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RESEARCH

The knowledge spillover theory of entrepreneurship and innovation: taking stock and new directions

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Abstract
This special issue revisits and extends the Knowledge Spillover Theory of Entrepreneurship (KSTE) and its more recent evolution and application to innovation. Rooted in the idea that knowledge created but unappropriated by incumbents and universities serves as a source for entrepreneurial activity, the theoretical framework emphasizes the critical role of entrepreneurs as conduits of knowledge commercialization. Since Audretsch's foundational works during 1990s and early 2000, scholars have explored how innovation is driven not only by R&D investment and knowledge collaboration within firms and universities, but also by the entrepreneurial actors who mobilize and transform created knowledge. Recent advances have broadened this perspective, highlighting the role of intrapreneurship and incumbent firms in creating and transferring knowledge and the ecosystem-wide dynamics. This special issue draws on the theoretical and empirical developments of the KSTE&I, identifies synergies between them, and outlines future research pathways.

Keywords Knowledge spillover · Knowledge transfer · Innovation · Institutions · Digitization · Entrepreneurship

JEL Classification L26 · O31 · O33 · R11

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1 Introduction

The source of entrepreneurial activity is knowledge created but not appropriated by incumbent organizations (Acs et al., 2013; Link & Siegel, 2007; Siegel & Phan, 2005) and universities (Guerrero & Urbano, 2014, 2017; Guerrero et al., 2019). Thus, entrepreneurs act as conduits between the research and development (R&D) activities of incumbents and universities to commercialize knowledge that would otherwise remain unexploited and uncommercialized (Audretsch & Keilbach, 2008; Guerrero et al., 2023; Guerrero & Urbano, 2012). A pivotal contribution to this perspective is Audretsch (1995) research, which was among the first to conceptualize knowledge as a driver for entrepreneurship. In his book, Audretsch posited that firms exist exogenously and then endogenously seek out and apply knowledge inputs to generate innovative outputs (Audretsch, 1995). Audretsch (2015) later argued that while the financial responsibility for pioneering new knowledge rests with major corporations and academic institutions, it is agile entrepreneurial entities that leverage this knowledge into innovation. Notably, Audretsch was, years later, the pioneer in coining the concept of the 'knowledge spillover theory of entrepreneurship' (KSTE) (Audretsch & Keilbach, 2008).

Drawing on the foundations of the KSTE, Leyden and Link (2013) improved our understanding of the role that universities play in facilitating the transmission of knowledge to private-sector business enterprises so as to generate economic growth. Extending the KSTE to universities, Leyden and Link (2013) developed a formal model of university-with-business enterprise collaborative research partnerships in which the resulting partnership is both mutually desirable and feasible. This model, until now, helps to explain how the university seeks to act as a complement to private-sector collaborative R&D. To be attractive to both incumbent firms and startup entrepreneurs, it needs to structure its program in a way that increases business revenues and reduces business enterprise R&D costs. The KSTE explains that the knowledge in the possession of economic agents is exogenous, and in order for the returns from that knowledge to be appropriated, the spillover of knowledge from its producing entity involves endogenously creating a new firm. Building on this, Audretsch and Belitski (2022) extended the KSTE to multiple economic agents, aiming to bring new services and products to market. They developed the Knowledge spillover theory of innovation (KSTE&I), which, in essence, shifts the focus from firm-centric innovation to a broader, ecosystem-oriented model. In this model, entrepreneurship is key to translating uncommercialized knowledge into invention, and ultimately into innovation with distinct market value.

The main idea of Audretsch and Belitski (2022) is that knowledge created but not fully commercialized within organizations (such as universities, R&D labs, or incumbents) may not only serve as an input for new business creation, but can have either an incremental effect (process and product innovation by incumbents) that are new to a firm, and a radical effect (creation of new product, service or inventing new processes) that are new to industry and market. There are several key points of the KSTE&I that have become widely accepted knowledge. Firstly, a key input to and for innovation does not solely emerge from the firm or institution that generates knowledge but is created within the organization or university (intrapreneurship, spinoffs) (Link & Scott, 2017). Much of the knowledge generated through collaboration and innovation may be underutilized internally (Audretsch & Belitski, 2013; Audretsch et al., 2025). Second, in the KSTE&I, both intrapreneurship and

entrepreneurship serve as a mechanism for identifying, absorbing, and commercializing underutilized knowledge, especially when formal institutions or firms do not fully exploit it. Thirdly, the spatial or regional context matters for knowledge spillovers that are more effective in regions in close geographical proximity (Audretsch & Feldman, 1996) and in organizations with high absorptive capacity (e.g., skilled labor, universities, entrepreneurial culture) (Cohen & Levinthal, 1990; Qian, 2018; Qian & Acs, 2013).

Knowledge spillovers enable entrepreneurs to learn from the business environment and develop new skills for their benefit and that of their business (Acs et al., 2013; Audretsch & Belitski, 2013). Knowledge spillovers are only made possible by the spatial proximity to the actual emitter of the knowledge: they manifest themselves in exchanges between the firms or through the mobility of labor (Audretsch & Lehmann, 2005).

This editorial introduces the foundations of the KSTE and the KSTE&I and explores synergies between the two theories. It then discusses key attributes shaping the KSTE&I and directions for advancing the theory. Finally, the editorial introduces the 13 papers featured in this special issue.

2 The foundations of the knowledge spillover theory of entrepreneurship and innovation

The KSTE incorporates insights from the endogenous growth theory (Grossman & Helpman, 1994; Romer, 1990), which posits that knowledge accumulation, technological advancements, and investments in human capital and innovation serve as primary catalysts for economic growth. Within this framework, innovation plays a critical role, as KSTE depends on both private and public R&D investments (Romer, 1986, 1990) to generate an ongoing, iterative process of knowledge spillovers and accumulation (Grossman & Helpman, 1994). Through innovation-driven entrepreneurship, knowledge that would otherwise remain uncommercialized is absorbed and transformed into new market opportunities, thereby fostering economic dynamism.

While recent research on KSTE has expanded our understanding of the mechanisms by which knowledge spillovers contribute to firm and regional economic performance (Audretsch & Belitski, 2020; Ghio et al., 2015; Guerrero & Urbano, 2014), many of these mechanisms remain ambiguous. Consequently, the precise ways in which innovation facilitates the translation of knowledge spillovers into entrepreneurial activity and economic growth continue to require further exploration. This increased interest in uncovering these mechanisms can be shown by the number of publications in the field using the "knowledge spillover theory of entrepreneurship" as a theoretical background over the years, which is presented in Fig. 1. However, the figure also shows a recent perceived decline in the use of KSTE as the foundational theoretical framework, which we argue is associated with a cross-pollination of ideas that broaden the scope of research questions.

