influence both the resources a firm can mobilize for innovation and the degree of flexibility it has to respond to emerging opportunities. From a theoretical standpoint, they form the backbone of the firm's resource base and directly affect its ability to build and activate dynamic capabilities. Ultimately, these inherent features determine not just how much a firm can invest in innovation, but how effectively it can transform those efforts into meaningful and sustained innovation outcomes (Ettlie & Rubenstein, 1987.; Vega-Jurado et al., 2008; Zawislak et al., 2018).

Firm size, for instance, carries both advantages and constraints. Laforet, (2013) finds that smaller firms tend to outperform larger ones in terms of innovation efficiency. Their lean structures, flatter hierarchies, and faster decision-making processes create a fertile ground for experimentation and responsiveness. Unlike large organizations often weighed down by bureaucracy, smaller firms are often more agile in adopting technologies and customizing solutions for niche markets. Mcadam et al., (2004) reinforce this point, noting that even within the SME spectrum, differences in organizational size can significantly affect how innovation is adopted and scaled.

Firm age introduces an additional layer of complexity in understanding innovation behavior. While Madrid-Guijarro et al., (2013) find no significant association between firm age and innovation in Spanish SMEs, Heimonen, (2012) offers a more differentiated perspective. Younger firms—especially those in the early stages of their development—often exhibit greater innovation activity, largely motivated by the imperative to stand out and establish a foothold in competitive markets.

Financial structure can also influence innovation in subtle but telling ways. Bartoloni, (2013) finds that innovation success tends to reduce future dependence on debt, as profitable innovations generate internal resources. Brancati, (2015)adds that while high leverage may discourage early or frequent innovation, firms with successful product innovations often require external financing to scale, leading to increased borrowing.

Family ownership introduces another important dimension. Classen et al., (2014)highlight that while family SMEs are often more willing to invest in innovation, their investment levels tend to be modest. Interestingly, these firms still outperform non-family firms in certain areas—particularly process innovation—suggesting a pragmatic, efficiency-driven approach to change. Islam et al., (2022) further nuance this relationship by showing that family ownership alone

may hinder technical innovation unless accompanied by active involvement in management. Human resources management practices, particularly in the form of employee training, is often cited as a cornerstone of innovation. Caloghirou et al., (2018) find that training and knowledge flows significantly enhance product innovation, especially in younger firms with limited experience. These mechanisms help bridge internal knowledge gaps and stimulate fresh thinking. Yet, training is not a universal remedy. Enrique Valdez-Juárez & Maldonado-Guzmán (2016), for example, find no significant impact of training on innovation capacity in Spanish firms—suggesting that without a supportive learning culture and absorptive capacity, training alone may fall short.

5 Managerial Profiles and Skills as Drivers of Innovation Intensity in SMEs Public support as a catalyst to SMEs' innovation capacities

A growing stream of research reminds us that innovation in SMEs is not solely the product of systems or strategic frameworks—it often begins with the people at the top references. As (Shah et al., (2021) illustrate, the educational background and financial literacy of senior managers are not merely credentials; they are powerful assets that shape how firms engage with uncertainty and opportunity. Well-educated leaders tend to better navigate complexity, absorb external knowledge, and translate it into innovation. Financially literate managers, in turn, are more equipped to balance risk and optimize resource use—especially in process and marketing innovation. Age and experience also bring value, offering perspective and strategic steadiness that support internal change.

Beyond these structural traits, behind every innovative SME lies not just a plan or a budget, but a leadership mindset—curious, resilient, and ready to turn uncertainty into possibility. Akjou & Idrissi Fakhreddine (2024) call attention to deeper psychological drivers—vision, confidence, and a willingness to embrace change—as key to fostering an adaptive and innovation-friendly culture. Extending this view, Naushad, (2022) highlights the role of entrepreneurial leadership—leaders who empower, take initiative, and create the emotional safety that allows creativity to thrive.

Melander et al., (2023)show that when SME leaders develop a strong sense of psychological ownership over strategic innovation tools, they are more inclined to champion management innovation and engage their teams around a shared vision. This sense of ownership transforms innovation from a formal process into a collective and participatory effort, deeply embedded in the organizational culture. The ability of SMEs to engage effectively in open innovation is closely tied to the qualities of those who lead them. Foundational elements such as training,

professional experience, and tenure equip managers with the stability and contextual understanding needed to steer innovation over time.

