

Entrepreneurial Leadership and Innovation for Hungary: A Scoping Review

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Abstract: This study conducts a scoping review of Entrepreneurial Leadership (EL) in the context of Hungarian Small and Medium-Sized Enterprises (SMEs), complemented by a web-based review of global entrepreneurial firms. The topic focuses on how EL enables innovation, dynamic capability development, and effective collaboration between SMEs, universities. The study aims to build a conceptual foundation for forthcoming empirical research examining how Hungarian SMEs sense and seize value within collaborative innovation ecosystems. Key learnings show that EL mediates the relationship between human capital and innovation, founder characteristics shape open innovation pathways, and managerial discretion affects entrepreneurial outcomes. Additional insights reveal that Hungary's innovation performance and SME structure make EL particularly crucial for strengthening university–industry partnerships.

Keywords: entrepreneurial leadership; SMEs; Hungary; innovation capability; dynamic capabilities; university–industry collaboration.

1 Introduction

1.1 Context and motivation

Small and medium-sized enterprises (SMEs) are central to Hungary's economic dynamism and innovation outcomes, yet they operate under resource and capability constraints [1, 2]. The lack of proper internal resource requires firms to develop collaborative innovation with external partners [3], strategic entrepreneurship [4] and entrepreneurial leadership (EL) are the core of competition. The capacity of founders and top managers to craft vision, mobilize people, and orchestrate boundary-spanning innovation – has been repeatedly shown to translate human capital into firm-level innovativeness in such contexts [5, 6]. This paper develops a concise, conference-length synthesis to ground an empirical research follow-up.

1.2 Hungary's innovation capacity and SME profile

According to the Global Innovation Index (GII) 2025, Hungary ranks 36th out of 139 economies overall (23rd in Europe), performing stronger in innovation outputs than inputs, while market sophistication and institutions were ranked merely at 49th and 63rd position [7]. The Hungarian Central Statistical Office (KSH) reports a business landscape dominated by SMEs – almost 900.000 micro, small and medium units registered in 2024 – underlining their pivotal role in employment and value creation [8]. Recent analyses also note uneven SME performance by sector and region [9], their inappropriate organisational and cooperation culture [10] implying that leadership-driven capability development is increasingly consequential for innovation contribution [11].

1.3 Why SME – university – science park collaboration matters

Science parks are contemporary policy instruments designed to enhance national innovation capacity by fostering linkages among firms, universities, and research actors; they reduce search and coordination costs for SMEs and facilitate access to shared infrastructure and talent [12, 13]. As partners of universities, SMEs can diversify innovation outputs (e.g. prototypes, joint intellectual property (IP), demonstrators) while capturing commercial value via joint projects and market-oriented translational research [14]. For Hungary – where institutional disadvantage hampers innovation – well-structured collaboration platforms can help convert academic knowledge into business resources, then scalable opportunities [15].

Alongside firm-internal leadership capabilities, the organizational environments in which firms operate condition how entrepreneurial leadership translates into innovation and collaboration outcomes. Science parks represent one such environment, particularly relevant in contexts where firms face resource constraints, coordination challenges, and uncertainty in university–industry interaction. Rather than acting as direct innovation drivers, science parks provide structured settings that shape the range of feasible open innovation options available to entrepreneurial leaders.

From an entrepreneurial leadership perspective, science parks can be understood as discretionary environments that reduce search and coordination costs, standardize interfaces with universities, and offer access to shared infrastructure and boundary-spanning support functions. These features do not determine firms' innovation strategies, but they influence how founders and top managers enact opportunity recognition, partner selection, and resource commitment decisions. In this sense, science parks are analytically relevant not as homogeneous actors, but as enabling conditions that interact with leadership characteristics at the firm-level.