Audretsch and his colleagues have added KSTE&I as complementary theoretical lenses to KSTE. While the KSTE is older (late 1990s and early 2000s), it focuses on entrepreneurship as a mechanism for exploiting unused or underutilized knowledge, primarily from R&D institutions and large firms (Acs et al., 2009, 2013). On the contrary, the KSTE&I is younger (Audretsch (Audretsch & Belitski, 2022) and expands the perspective to regional, national, and international innovation ecosystems, emphasizing that not all knowledge

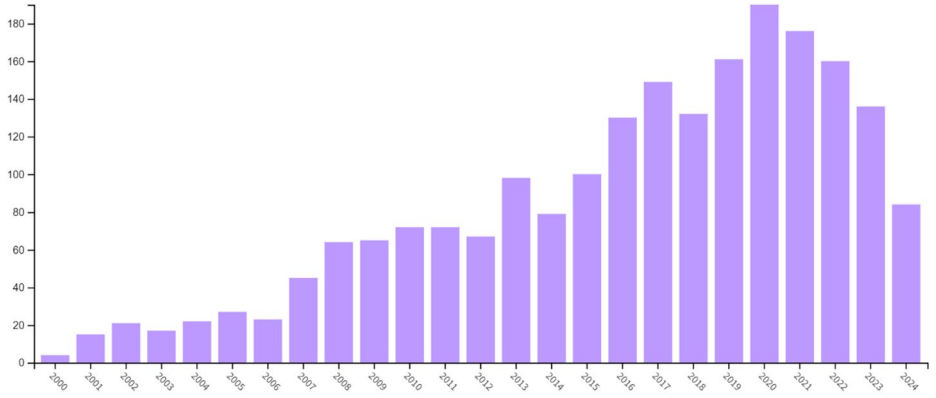


Fig. 1 Publications on KSTE field (per year). *Note*: Data for the year 2024 is incomplete and is provided here for illustration., It covers the period between January 2024 and June 2024. *Source*: Web of Science.

leads to innovation internally, but it can spill over to external agents through open innovation mechanisms (Audretsch et al., 2024a; Chesbrough, 2003; Enkel et al., 2009) and be commercialized externally via entrepreneurial activity. Therefore, the interconnection and synergies between the two theories are not only possible but desirable, as they reflect the dynamic interaction between innovation systems and entrepreneurial agents.

To situate these insights of the KSTE and KSTE&I within a broader scholarly lineage, we revisit and integrate foundational theories of knowledge spillovers, namely the Marshall-Arrow Romer (MAR) framework, and the Jane Jacobs' theory. A long theoretical tradition of knowledge spillovers dates back to the Marshall-Arrow-Romer (MAR) model (Arrow, 1962; Marshall, 1890; Romer, 1986), which argues that knowledge is primarily industry-specific, and that knowledge spillovers are therefore fostered through industry agglomeration.

Marshall (1890) was the first to articulate how firms benefit from geographical proximity to other enterprises, enabling them to recruit skilled employees and cultivate innovative ideas. Porter (1980, 1998) expanded on this by emphasizing the significance of clusters in facilitating knowledge externalities, which emerge from geographic concentrations of R&D investments, interconnected firms, specialized suppliers, service providers, related industries, and supporting institutions that both compete and collaborate. The foundational studies by Acs and Audretsch (1987) and Acs et al. (1994) further examined the role of agglomeration externalities and spillovers in firm performance (Glaeser et al., 1992), highlighting how economic actors leverage knowledge spillovers to drive innovation and transform knowledge into commercially viable products and services.

Building on the well-established Marshall-Arrow-Romer (MAR) framework, which conceptualizes knowledge spillovers as intra-industry and scale-dependent, it is crucial also to integrate Jacobs (1970) insight into inter-industry or heterogeneous knowledge spillovers. While MAR-type externalities emphasize the benefits of specialization within clusters (e.g., firms in the same industry located in proximity), Jacobs challenged this view by proposing that diversity in economic activity, not specialization, is the primary engine of innovation and long-term economic growth.

Table 1 Main components and origins of the knowledge spillover theory of entrepreneurship and innovation

Component	Origin Knowledge Spillover Theory of Entrepreneurship (KSTE)	Origin Knowledge Spillover Theory of Innovation (KSTE&I)	Merged View
Knowledge Source	R&D, universities, private firms	R&D, universities, multinationals, organizations, private and public firms	Shared
Underutilized Knowledge	Knowledge not commercialized	Knowledge not yet created or partly commercialized	Common premise
Mechanism of Spillover	Entrepreneurial alertness, firm formation, engaging with knowledge spillovers and investment in R&D and hiring human capital	Innovation agents (including firms, networks, universities, policymakers) aiming to develop new products and services or engage in collaboration with external partners on innovation	Expanded mechanisms
Actors	Entrepreneurs	Firms, entrepreneurs, policymakers, larger third-party organizations, intrapreneurs, associations and public and private institutions	Multi-actor interaction
Unit of Analysis	Individual entrepreneur	Firms and entrepreneurs, organizations, Innovation ecosystems of region and organizations, teams	Multilevel
Outcome	New venture creation	Innovation output such as incremental and radical product and service innovation, process innovation and organizational innovation	Multiple innovation outcomes

Source: Authors comparison

Jacobs argued that urban diversity fosters innovation by enabling knowledge recombination across heterogeneous sectors, promoting novel solutions and entrepreneurial opportunities. In contrast to the homogeneity inherent in MAR spillovers, Jacobian knowledge spillovers emerge from cross-industry fertilization, where the juxtaposition of unrelated knowledge domains stimulates creative problem-solving and entrepreneurial experimentation. For instance, a software developer in an urban environment might draw inspiration from the healthcare sector to develop digital health solutions—an interaction unlikely in a more specialized cluster (Caragliu et al., 2016).

This view has profound implications for entrepreneurial ecosystems and regional innovation strategies. While MAR spillovers support incremental innovation within established industries, Jacobian externalities are more conducive to radical innovation and new venture creation across industry boundaries (Qian et al., 2013). Hence, integrating Jacobs' theory into the knowledge spillover discourse (as suggested by Audretsch & Belitski, 2017; Audretsch & Belitski, 2022) provides a more comprehensive framework that accommodates depth and breadth in knowledge dynamics in the KSTE&I. The synthesis of MAR and Jacobian logics is deeply embedded in the KSTE&I and aligns with current thinking in entrepreneurial ecosystem research, where regional economic development increasingly depends on both specialized knowledge flows (e.g., biotech clusters) and cross-domain innovation platforms (e.g., smart cities, creative hubs). Table 1 offers the common grounds and distinctive features of KSTE and KSTE&I theories.

This integration of both theories reflects Audretsch and Belitski (2022) work, where the authors emphasize that entrepreneurship is not a by-product, but a core pathway for innovation through knowledge spillover. The key implications for new theory development lie in encouraging policies that both fund R&D and enable entrepreneurial ecosystems (e.g., incubators, accelerators, knowledge transfer offices). This perspective focuses on the importance

of national and regional innovation ecosystems, suggesting that regional innovation ecosystems must simultaneously focus on generating knowledge and establishing mechanisms for that knowledge to spill over into startups and innovative firms.