Personal attributes—like openness, patience, and assertiveness— also shape how leaders approach collaboration, manage complexity, and adapt to change. On a strategic level, factors such as entrepreneurial orientation, vigilance, and the breadth of a manager's network play a central role in spotting new opportunities and forging innovation pathways (Barrett et al., 2021). Crucially, leadership style also matters: transformational, authentic, and empowering leaders are more likely to inspire trust, mobilize internal capabilities, and create the inclusive environment needed for innovation to take root. Taken together, these insights highlight that fostering open innovation in SMEs depends not only on organizational conditions but on the human depth and leadership quality at the firm's core (Table 2).

Table 2. Managerial Attributes and SME Innovation

Managerial Attribute	Key Elements	Contribution to Innovation	Proxies	References
Demographic Characteristics	Education, financial literacy, age, experience, tenure	Builds cognitive capacity, strategic stability, and absorptive ability	Educational level, financial expertise, years of experience, managerial tenure	(Bonyuet, 2021; Molina-García et al., 2025)
Personal Characteristics	Openness, patience, assertiveness, confidence, willingness to change	Shapes adaptive behaviors, collaborative engagement, and resilience to uncertainty	Psychometric scales assessing openness, assertiveness, adaptability	(Agazu et al., 2025; Deng et al., 2023)
Managerial Characteristics	Entrepreneurial orientation, vigilance, strategic vision, networks	Enables opportunity recognition, proactive decision-making, and strategic agility	Self-assessed strategic vision, entrepreneurial orientation index, network density	(Deng et al., 2023) (Agazu et al., 2025)
Leadership Style	Transformational, authentic, empowering leadership styles	Fosters trust, motivates teams, and creates a culture of inclusion and experimentation	Leadership style inventory (e.g., MLQ for transformational leadership)	(Ye et al., 2022)