This positioning is particularly pertinent in economies where innovation performance depends less on the scale of internal resources and more on leadership-enabled collaboration. Through situating entrepreneurial leadership within science park environments, the paper connects micro-level leadership mechanisms with meso-level collaboration structures, without assuming uniform effects across firms. Science parks are therefore treated as contextual settings that may amplify or constrain the expression of founder-specific entrepreneurial leadership orientations, a linkage that becomes relevant when discussing open innovation mode fit and collaboration patterns later in the paper.

1.4 Entrepreneurial leadership: definition and relevance

Drawing on the Upper-Echelons perspective by Hambrick and Mason [16] – organisational outcomes can be predicted by the characteristics of top executives – and innovation leadership research, we define EL as the leadership configuration that combines opportunity recognition, future orientation, risk management, and mobilization of internal and external stakeholders to achieve innovation outcomes.

We position the work at the intersection of the Resource-Based View (RBV) and the Dynamic Capabilities View (DCV). Under RBV, human and social capital (e.g. employees' skills, founder's networks, leadership routines) constitute strategic resources; EL enhances their value creation by aligning them with a compelling vision [17]. While in DCV, EL fosters the routines to sense opportunities (market/technology scanning with universities), seize them (resource commitment and alliance governance in science parks), and transform assets (reconfiguring processes and roles for commercialization) [18].

1.5 Problem statement and research aim

Despite Hungary's stable mid-table GII position and comparatively better output performance, persistent input-side constraints (e.g. financing frictions, uneven absorptive capacity) and institutional boundaries (eg. lack of entrepreneurial and cooperative culture) limit the innovation productivity of SMEs. Consequently, leadership-enabled transformation, also collaboration with universities, is especially salient. This paper therefore synthesizes the state of knowledge on EL as a driver of SME innovation and collaboration readiness.

Methodologically, we employ a scoping review of academic studies retrieved with Scopus strings that combine leadership, entrepreneurship, innovation, and the "human" dimension, complemented by a web-based review of archetypal entrepreneurial firms (e.g., Tesla, Apple, Uber, PayPal) to illustrate how EL orchestrates dynamic capabilities at scale. The scoping approach is appropriate to map a fragmented field, identify consensus mechanisms (e.g. EL mediation), and spotlight contextual moderators (e.g. managerial discretion) [19] before hypothesis testing in Hungary.

2 Literature Review

2.1 Conceptual foundations

Research on the human side of innovation consistently roots firm-level innovativeness in intangible assets and leadership routines. The Resource-Based View (RBV) argues that valuable, rare, inimitable and non-substitutable (VRIN) resources – particularly human and social capital – underpin sustainable advantage, positioning leadership as a capability that orchestrates these resources toward innovation [17]. The Dynamic Capabilities View (DCV) extends this logic, emphasizing routines to sense opportunities, seize them through timely commitments, and transform assets for continued renewal [18]. The Upper-Echelons Theory (UET) adds a micro-foundational lens: strategic outcomes reflect top managers' experiences, values and cognition, implying that EL – as enacted by founders/CEOs and top management teams (TMTs) – channels attention and shapes the firm's innovation trajectory [16].

2.2 Entrepreneurial leadership as mediator between human capital and innovativeness

Across efficiency-driven and emerging contexts, EL is repeatedly shown to convert employee intellectual agility into firm-level innovativeness. In a study of 110 Serbian micro and small firms, the direct effect of intellectual agility on innovativeness disappears once EL is introduced as a mediator; future orientation—the leader’s capability to articulate a compelling direction and reduce uncertainty—emerges as the strongest path, while community building remains a positive, though weaker, channel [6]. This mediation pattern aligns with RBV/DCV: EL activates VRIN human capital and builds dynamic routines that transform cognition into outcomes under resource constraints typical of emerging economies.

Positive leadership appeared as an emerging trend, potentially supporting EL with a better workplace culture, introducing techniques like strength-based seminars and job crafting, emphasizing the role of managers and managers’ tasks in achieving the engagement and better performance of employees [20].