A study by Audretsch et al. (2024a) sees entrepreneurs as the most active agents embedded within regional and national innovation systems, not isolated actors, and able to access knowledge either via knowledge spillovers or collaboration with external partners while deciding on the level of investment in knowledge internally. This study implicitly supports the synthesis of KSTE and KSTE&I as parts of a larger understanding of how knowledge transfers into economic value. The new KSTE&I allows for a more nuanced, policy-relevant, and system-level explanation of innovation and entrepreneurship dynamics. Building on Audretsch and his colleagues' evolving theoretical work, this study proposes an integrated Knowledge Spillover Framework where entrepreneurship and innovation co-evolve through the mobilization of underutilized knowledge—transforming it into regionally embedded innovation outcomes.

Despite its useful mechanisms explaining how innovation takes place, critics yet argue that KSTE and KSTE&I, while conceptually appealing, suffer from a lack of precise theory formulation (Tsvetkova & Partridge, 2021). This raises important questions: Does the existing model of KSTE need a more explicit formulation? Should the theory be recalibrated, making it more theoretically stringent, or should it expand its relevance by encompassing broader, more varied theoretical contexts and disciplines?

In response to these concerns, this editorial brings new insights and clarity to better understand how knowledge spillovers may facilitate new firm creation as well as improve the development of products and services. By directly and indirectly improving process innovation, these spillovers create further opportunities for individual entrepreneurs and intrapreneurs, but also for a wider range of economic agents, such as incumbents, universities, and other innovation agents, to initiate or support entrepreneurial activity.

In summary, diminishing influence of the KSTE as a foundational theoretical framework is associated with the emergence of a synergetic perspective between two theories, first noted by Audretsch and Belitski (2022). This shift is attributed to the evolving focus of the KSTE and new research streams towards a more comprehensive understanding of entrepreneurship phenomenon and its heterogeneity, advancements in technology and data analytics facilitating entrepreneurship decision-making and knowledge spillover, as well as an increasing role of sustainability-related spillovers and entrepreneurship activity (Audretsch & Fiedler, 2023a; Audretsch et al., 2024b).

3 Attributes shaping the KSTE&I

The KSTE&I is useful in understanding how entrepreneurial activity spills over out of knowledge transfer from incumbent firms and universities to startups (Acs et al., 2009, 2013; Audretsch, 1995) and innovative firms (Audretsch et al., 2024a). KSTE&I has integrated the multifaceted views of knowledge spillover and technology transfer at macro- (regional and national policies), meso- (industry and cluster policies), and micro- (individual firms and startups) levels. It has given rise to the quadruple helix and entrepreneurial ecosystems literature, as well as literature on culture, public policy, and clinical research (Thurik et al., 2024). These models facilitate a comprehensive understanding and critical examination of

knowledge spillover effects inductively and deductively. The KSTE&I embraces the following elements of its growth. Firstly, evolving research focuses on greater recognition of the role of knowledge spillovers of entrepreneurship, drawing on agglomeration economies and agglomeration spillovers. The focus of knowledge spillovers has reached other fields, such as agglomeration economies and the role of entrepreneurial ecosystems (Audretsch & Belitski, 2017; Spigel & Harrison, 2018; Stam, 2015). This broader perspective encompasses the role that knowledge spillovers play in material, cultural, and social characteristics of entrepreneurship activity (Spigel & Harrison, 2018) related to the role of infrastructure, networks, social capital, and localized resources that collectively drive entrepreneurial activities and have been skillfully summarized as material, social, and cultural attributes of entrepreneurial ecosystems (Spigel, 2017).

Secondly, technological advances and digitalization of knowledge transfer have received increasing attention from entrepreneurship scholars. Technological advances and the availability of big data have transformed the research landscape on knowledge spillovers. Researchers now have access to more sophisticated tools and datasets, allowing for deeper analysis of complex phenomena like KSTE&I. However, this also means that researchers are exploring more nuanced and intricate aspects of entrepreneurship, potentially overshadowing the foundational elements of KSTE&I, with the focus shifting towards artificial intelligence (AI), and digitization in explaining the mechanisms of knowledge spillover (Bianchini et al., 2022). AI's impact on knowledge spillovers extends beyond data availability and analytics. It shapes a reconsideration of foundational theories and concepts in entrepreneurship. For example, traditional models of entrepreneurial uncertainty, such as Knightian uncertainty (Knight, 1921) or Schumpeterian creative disruption (1939), are being re-evaluated in the context of AI's predictive capabilities. As noted by Ramoglou et al. (2024). AI challenges the extent to which entrepreneurs are bound by epistemic limitations identified in classical theories, leading to theoretical frameworks that accommodate new digital capabilities.

The emergence of new entrepreneurial opportunities in the market is often created by new digital technologies that enhance the modification of traditional market opportunities into new products and services, changing the identification and realization of entirely new types of entrepreneurial opportunities that were previously inconceivable and unimaginable. For example, the ability of new digital tools to simulate various scenarios and predict outcomes enables entrepreneurs to explore a broader spectrum of potential startups and the predicted outcomes, while increasing knowledge spillover may also serve as a digital filter to startup ambition and aspirations. Digital tools can model potential market responses, financial projections, and competitive dynamics, providing a more comprehensive evaluation framework. This shift in evaluation methodology reflects a broader change in the entrepreneurial process where digitally-driven insights become integral to decision-making for both startups and scaleups. Chalmers et al. (2020) highlight how AI can facilitate venture creation by revealing opportunities in the Fourth Industrial Revolution that traditional approaches, such as knowledge spillover of entrepreneurship, might overlook.

Thirdly, the role of interdisciplinary research has increased, which makes KSTE&I applicable to more fields. The interdisciplinary nature of contemporary entrepreneurship research, incorporating insights from economics, management, sociology, and psychology, has broadened the scope of research questions. While this cross-fertilization of knowledge has enriched the field of entrepreneurship, it also means that the KSTE&I describes the

mechanisms of knowledge access and transfer across multiple fields of science. While knowledge spillovers remain important to explain the phenomenon of idea creation and commercialization (Acs et al., 2009; Audretsch & Keilbach, 2008)KSTE&I is now widely applied across different levels of analysis (firm, organization, team, industry, university, complex regional innovation ecosystems).

Finally, the KSTE&I has changed due to democratization of entrepreneurial opportunities and open markets, and related to it, the processes of internationalization and localization of knowledge (Audretsch, 2023). KSTE&I has substantially democratized access to entrepreneurial opportunities by breaking down barriers related to knowledge transfer from incumbents and universities, who otherwise might activate their power against newcomers (Audretsch & Fiedler, 2023b), to entrepreneurs and innovators. This democratization of knowledge embodied in entrepreneurs and creative individuals has led to the KSTE&I directly contributing to explaining why economic agents and their interactions are more powerful when they take place within a specific geographical location such as entrepreneurial ecosystems, where entrepreneurial actors can tap into knowledge from other stakeholders (Brown & Mason, 2017), thus accelerating the knowledge spillover for idea creation, development, and commercialization.