Source: Author's work

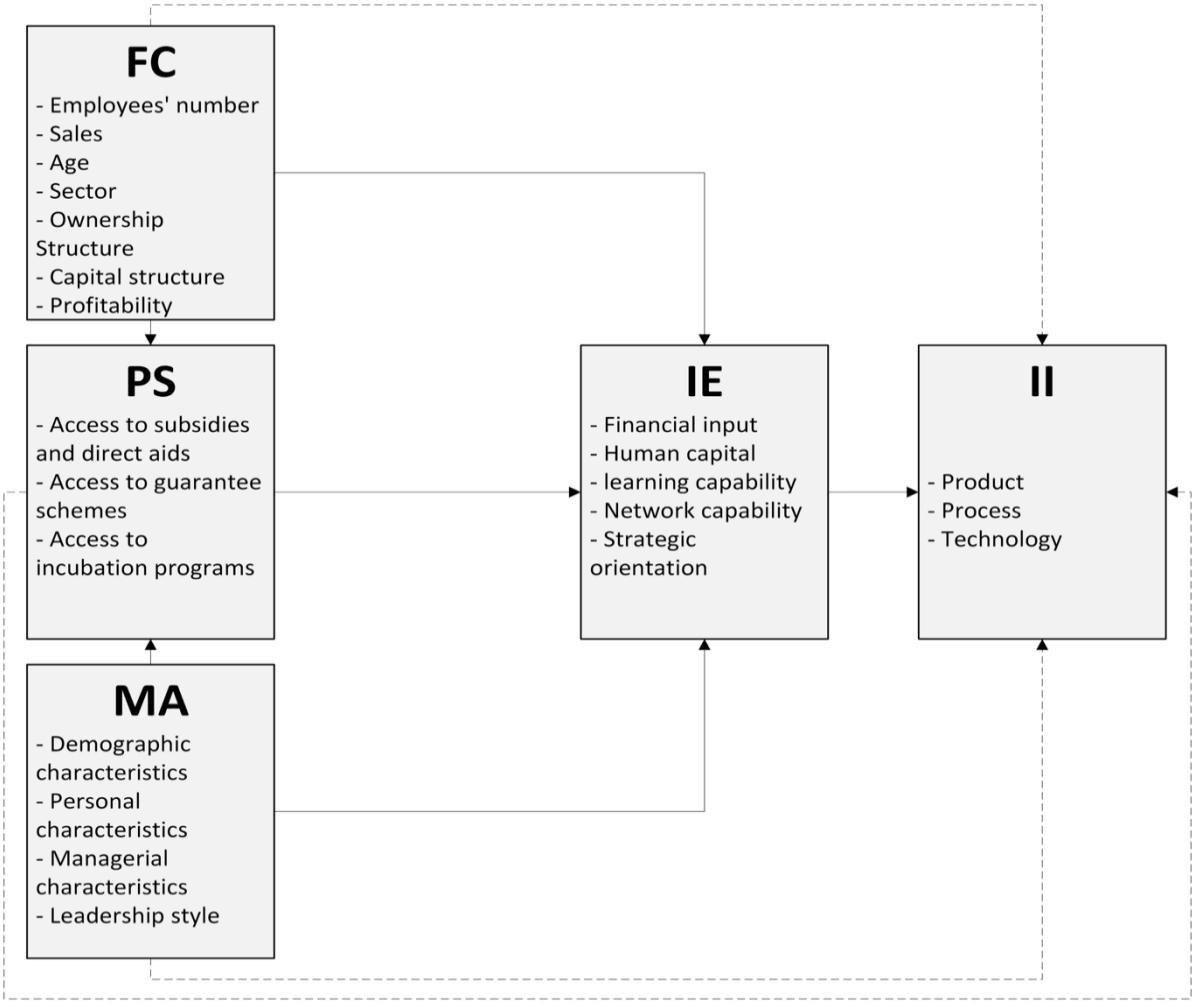
6 The Proposed Framework

The conceptual framework advanced in this study offers an integrated view of the mechanisms through which SMEs generate innovation intensity (Figure 1). Anchored in the Resource-Based View and Dynamic Capabilities theory, it captures the dynamic interplay between three primary determinants: firm-specific characteristics (FC), public support mechanisms (PS), and

managerial attributes (MA). These factors shape the scale and nature of a firm's innovation efforts (IE), which in turn mediate the pathway toward tangible innovation outcomes (II) across products, processes, and technologies.

Rather than viewing firm characteristics as static descriptors, the framework positions them as enabling or constraining conditions that affect both the availability and strategic deployment of internal resources. Public support is conceptualized not merely as external aid, but as a targeted intervention addressing structural deficits—offering financial incentives, and ecosystem access that expand a firm's capacity to innovate. Managerial attributes, as the cognitive and behavioral engine of the firm, form the human core of the framework. Leadership characteristics—ranging from demographic traits to strategic orientation and leadership style—shape how firms perceive, interpret, and act upon both internal capabilities and external opportunities.

Fig. 1. Conceptual Framework for Innovation Intensity within SMEs



Source: Author's work

5 Conclusion

From this vantage point, innovation efforts can be seen as strategic manifestations of dynamic capabilities—activities that enable the firm to learn, adapt, and stay competitive. Innovation intensity, in turn, becomes the observable expression of how well those capabilities have been enacted. This causal link reinforces a core insight: innovation intensity rarely emerges spontaneously. Rather, it is the cumulative outcome of sustained and focused efforts, shaped by the firm's internal conditions and the institutional support systems in which it operates. By clearly differentiating what firms *do* to foster innovation from what they *achieve* as a result, this conceptual distinction not only sharpens analytical clarity but also enriches the foundation for empirical investigation.

This study sets out to unpack the complex drivers behind innovation intensity in SMEs—those often-overlooked yet vital engines of economic vitality. By distinguishing between innovation efforts—the strategic investments firms make to foster innovation—and innovation intensity—the tangible, sustained outcomes of those efforts—this work contributes a fresh and integrated lens to the SME innovation discourse. Grounded in the Resource-Based View and Dynamic Capabilities theory, the proposed framework underscores that innovation is not a linear result of inputs, nor a matter of luck. It is a process shaped by how well internal resources, external support, and managerial vision come together and reinforce one another.

Beyond offering a conceptual contribution, the framework has practical relevance. For policymakers, it highlights the importance of crafting support instruments that are not only accessible but strategically aligned with firms' evolving capabilities. For SME leaders, it emphasizes that innovation is not just about funding or tools, but about cultivating the right mindset, leadership approach, and organizational culture. Ultimately, innovation intensity is not a given—it is earned through purposeful alignment, learning, and adaptation. By clarifying the pathways from intent to outcome, this framework lays a foundation for future empirical exploration, while offering a useful guide for those committed to making innovation a defining feature—not an occasional occurrence—in the life of an SME.

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