2.3 Founder/CEO characteristics and Open Innovation (OI) mode fit

Founder-level attributes strongly shape Open Innovation (OI) adoption and maturity in SMEs. OI paradigm describes the company’s outward-facing strategy, actively collaborating with business partners, to capture and create value [21]. Case evidence from seven Irish high-tech SMEs shows that OI is project-based and often followed by a “switchback” to more closed approaches once the immediate need is met; functional (technical) background enhances absorptive capacity, career and industry experience broaden networks and negotiation efficacy, legacy linkages ease partner access, and entrepreneurial orientation sustains boundary-spanning and selective revealing [11]. Complementary survey research on Korean SMEs finds that CEOs’ positive attitude, patience (crucial for longer-cycle inbound R&D), and technology education are associated with specific OI modes and with overcoming internal resistance such as NIH/NSH syndromes [22]. Together, these studies reinforce the UET view that who the leader is conditions how openness is practiced, with direct implications for crafting university–SME collaboration architectures.

Founder and CEO characteristics shape not only whether SMEs engage in open innovation but also how openness is enacted. Prior research shows that technical background, industry experience, entrepreneurial orientation and temporal preferences influence the selection and execution of different open innovation modes such as inbound, coupled or project-based collaboration [22, 11]. In this context, science parks can be understood as organizational settings that condition the enactment of founder-specific leadership preferences rather than as uniform innovation drivers.

Technically trained founders with strong absorptive capacity tend to align with inbound open innovation modes, emphasizing access to scientific knowledge, laboratories and skilled human capital. Science park settings reduce coordination frictions and facilitate structured interaction with universities, supporting leadership practices centered on opportunity sensing and selective knowledge acquisition. Conversely, founders with extensive industry experience and network capital are more likely to engage in coupled open innovation modes, using science parks as coordination spaces for joint development projects and collaborative governance arrangements. Here, entrepreneurial leadership is expressed through alliance orchestration and the alignment of heterogeneous partner expectations.

For more entrepreneurially oriented founders with limited internal R&D depth, science parks may initially enable exploratory and time-limited collaboration modes, such as pilot projects, demonstrators or publicly funded consortia. These arrangements allow learning and experimentation with reduced commitment, while leadership practices focus on flexibility and opportunity testing. Across these configurations, science parks expand the range of feasible open innovation modes without determining outcomes. Seen through this lens, science parks function as discretionary environments that amplify or constrain the expression of founder-specific entrepreneurial leadership. This perspective integrates founder fit and open innovation mode selection within a coherent analytical framework and supports treating science parks as enabling conditions in studies of SME collaboration rather than as actors with uniform effects.

2.4 Team-level leadership, market orientation and innovation capability

At the TMT level, shared leadership and market-oriented culture have significant positive effects on innovation capability, which in turn drives performance – evidence based on 336 SMEs (UAE) using structural-equation modeling [23]. Framed by RBV/DCV, shared leadership and market orientation function as strategic resources that operationalize sensing, seizing and transforming – thereby linking leadership behaviors to scalable innovation routines rather than isolated projects.

2.5 National context and managerial discretion

A meta-analysis integrating UET with the managerial discretion perspective shows that the effects of TMT attributes on corporate entrepreneurship are context-contingent: in environments with tighter constraints on managerial discretion (e.g., regulatory rigidity), the strength and direction of leadership effects vary, cautioning against “one-size-fits-all” prescriptions [24]. This is salient for emerging economy SMEs, where institutional frictions can dampen otherwise

positive leadership–innovation links; it elevates the role of collaboration platforms that expand leaders’ discretion via shared infrastructure and more flexible contracting.

2.6 Sustainability-oriented leadership (“innovability”)

Recent synthesis work extends EL toward innovability – the integration of sustainability with innovation – identifying leadership competencies in strategic framing, collaboration culture, sustainability commitment, continuous learning, and sensitivity to global megatrends [25]. Embedding these competencies at university–industry interfaces aligns innovation portfolios with EU policy priorities and can increase the legitimacy and funding prospects of SME projects.