4 New directions for advancing the KSTE&I

Based on the above discussion, we propose three key themes that could advance a broader research agenda that integrates KSTE&I into emerging topics in the field of entrepreneurship and innovation. Figure 1 provides an illustrative overview of three areas in which the KSTE&I could be extended, namely (1) beyond places, (2) beyond technology, and (3) beyond appropriability. We argue that these new areas of KSTE&I research are enabled by the emergence of new contexts (e.g., digital connectivity and ecosystems), new conditions (e.g., technological convergence and AI), as well as shifts in values (e.g., from economic towards more complex goals).

4.1 Beyond place

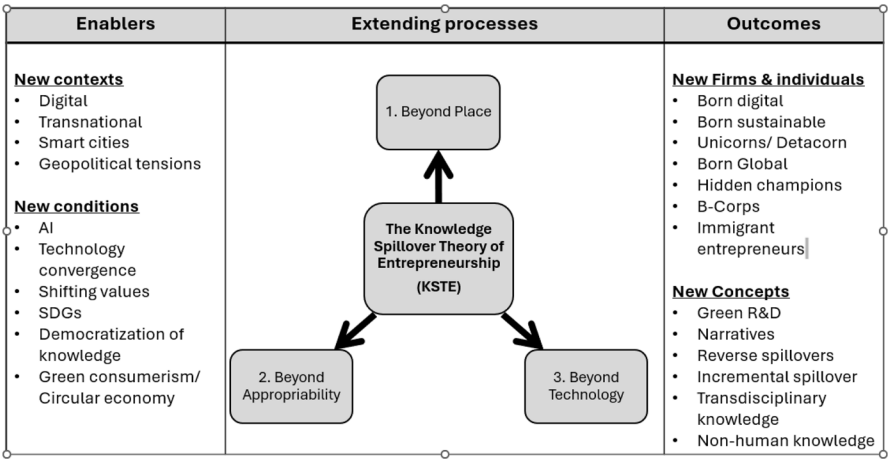
The KSTE&I has location as the main premise where knowledge transfer takes place, with knowledge spillovers stronger in the close proximity (Audretsch & Feldman, 1996). There is an agreement in the KSTE&I that the geographical proximity of economic actors intensifies knowledge spillovers within regions, cities, and industries (Audretsch, 2015; Audretsch & Lehmann, 2005). However, while conditions created by spatial proximity are conducive for KSTE&I, particularly for knowledge with a high degree of tacitness (Döring & and Schnellenbach, 2006), recent research points to other enabling conditions that can overcome distance. Specifically, other dimensions of proximity, including relational organizational, social, and institutional proximity, also play an important role in knowledge spillovers (Boschma, 2005). These dimensions emphasize the importance of knowledge, collaborations and partnerships (Cagno et al., 2016) beyond regions, but nationally and internationally (Audretsch & and Belitski, 2024). Knowledge coming from within the country and internationally is a useful resource for new ideas creation, as well as technology upgrading, and

human capital enrichment when exchanging new knowledge (Corredoira & McDermott, 2014; Hobday & Rush, 2007).

Furthermore, the rise of new types of firms, such as 'born digital'- firms that mainly create value in the digital space, such as Netflix and Expedia, calls for investigations beyond place (Monaghan et al., 2020), considering virtual spaces where individuals, organizations, and institutions interact, collaborate, and create value using digital tools and platforms. Scholars have argued and empirically evaluated how knowledge spillovers can be transferred using digital tools for new knowledge creation and economic growth (Colombelli et al., 2024) and, more recently, pointed to the emergence of the digital entrepreneurial ecosystem as a knowledge space (Audretsch et al., 2024b). While research on digital KSTE&I continues to evolve, knowledge can also be transmitted through virtual proximity, adding another dimension to complement spatial proximity.

Related, AI-driven systems aggregate, refine, and distribute knowledge across borders without the advantages of physical proximity. AI can enhance access to information and reduce cognitive (Booyse & Scheepers, 2024), language, and geographical barriers that traditionally give rise to advantages of place-based knowledge spillovers. It is the unbounded nature of AI-driven diffusion that enables new forms of KSTE&I, utilizing non-human knowledge and intelligence. How AI knowledge spillovers will contribute to economic growth and sustainability is not well understood. Early evidence from Australia's largest city– Sydney- suggests AI-enabled knowledge remains low, calling for future research to understand the mechanism and how AI can enable KSTE&I (Cetindamar et al., 2020). Other studies suggest that the cognitive proximity of AI to pre-existing technologies is an important mechanism through which AI knowledge can be harnessed within a region (Cicerone et al., 2023).

Overall, building on the idea that various forms of proximity enable knowledge spillovers, we encourage future research to consider multifaceted conditions and contexts and how digital technology may be applied to connect them and enable knowledge transfer. This will include considering different types of proximity, such as geographical, but also cultural-cognitive, technological, and social (Lamotte, 2025).



Model 1: Enablers that extend processes of KSTE&I and outcomes

4.2 Beyond technology

Research on KSTE&I embraces multifaceted technological knowledge needed for the creation of new products to firms, industry and markets (Audretsch et al., 2023; Wagner et al., 2021). Our literature review suggests that KSTE&I will play an important role in understanding how these multifaceted technologies can serve to achieve both economic and environmental and social goals, including the United Nations Sustainable Development Goals (SDGs), can be advanced. Specifically, KSTE&I is well suited to capture the complex nature of knowledge needed (Antonelli et al., 2023) as well as the process of synthesizing knowledge flows from a range of actors in addressing for economic but also social and sustainability challenges (Audretsch & Fiedler, 2023a; Cloitre et al., 2024). The evolving complexity of knowledge, particularly in relation to environmental goals demonstrates the need for fresh research on how KSTE&I fosters new types of firms, such as B-Corps and green start-ups, that align with shifting values. Recent evidence confirms KSTE&I as a valuable framework for understanding green knowledge spillovers and their role in driving sustainability transitions. A study by Shi et al. (2023) suggests that reverse green innovation spillovers enhance the green innovation capabilities of Chinese MNEs, strengthening both environmental sustainability efforts in China and their global competitive advantage. Similarly, Wu et al. (2023) found that foreign green technology spillovers support Chinese domestic firms in developing eco-innovation. Entrepreneurs also play a key role in advancing critical knowledge related to sustainability and circularity, often generating reverse spillovers that help large legacy firms integrate circular knowledge (Audretsch & Fiedler, 2023a). Additionally, insights from the circular economy highlight that entrepreneurial opportunities frequently emerge through inter-industry collaboration across spatial boundaries (Audretsch & Fiedler, 2023a).

Overall, recent evidence suggests that KSTE&I will remain critical for understanding the role of entrepreneurship in sustainable innovation and growth. However, to better reflect evolving conditions, it is important to integrate new knowledge sources, including knowledge from public and non-for-profit organizations, knowledge obtained via green R&D, and consider other complementary concepts such as reverse knowledge spillovers when stakeholders can learn from each other but also setting a business to obtain new knowledge.

We contend that KSTE&I extends traditional knowledge spillover philosophy and logic by acknowledging that knowledge created in one context (e.g., green R&D, multinationals, clusters, high-tech industries) can spill over into new entrepreneurial ventures like B-Corps and green startups, as well as lead to new radical solutions for business and society (Audretsch et al., 2024a; Audretsch & Fiedler, 2023a) enabling firms and non-for-profit organizations to equally benefit from knowledge spillovers. These knowledge spillovers are not unidirectional; we also argue that *reverse knowledge spillovers* are important sources of knowledge from entrepreneurs to incumbent firms, and this is how technologies of incumbents can be enriched and innovation created. We argue on the dual role of Multinational Enterprises (MNEs) and their contribution to generating new knowledge later used by entrepreneurial firms, as their strategy is also to protect their knowledge through different appropriability devices, such as patenting, to prevent involuntary knowledge spillovers. By synthesizing knowledge from heterogeneous sources across geographic and organizational boundaries, KSTE&I helps explain how entrepreneurship contributes not just to economic growth, but to transformative, sustainability-driven innovation aligned with the SDGs.

4.3 Beyond appropriability

The final direction for advancing KSTE&I is a need for the knowledge to be commercializable – it should be appropriated. The KSTE&I sets on the foundations that knowledge created in one organization (such as a university, R&D lab, or large firm) can spill over and be commercialized by entrepreneurs (Acs et al., 2009; Audretsch, 1995). While large firms might create valuable knowledge, they may encounter limited knowledge appropriability due to their knowledge filter (Morris et al., 2024). The knowledge filter itself means that opportunities for entrepreneurs to commercialize "filtered" knowledge arise in new ways, leading to innovation and new firm creation. In order to do this knowledge should be appropriated by economic agents, such as entrepreneurs, spinouts, etc. (Cassiman & Veugelers, 2002, 2006). However, new conditions shift opportunities for the appropriability of knowledge and impact whether actors can appropriate the knowledge they create (Audretsch & Fiedler, 2023b). Below we discuss how knowledge spillovers could become a common good and bolster sustainable economic growth.

In her work on common-pool resources, Ostrom (1990) argues that knowledge might be created and managed by communities as a shared resource. Ostrom (1990) argues that NGOs and policymakers may play a role in democratizing green knowledge in order to achieve transitions towards more sustainable economic growth. For example, a study by Denac et al. (2018) points out that EU projects such as the EU EDECON target SMEs operating in the construction and building sector to transfer eco-design knowledge. Also, new information technologies and AI combine knowledge created by multiple actors in new forms, democratizing knowledge and potentially reducing power imbalances (Audretsch & Fiedler, 2023b). While this makes a wider range of knowledge accessible to a wider range of actors, beyond spatial boundaries (Ostrom & Hess, 2007), the economic value of the creator's knowledge might become diluted. Future research is needed on how the democratization of knowledge might change the development of the KSTE&I. This includes examining the conditions under which actors can appropriate such knowledge. Also, as efforts to democratize sustainable knowledge expand, KSTE&I might also provide a useful framework as to how synergies between a broader range of knowledge and market actors are realized.

5 Introducing the papers in the special issue

Geopolitical dynamics significantly influence the appropriability of knowledge by both international entrepreneurs and incumbent firms, particularly in the context of cross-border R&D and innovation activities. While global trade and Free Trade Agreements (FTAs) have traditionally facilitated stronger intellectual property (IP) regimes through harmonized standards and enhanced protections, especially in countries where such norms were previously weak, geopolitical tensions can reverse this progress. When international IP agreements are undermined, the ability of firms to enforce their IP rights across borders becomes uncertain (Tung et al., 2023).

This uncertainty directly affects the KSTE&I, as entrepreneurs and firms may become more cautious about engaging in international partnerships and knowledge exchanges (Audretsch & Belitski, 2021; Knight, 1921). In response to deteriorating geopolitical conditions, firms may limit participation in collaborative R&D or shift their innovation strate-

gies inward, thereby constraining the potential for productive knowledge spillovers (Luo & Van Assche, 2023). From a firm-level perspective, the balance between accessing external knowledge (incoming spillovers) and protecting internal innovations (appropriability) becomes more complex. Firms benefit from tapping into public pools of knowledge but also seek to restrict outbound flows to safeguard their competitive advantage. When appropriability weakens due to political or legal instability, firms may either increase cooperative R&D to absorb shared knowledge or avoid it to mitigate risk. Notably, the decision to engage in cooperative R&D is influenced by how spillovers and appropriability interact: when spillovers exceed a critical threshold, joint R&D becomes more attractive and profitable than isolated innovation (Cassiman & Veugelers, 2002, 2006).

6 Introducing papers in the special issue

This special issue includes thirteen papers that advance the KSTE&I drawing on different methodological approaches and analytical focus. In the following, we present these papers based on four main clusters that we identified, including four themes (1) the interplay between KSTE&I and individual and firm-level characteristics; (2) the role of MNCs on KSTE&I, (3) new conditions that affect the KST&I, 2), and (4) complementing concepts that extend KSTE&I. Our first theme is associated with better understanding of the role of individual and firm-level characteristics shaping KSTE&I.

The first paper by Coad (2025) provides a comprehensive examination of the distinctions between university and corporate entrepreneurship, comparing University Startup Entrepreneurs (USEs) with Corporate Startup Entrepreneurs (CSEs) through various theoretical lenses. The analysis reveals that USEs are primarily motivated as opportunity entrepreneurs, whereas CSEs are more inclined toward lifestyle entrepreneurship. A key challenge for USEs is transitioning from a scientific mindset to one emphasizing commercial value. In contrast, CSEs typically have closer customer connections and a more direct path to commercialization. The paper also explores how USEs can overcome their challenges to transform inventions into commercial success, such as by adopting lean startup methodologies to better engage with market dynamics and customer needs. Despite often enjoying a supportive ecosystem, including substantial encouragement and resources from their affiliations such as universities, USEs frequently lack proactive encouragement to embrace market testing and customer validation. The paper suggests that policy adjustments, where technology transfer offices (TTOs) and similar institutions take an active role, could push USEs towards developing a more commercialization-focused entrepreneurial identity. These insights have important implications for KSTE&I, highlighting that barriers to knowledge commercialization may stem from a lack of a commercial mindset among individual entrepreneurs.