The literature underscores a coherent mechanism chain: EL (future orientation; community building) mediates the conversion of human capital into innovativeness; founder attributes shape OI mode fit and collaboration behavior; shared leadership and market orientation form the bridge from leadership behaviors to innovation capability and, ultimately, performance; and national discretion moderates all of the above. For Hungary, where SMEs dominate the economy and innovation outputs exceed inputs, the greatest marginal gains likely lie in leadership-enabled collaboration—precisely where sensing, seizing and transforming can be institutionalized at manageable cost for SMEs.

3 Methodology

Given the breadth and conceptual heterogeneity of EL and its intersections with OI, RBV/DCV, and university–industry collaboration, we adopted a scoping review to map key constructs, mechanisms, and contextual moderators prior to an empirical Hungarian study. A scoping approach is appropriate for orientation in an evolving field [19] and to surface research gaps and practical implications for the SME–university–science park nexus in Hungary (see Norman et al. [26] for scope review in the field of innovation). The Hungarian context indicators used later in interpretation were drawn directly from WIPO’s Global GII 2025 and KSH statistical pages.

3.1 Academic review

Database: Scopus was selected for coverage depth in management, entrepreneurship, innovation, and engineering management journals.

Search strings: We reused the course-provided strings to ensure replicability:

TITLE-ABS-KEY (leader*) AND TITLE-ABS-KEY (innov*) AND TITLE-ABS-KEY (human*) AND TITLE-ABS-KEY (entrepreneur*)

with data filter PUBYEAR > 2009

case-enhanced variants to capture systemic entrepreneurship exemplars:

TITLE-ABS-KEY (leader* AND innov* AND human* AND entrepreneur* AND tesla) and

TITLE-ABS-KEY (leader* AND innov* AND human* AND entrepreneur* AND musk)

Time window: Publications from 2010–2025 (inclusive) to reflect contemporary EL/OI theorizing and empirical work in SMEs.

Eligibility criteria:

Inclusion: peer-reviewed journal articles; conceptual, quantitative, qualitative or mixed-methods studies; explicit focus on EL (or closely allied constructs: founder/CEO attributes, TMT shared leadership) and outcomes related to innovation capability, corporate entrepreneurship, OI, or dynamic capabilities; SME samples or general firm samples with interpretable SME implications.

Exclusion: conference abstracts only; dissertations; non-English articles; studies without leadership content; purely macro policy reports without firm-level mechanisms.

Screening and selection: Titles/abstracts were screened against eligibility criteria; full texts were then reviewed to extract constructs (e.g. EL components, OI modes), contexts (economy type, industry), mechanisms (e.g. mediation of intellectual agility by EL), and outcomes (innovation capability, performance). The strings above returned core studies later analyzed in Chapter 2.

Synthesis approach. We applied thematic coding to group evidence into mechanism clusters (EL mediation; founder/OI fit; TMT shared leadership–market orientation–innovation capability; managerial discretion as moderator; sustainability/innovability leadership), which structure Chapter 4 (Results).

3.2 Web-based review of non-academic sources

To triangulate leadership mechanisms with practice-proximate narratives, we carried out a targeted review of authoritative non-academic sources on firms widely used as entrepreneurial leadership exemplars. These sources were used only to illustrate mechanisms already identified in peer-reviewed studies (e.g. visionary framing; absorptive capacity; ecosystem orchestration) and not as primary empirical evidence for Hungary.

3.3 National indicators for contextualization

To anchor findings in Hungary, we referenced WIPO's GII 2025 (rank 36th overall; outputs > inputs) and KSH SME demography and performance snapshots (dominance of SMEs; sectoral heterogeneity) for brief contextual statistics used in Chapters 1–2 and for result links in Chapters 4–5.