The second paper by Civera, Vismara, and Schenkenhofer (2025) explores how knowledge spillovers drive innovation within dynamic clusters, focusing on how different firms absorb and utilize external knowledge. They develop a taxonomy categorizing firms into five types—innovative startups, academic spin-offs, corporate spin-offs, unicorns, and hidden champions—highlighting variations in how scholars apply the knowledge spillover theory of entrepreneurship (KSTE). The study finds that while KSTE&I describes how firms acquire knowledge, the dimensions emphasized vary by firm type. By identifying that different firms rely on distinct knowledge sources and follow different pathways for spill-

overs, the study advances our understanding of the role of different types of firms in innovative ecosystems. Building on their analysis, the authors suggest complementing KSTE with other theoretical perspectives, such as the resource-based view, the competency-based perspective, and evolutionary theory.

The final paper of this theme cluster by Aronica et al. (2025) investigates the relation between knowledge spillovers and the risk of firms' failure after they enter the market, using data from the Italian manufacturing sector. The authors investigate the risk of market exit of a sample of 9,791 firms founded in 2017 over a six-year period. They found that high-tech firms face increased risks of failure after entering the market. Furthermore, the study finds that inter-industry spillovers, which denote the variety within the local economy, moderate this risk. In contrast, intra-industry spillovers (the industrial specialization of the local economy) have the opposite effect. The paper advances KSTE&I by providing new evidence on how intra- and inter-industry spillovers affect the survival of new firms. While spillovers can help firms enter the market and provide initial benefits, they can also pose significant risks to firm survival later on. The reason for this is that established firms are both sources of valuable knowledge, spillovers that help new entrepreneurs and strong competitors to these new firms. Overall, the study demonstrates that the effects of knowledge spillovers are contingent on both the technological nature of firms and the specific characteristics of their local industrial environments.

Our second cluster theme represents new micro- and macroeconomic conditions and technology shaping *the* KSTE&I, such as as Artificial Intelligence (AI) and the Sustainability Development goals (SDGs).

The first paper by paper by D'Alessandro et al. (2025) investigates the relationship between regional AI knowledge stocks and the emergence of newly established innovative ventures across European NUTS-2 regions. Utilizing fixed-effect regressions with Poisson and Negative Binomial models, the paper confirms that regional AI knowledge boosts innovative startup activity within AI-centric industries. These findings validate the benefits of a balanced AI knowledge stock in fostering entrepreneurial opportunities, specifically in the AI sector. However, the influence of AI does not extend to non-AI sectors, indicating its limited role as a general enabler at this stage. The research highlights the importance of sector-specific dynamics and absorptive capacity, suggesting that AI's impact is predominantly strong in regions already engaged with AI technologies. This nuanced understanding of AI's enabling role could inform regional strategies for fostering innovation and economic development within and beyond AI-specific fields, guiding more effective policy formulations to leverage AI's full potential. Overall, their study extends the KSTE&I by illustrating that local AI knowledge stocks serve as focused enablers for initiating innovative ventures specifically within AI-related industries, reinforcing that knowledge spillovers are significantly technology-specific and regionally impactful.

The second paper by D'Amico et al. (2025) examines how Artificial Intelligence (AI) adoption influences firm innovation through various knowledge collaborations, using data from 14,143 UK firms with 24,017 firm-year observations from 2004 to 2020. It finds that AI adoption enhances innovation performance when complementing a firm's own R&D investments. The study further finds that the impact of AI adoption varies with the type of knowledge collaboration. While the impact of AI adoption in collaborations with universities and government is minimal, there are benefits in innovation outcomes when collaborating with suppliers, customers, and consultants. Overall, this study enhances KSTE&I by

suggesting that AI adoption modifies the way knowledge is shared between partners. The findings that AI adoption does not equally improve innovation performance for all collaborators imply that the effectiveness of knowledge spillovers depends on both the technology used and the types of collaboration involved.

The third paper by Khlystova and Kalyuzhova (2025) explores KSTE&I in the context of resource-rich countries. The study highlights that in resource-rich countries, the knowledge filter—the gap between knowledge creation and commercialization—can be particularly thick due to dependencies on extractive industries. Through a systematic literature review, the authors identify key enabling factors for inbound and outbound knowledge spillovers and innovation in these economies. These factors include conditions and practices relevant to outbound knowledge spillovers, such as knowledge exchange, new partnerships and collaborations, infrastructure development, urbanization, and skilled labour mobility. Similarly, inbound knowledge spillovers are influenced by the absorptive capacity of firms, university-industry collaborations, effective government interventions, and technology adoption. Another key contribution of this paper is its emphasis on the need to consider both economic development and sustainability within the KSTE framework, as resource-rich countries increasingly seek to balance resource dependence with long-term innovation capacity.

The final paper in this cluster, authored by Colombelli et al. (2025), examines the interplay between knowledge availability and green innovation, extending KSTE&I by integrating demand-side factors. Utilizing a novel and flexible AI-driven methodology to identify green startups from the Italian Registry of Innovative Startups, their province-level econometric analysis reveals that green demand is critical in fostering innovative green startups and boosting local knowledge spillovers. The study also indicates that the overall size of the local knowledge stock, rather than its specific green attributes, has a stronger association with green entrepreneurship. Based on this, the authors argue that green demand softens the Knowledge Filter, facilitating entrepreneurs' ability to capitalize on knowledge spillovers into new businesses due to improved short-term expected returns on innovation investments. Overall, the paper highlights the importance of considering both supply- and demand-side factors in entrepreneurial ecosystems to support sustainable economic development.

The third cluster theme describes the effect of context for the KTSE&I. First, the paper by Barboza et al. (2025) investigates the impact of Multinational Enterprises (MNEs) and Foreign Direct Investment (FDI) on regional economic growth in emerging markets, focusing specifically on technology transfer and the development of local Specialized Exporting Companies (SECs). The study utilizes data from 652 exporting companies in Costa Rica, a small and open economy, spanning from 1990 to 2022. It examines how FDI by MNEs contributes to both intra- and inter-industry knowledge spillovers and fosters the development of a domestic SEC entrepreneurial sector. The authors argue that active FDI by foreign MNEs into emerging markets serves as a conduit for advanced technology transfer and knowledge spillovers, which are crucial for the development of local SECs and thus promote economic progress in the host country. The findings provide empirical evidence for the relevance of KSTE for emerging markets. The results further suggest that the effects of FDI are asymmetric between intra- and inter-industry spillovers, presenting important insights for policymakers on optimizing FDI strategies to enhance the beneficial impacts of FDI on the local economy.

The second paper in this cluster by Lavoratori and Driffield (2025) investigates the role of institutional roles in enhancing knowledge spillovers, focusing specifically on multinational enterprises (MNEs) and their interaction with domestic firms through knowledge transfer processes. The authors posit that robust institutions do more than just facilitate multinational operations; they also enable domestic companies to better absorb knowledge and technologies. Contrary to the traditional view that suggests a linear positive relationship between the quality of institutions and the efficacy of knowledge transfer, this paper introduces the concept of an optimal institutional quality level, proposing that beyond a certain point, the relationship between institutional quality and the effectiveness of foreign direct investment (FDI)-induced spillovers takes the shape of an inverted U. The authors test their hypothesis by drawing on a comprehensive dataset comprising approximately 1,300 investment initiatives by 621 MNEs across the automotive and computer sectors, sourced from Moody's Orbis-Cross Border Investment database, spanning 201 cities in 30 emerging markets. The results support the hypothesis inverted U-shape relationship between local institutional quality and observed spillover effects.

Finally, our fourth theme cluster presents new, complementing concepts for the KSTE&I.

The first paper by Audretsch and Lehmann (2025) extends the knowledge spillover theory of entrepreneurship (KSTE) by incorporating the role of narratives in aligning individuals with specific locales. The authors argue that KSTE primarily outlines how geographical differences in economic activity are driven by new enterprises that capture and utilize knowledge spillovers. However, it falls short of detailing the mechanisms behind sustainable agglomeration effects. To address this, the authors introduce the knowledge spillover narrative theory of entrepreneurship (KSNTE), arguing that narratives attract external talent and enhance regional reputations as entrepreneurial hubs. By linking the spread of these narratives to epidemiological models, the paper demonstrates that just as narratives historically transformed places, like San Francisco from sparse fields into bustling hubs, modern narratives about a locale's untapped potential can similarly transform its economic landscape. The paper describes this process through a 'matching production function' where narratives serve as the conduit for attracting and retaining talent, thereby enhancing the local economic and entrepreneurial fabric. Based on these findings, the author encourages future research to draw on narrative entrepreneurship to investigate why some places might outperform others.

The second paper by Vivona et al. (2025) develops a theoretical framework for reverse knowledge spillovers (RKS), exploring how knowledge from the private sector can trigger entrepreneurship within the public sector. While research on private-sector entrepreneurship is well established, public-sector entrepreneurship remains relatively underexplored. Drawing from KSTE&I, public-sector entrepreneurship, and open innovation, the authors develop a model that captures critical components of RKS, including key actors, innovation types, proximity dimensions, and knowledge transfer mechanisms. Their analysis highlights the broader practical and policy implications of RKS, emphasizing the need for stronger collaboration between private and public entities to foster innovation.

The third paper by Tsvetkova and Partridge (2025) contributes to KSTE&I by highlighting the significance of incremental knowledge spillovers in driving business performance. The authors propose that companies located in areas with a tightly integrated industrial framework are more adept at assimilating, merging, and utilizing incremental knowledge, even in situations where R&D capabilities are limited. The emphasis of this contribution is

on the transition from radical to incremental knowledge flows as a vital driver for business success. The research utilizes data from 3,055 counties across the continental United States for the years 2001 to 2013. The results indicate that particularly single-unit firms and those in non-metropolitan areas benefit from cohesive industrial structures, which likely enhances knowledge diffusion. The study also confirms a positive relationship between the cohesion of local industries and regional economic indicators like employment and income growth, suggesting that local industrial cohesion fosters greater business competitiveness.

The final paper by Antonelli and Pialli (2025) adopts the knowledge cost approach as a comprehensive framework to account for endogenous technological change. The authors argue that the knowledge cost approach offers an alternative framework to the New Growth theory, which assumes that underutilized knowledge spilling over from its creators benefits all firms within the region equally. In contrast, the knowledge cost approach emphasizes the localized and context-specific impacts of knowledge spillovers that predominantly occur in high-quality innovation systems. In such systems, if the acquisition and assimilation of knowledge are more cost-effective, the overall cost of knowledge dips below equilibrium levels. Using a sample of 192 European regions for which we estimate productivity growth for the period from 2005 to 2020 this paper contributes to KSTE&I theory by advancing the knowledge cost approach as a more context-sensitive alternative to New Growth Theory. The study demonstrates that regions with lower costs of acquiring and assimilating knowledge experience significantly higher Total Factor Productivity growth due to more effective integration of knowledge into innovation systems.

7 Future research of KSTE&I

There is a growing recognition that KSTE&I is increasingly shaped by shifts that extend beyond traditional assumptions of place, technology, and appropriability. Digitalization, smart city dynamics, and rising geopolitical tensions are transforming the context in which KSTE&I unfolds, and how. We now outline four emerging research directions for advancing KSTE&I.

7.1 New types of entrepreneurs and firms

Contributions in the special issue highlight the interplay between KSTE&I and different individual and firm-level characteristics. The paper by Civera et al. (2025) encourages future research how different firm types, such as social entrepreneurship and digital entrepreneurship, absorb and utilize knowledge spillovers (Gambardella et al., 2021). There is a need to consider that different types of entrepreneurs and firms might focus on different outcome variables such as growth, survival, and impact. This leads to need to better for the role of different types of knowledge in the entrepreneurship process. For example, future studies could focus on company forms such as academic spinoffs, where the lifecycle has only been partially investigated (Clarysse & Moray, 2004; Rasmussen et al., 2011).

Building on Coad's (2025) study, further insights are also needed to understand what characteristics of the "knowledge filter" prevent different types of entrepreneurs and businesses, such as University Startup Entrepreneurs (USEs), from reaching their full potential. Coad's study calls for closer investigation into academics' attitudes toward managerial and

promotional roles, their tendency to avoid bureaucratic procedures, distinct working styles, and approaches to problem-solving. Given the fundamental differences in organizational culture and individual motivation, future studies might explore whether USEs and other firm types face competitive disadvantages if their knowledge filter limits their entrepreneurial opportunities.

Finally, future research is needed to understand better what barriers different entrepreneurs and firms face. Indeed, local incumbents whose knowledge spillovers created conditions that favored new firm creation may become threats to their survival. This duality arises because incumbents serve as both sources of valuable knowledge spillovers that foster entrepreneurship and as well competitors to newly established firms. The negative impacts of KST&I are less understood. The paper by Aronica et al. (2025) highlights this issue, suggesting that spillovers may have side effects on certain firms. Future research could investigate further the winners and losers of KSTE&I.

7.2 New conditions

New conditions, most notably Artificial Intelligence (AI) and sustainability, will affect KST&I. The studies by D'Alessandro et al. (2025) and D'Amico et al. (2025) show that AI, as a General-Purpose Technology (GPT) will impact KIST&I. It not only accelerates the diffusion of knowledge across regional and industrial boundaries, fostering new entrepreneurial ventures (Colombelli et al., 2024), but it also will impact how firms absorb knowledge. A promising avenue of research can combine the KSTE&I approach with innovation studies specifically to study the drivers, nature and the implications of knowledge diffusion in the age of AI. Furthermore, the interplay between AI and KSTE will likely emphasize the role of regional specialization and multi-specialization in shaping competitive advantages. AI might serve as a new vehicle for transforming tacit knowledge into commercial innovations, reinforcing the importance of place-based strategies that enhance localized knowledge spillovers (Cavallo et al., 2023). But the processes how this will occur, as well as how it will impact the role of policymakers, universities, and businesses in fostering innovative ecosystems, needs future research. Furthermore, as AI's influence on labor markets and productivity deepens, KSTE&I will need to address the broader socio-economic implications of AI-driven entrepreneurship, including job displacement, workforce reskilling, and ethical considerations in innovation.