Nevertheless, the scoping review privileges breadth over critical appraisal; we did not conduct formal risk-of-bias assessments or meta-analytic weighting. The inclusion of illustrative non-academic corporate histories is for conceptual triangulation only; interpretations rely primarily on peer-reviewed evidence. Finally, while GII/KSH data strengthen contextual relevance, country-specific causal claims require the planned empirical follow-up within Hungarian SME–university–science park triads.

4 Results

4.1 Theme 1. EL as the Activation Mechanism of Human Capital

Building directly on the evidence summarized in Chapter 2, the findings confirm that entrepreneurial leadership is the mediating mechanism that activates employees' intellectual agility into measurable innovativeness [6]. In the Serbian SME study, intellectual agility alone had no significant direct effect on innovativeness after incorporating EL; future orientation emerged as the strongest mediator, followed by community building.

SMEs in emerging economies require *leadership-driven capability activation* rather than relying solely on human capital availability. This supports applying the same mechanism to Hungary, where SMEs dominate the economic landscape and innovation performance is shaped more by leadership and collaboration patterns than by resource abundance (as indicated by WIPO GII and KSH data).

4.2 Theme 2. Founder/OI Mode Fit as a Determinant of Collaboration Success

Results reinforce that founder/CEO characteristics determine how SMEs select and execute OI modes. Studies show that OI is typically project-based, often reverting to closed practices once a need is met [11]. Technically trained founders demonstrate greater absorptive capacity, while founders with broader industry or

career experience enable richer networks and negotiation capacity; those with strong entrepreneurial orientation (EO) facilitate boundary-spanning behavior needed for collaboration with universities or science parks. For Hungary, tailoring collaboration structures (e.g. inbound vs. coupled OI modes) to specific founder profiles is likely essential. This is pertinent given the heterogeneous SME composition reported by KSH and EU SME Fact Sheets, showing significant variation in sectoral maturity and absorptive capacity among Hungarian SMEs [8, 27].

4.3 Theme 3. Shared Leadership and Market Orientation as Drivers of Innovation Capability

The TMT-level findings illustrate that shared leadership, together with a market-oriented culture, exerts indirect but powerful influence on innovation capability and overall performance via dynamic capability development [24]. These effects were validated in the large-scale study of 336 SMEs (UAE), demonstrating high external validity across non-Western, efficiency-driven contexts.

For Hungarian SMEs within university collaborations, embedding shared leadership structures (e.g. joint academic–SME decision boards, co-led project teams) can significantly enhance innovation capability formation, improving the likelihood of commercialization – a national priority indicated by Hungary’s stronger GII outputs than inputs.

4.4 Theme 4. Institutional Moderators: Managerial Discretion and Collaboration Platforms

A major outcome of the meta-analysis reviewed in Chapter 2 concerns managerial discretion. Where national contexts restrict leaders’ discretion (regulatory rigidity, weak institutional support), leadership attributes have attenuated effects on corporate entrepreneurship [24]. Conversely, environments that expand discretion amplify EL’s positive impact on innovation. Science parks and university partnership frameworks – by offering shared infrastructure, clearer IP protocols, and standardized contracting – can act as discretion-enhancing environments for Hungarian SMEs. This is critical because GII 2025 data show that Hungary’s innovation inputs lag behind outputs [7], implying structural constraints that collaboration platforms can help mitigate.

4.5 Theme 5. Innovability Competencies as Emerging Requirements

The literature reveals that beyond classical EL behaviors, innovability competencies – including sustainability orientation, collaboration culture, and megatrend awareness—are increasingly necessary for innovation leadership. These competencies are especially relevant for SMEs embedded in EU policy landscapes emphasizing climate, digital, and societal missions [25]. Hungarian SMEs operating in science parks (which are policy tools for mission-oriented innovation) are well-positioned to benefit from acquiring such competencies, especially as Hungary seeks to improve its GII outputs in sectors like high-tech manufacturing and R&D linkage performance [28].