The studies by Khlystova and Kalyuzhova (2025) and Colombelli et al. (2025), provide insights into the link between sustainability and KSTE&I. Future studies may examine the institutional conditions that foster or hinder knowledge spillovers as economies transition towards more sustainability and meeting the United Nations Sustainable Development Goals (SDGs) (COP 28, 2023). One of the limitations of the KSTE&I approach is its exclusive focus on supply-side factors. Colombelli et al. (2025) expand the scope of the KSTE by integrating both supply- and demand-side factors. Their broader approach enhances our understanding of how technological and market opportunities, including the demand for more sustainability, translate into entrepreneurial activity. Their framework provides a more comprehensive view of the push and pull dynamics, which can be used in future research.

Moreover, KSTEI research would benefit from focusing on the interplay between knowledge spillovers, sustainability, and digital transformation. The next decade of research could also explore how digital platforms and big data analytics facilitate knowledge spillovers

across industries, particularly in sectors critical to sustainability such as renewable energy, and extractive industries. AI-driven predictive analytics, automation, and machine learning could bridge knowledge gaps and facilitate cross-sector innovation (Jha & Basu, 2025). Future KSTE&I research should also focus on identifying optimal policy mixes to foster spillovers and positive externalities (social and environmental).

7.3 The role of MNCs

Research has highlighted the role of foreign MNCs as a catalyst for KST&I (Barboza et al., 2025; Lavoratori & Driffield, 2025). Embracing emerging economies and their unique conditions is a promising research direction for the KSTE framework. FDI benefits are not automatically or evenly distributed across regions, sectors, and workers (Barboza et al., 2025). Furthermore, according to Lavoratori and Driffield (2025), researchers need to recognize that there are two elements to spillovers: the "supply" of knowledge, which, for example, can be provided by inward investors, and the ability of local firms to absorb it. Existing literature has often focused on one element or the other, and future research could consider the multi-dimensional nature of knowledge transfer.

Geopolitical tensions, digital technologies, AI, and climate change add new layers to FDI policy considerations. These external forces remain underexplored. They might lead to fundamental reconfigurations of global trading relationships. Research could explore how MNC responses to changing tariffs, regulatory, and sustainability demands shape KSTE&I.

7.4 Complementing concepts

Contributions in this special issue highlight opportunities for KSTE&I to draw on complementing theoretical perspectives, such as the New Growth Theory (Antonelli & Pialli, 2025), or methods, such as using narratives (Audretsch & Lehmann, 2025), or more nuanced conceptualization, such as reverse (Vivona et al., 2025), or incremental spillovers (Tsvetkova (Tsvetkova & Partridge, 2025). Audretsch and Lehmann (2025) call for the need to empirically analyse different narratives and stories told, both the good and the bad, as individual narratives and stories might be too exaggerated and are based on fake instead of reliable information (Eliaz & Spiegler, 2020). Tsvetkova and Partridge's (2025) study on incremental knowledge spillovers provides a foundation for future research to investigate how KSTE&I might change the fates of lagging regions. Scholars and policymakers will benefit from understanding how knowledge gradually spills into non-agglomerated regions. When knowledge flows freely, it also enables distributed innovation ecosystems—likely driven by incremental innovation in non-urban regions.

Traditional views of knowledge spillovers are evolving to recognize multidirectional flows across different types of actors and industries, such as the public and private sectors (Vivona et al., 2025). Such multi-stakeholder perspective would also allow to consider finance as a foundational yet underexplored role. Schumpeter (1934) highlighted the innovative banker as essential to selecting and funding entrepreneurs while later stressing corporate self-financing in *Capitalism*, *Socialism*, *and Democracy* (1942). This shift raises ethical, regulatory, and methodological questions. Future research could explore knowledge creation in cross-sector collaborations—such as smart cities—where diverse actors co-create solutions. Applying new lenses, such as the RKS lens, can provide insights into

how multidimensional flows drive entrepreneurship's economic and social impact, expanding the scope of KSTE&I.

The *raison d'être* of any theory is to provide a deep and profound explanation and understanding of a phenomenon that is not only important, but also remains beyond the grasp of full understanding by the scholarly community. Thanks to the KSTE&I, two perplexing paradoxes confronting scholars have been resolutely resolved. The first is the vigorous innovative activity exhibited by new and small firms. Theories emphasizing the importance of resources, such as the resource-based theory of the firm in management and the model of the knowledge production function of innovation in economics would seemingly have predicted exactly the opposite, given the paucity of knowledge resources in new and small firms vis-à-vis their larger and more established counterparts. The second paradox revolves around one of the most basic tenants in the academic field of entrepreneurship – why would people chose to start a firm even when they are enjoying employment in a successful legacy company? The answer provided by the knowledge spillover theory of entrepreneurship suggests that if they have knowledge and ideas that remain unappreciated and not commercialized in the organizational context of the legacy corporation, they may choose to become an entrepreneur to appropriate the economic value of that knowledge. Thanks to this Special Issue, there are a plethora of additional contributions building on these two fundamental insights emanating from the knowledge spillover theory. The insights provided in this Special Issue pave the way for new and unprecedented applications as the analytical lens provided by the Knowledge Spillover Theory of Entrepreneurship is brought to bear on new and important contexts. So, what is the Knowledge spillover theory of entrepreneurship and innovation? As poet said:

"Somehow the genetic, becomes merely tangential, and the answers are both prophetic and self-referential,

I guess, that's by design, this is us dreaming with wide open eyes,

this is us looking, at one another as mirrors, and what we find is clearance"

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Author contributions This study contributes to the field of entrepreneurship and innovation by revisiting and extending the Knowledge Spillover Theory of Entrepreneurship (KSTE) and introducing its evolution into the Knowledge Spillover Theory of Innovation (KSTE&I). It synthesizes decades of research on how underutilized knowledge from universities and incumbent firms fuels entrepreneurial activity and innovation, highlighting the shift from firm-centric to ecosystem-level dynamics. It introduces recent contributions and integrates foundational frameworks (e.g., MAR and Jacobs externalities), explores intrapreneurship, digital transformation, and regional innovation systems, and proposes a unified theoretical lens that accommodates multilevel, interdisciplinary, and digitally enabled mechanisms of knowledge transfer. It also outlines future research directions beyond geography, technology, and appropriability, offering a comprehensive agenda for advancing theory and policy in innovation-driven entrepreneurship.

Data availability No datasets were generated or analysed during the current study.

Declarations

Conflict of interest The authors declare no competing interests.

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