4.6 Theme 6. Systemic Entrepreneurship as a Benchmark for Leadership Patterns

Although global exemplars – Tesla, Apple, Uber, PayPal [29]-[34] – are not directly comparable to SMEs, they illuminate recurring leadership patterns also reflected in SME-level evidence: (1) Visionary future framing (Tesla under Elon Musk), (2) Design- and culture-driven transformation (Apple under Steve Jobs), (3) Aggressive scaling with ecosystem orchestration (Uber under Travis Kalanick), (4) Complementary founder skills enabling OI (PayPal founders: Max Levchin, Peter Thiel, Luke Nosek, later Elon Musk).

These cases validate mechanisms identified in peer-reviewed SME studies: absorptive capacity, boundary spanning, and leadership-enabled sensing/seizing. They support using EL-focused frameworks when analyzing Hungarian SME collaboration readiness.

4.7 Theme 7. Learning-by-Doing and Proximity Effects in Collaboration Maturity

Studies reviewed in Chapter 2 consistently show that SME innovation processes mature through iterative learning, not static planning [11]. Moreover, spatial and cognitive proximities strongly moderate collaboration outcomes, influencing absorptive capacity and EL effectiveness [6].

Hungarian SMEs – many concentrated in Budapest/Pest County clusters (per KSH data) yet diverse across regions [9] – will experience differing collaboration frictions. Science parks thus offer an important function by reducing cognitive distance (through boundary-spanning professionals, joint labs) and supporting cumulative capability building.

Conclusions & Implications

This conference manuscript synthesized how EL operates as the pivotal integrator of human and social capital, open-innovation behavior, and dynamic capability building in SMEs – mechanisms that are especially salient for Hungary’s innovation context. Hungary’s GII 2025 profile [7] indicates that firms convert available inputs relatively efficiently but face input-side constraints (e.g. financing, linkages, skills) that limit the scale and pace of innovation investment. In such circumstances, *leadership-enabled collaboration* becomes a high-leverage pathway for improving national innovation outcomes.

Across studies reviewed in Chapter 2 and structured in Chapter 4, EL – particularly future orientation and community building – mediates the relationship between employees’ intellectual agility and firm innovativeness in micro and small firms; without EL, human-capital advantages underperform. This consolidates RBV/DCV insights: EL activates VRIN resources and establishes sensing–seizing–transforming routines that convert cognition into outcomes under resource constraints typical of emerging economies. For Hungary’s SME-dominated economy, these leadership mechanisms are not peripheral but central to innovation productivity.

Results also show that founder/CEO attributes (technical background, experience, network legacy, entrepreneurial orientation) shape OI mode fit – for example, technically-educated and patient founders align with inbound R&D, while network-strong founders favor coupled modes. In practice, this implies tailoring university–SME collaboration architectures (timelines, IP and milestone design, partner composition) to *specific* founder profiles - crucial given the heterogeneity observed across Hungarian SME ecosystems.

At the team level, shared leadership and market orientation reliably enhance innovation capability and performance, offering a design cue for collaboration governance (e.g. mixed academic–SME steering groups, joint product councils) inside science parks. Because managerial discretion moderates the effect of leadership attributes on corporate entrepreneurship, science park frameworks that standardize contracting, IP options, and access to shared infrastructure can act as discretion-enhancing environments – amplifying EL’s positive impact and helping Hungary address input-side frictions flagged by the GII.

Finally, aligning EL with innovability competencies (sustainability commitment, collaboration culture, megatrend sensitivity) positions SME–university projects for EU-relevant funding and legitimacy while enlarging the scope of innovation outcomes beyond short-term commercialization. In short, the strongest near-term gains for Hungary likely lie where entrepreneurial leadership meets structured collaboration platforms (universities and science parks), enabling founder-fit OI, shared-leadership routines, and accelerated capability maturation. This conclusion provides a practical map for the next study phase: testing EL-mediated value

creation in Hungarian SME–university–science park dyads through carefully specified, context-sensitive designs.

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