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TCKF-Connect: A Cross-Disciplinary Conceptual Framework to Investigate Internationalization within the Context of Entrepreneurial Ecosystems

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Abstract: This conceptual paper examines the still under-researched phenomena associated with internationalization within the context of entrepreneurial ecosystems. Drawing on multiple literature streams, I develop TCKF-Connect, a cross-disciplinary conceptual framework to investigate how entrepreneurial ecosystems become globally connected, and how, in turn, an ecosystem's global connectedness can drive and sustain the internationalization processes of innovative start-ups. I propose a distinction between entrepreneurial ecosystems' connectivity and ecosystems' connectedness, where the former is purported as a necessary but not sufficient condition to achieve the latter. The framework developed revolves around the role played by a specific "vehicle" of connectivity across entrepreneurial ecosystems, i.e., temporary clusters, as conceptualized by Maskell, Bathelt and Malmberg and focuses on the role of knowledge flows within temporary clusters and across the entrepreneurial ecosystems where the temporary clusters are nested. The cross-disciplinary conceptual framework developed contributes to both research and policy debates by underpinning the investigation of research questions to further our understanding of the interplay between internationalization of entrepreneurial ecosystems and internationalization of the start-ups nested within them. The article proposes a research agenda emanating from the application of the cross-disciplinary conceptual framework developed and suggests a methodology for the empirical investigation.

Keywords: clusters; temporary clusters; entrepreneurial ecosystems; start-ups; internationalization; connectedness; connectivity

1. Introduction

Both governments and business communities around the world have recently embraced the development of entrepreneurial ecosystems to foster international entrepreneurship and global innovation [1–7]. The phenomenon saw a significant spike following Isenberg's influential *Harvard Business Review* article that drew the attention on a "global start-up revolution" taking place in entrepreneurial ecosystems around the world [8]. Isenberg's article [8] reached and resonated with a wide audience within as well as outside academia and has since generated a wealth of academic as well as practitioners' research aimed at shedding light on how entrepreneurial ecosystems function and evolve over time, not only insofar as they provide a support structure that facilitates the emergence and growth of start-up firms [9–22], but also because the diverse actors that operate within an entrepreneurial ecosystem are acknowledged as active contributors to the processes by which firms *recognize* and subsequently exploit entrepreneurial opportunities [23]. Moreover, as it has recently been argued that entrepreneurial opportunities can be created within the context of the mutual relationship between an individual entrepreneur and the community in which he/she is a part [24], it follows that entrepreneurial ecosystems can also be the context where entrepreneurial opportunities are *created*

by start-up founders and/or *co-created* as a result of the relationship between an individual start-up founder and other start-up founders as well as within the context of the relationship between a start-up founder and other ecosystem actors [23].

Moreover, the growing interest in "how to build an entrepreneurial ecosystem in your city" spearheaded by the highly popular and influential book by the same title by Feld [25] drove the commitment to develop entrepreneurial ecosystems around the world on the part of policy-makers as well as of a broad range of other stakeholders. The phenomenon led many governments at the national, state and city level to shift from policies focused primarily on enhancing the competitiveness of large corporations to policies supporting the creation and nurturing of vibrant entrepreneurial ecosystems [9], expected to be conducive to the emergence of fast-growing innovative new ventures [26] ultimately enhancing the economic performance of their respective cities, regions and states in terms of job creation and higher prosperity and standard of living [9].

The importance of connectivity in *entrepreneurial ecosystems* (sometimes referred to as *entrepreneurship ecosystems* or, when made primarily of start-up firms, *start-up ecosystems*) is paramount as the entrepreneurial ecosystem construct is itself conceptualized as a "set of interconnected entrepreneurial actors" [6] (p. 5), whereby actors include organizations such as start-up firms, start-up accelerators, venture capitalists and institutions such as public sector's agencies and universities. Indeed, a high level of connectivity among actors within an entrepreneurial ecosystem has been widely acknowledged as quintessential to the effective working of the ecosystem and to its growth over time [6,13]. However, whilst extant research is focused on the internal functioning of entrepreneurial ecosystems, interactions among ecosystems are still largely underexplored [27].

As a consequence, what is now gaining traction as domain for scholarly research is connectivity *among* entrepreneurial ecosystems, as recent empirical evidence suggests that globally connected start-up ecosystems grow faster and perform better than less connected ones, across a number of metrics [2]. In particular, a high level of "*global connectedness*" or "*global connectivity*" achieved early in the start-up ecosystem lifecycle enables the ecosystem to tap into knowledge, capital and talent on a global scale, facilitating the development on the part of innovative start-ups of sustainable business models and of globally-attractive product and service offerings [28], enabling them to access global customers shortly after inception [2]. In so doing, an ecosystem's high level of global connectivity/connectedness can lead to the emergence within it of entrepreneurial start-ups that from or shortly after their founding derive a substantial proportion of their revenues from the sale of products in multiple international markets, characterized as *Born Globals* [29,30]. Moreover, by tapping into resources on a global scale, a globally connected entrepreneurial ecosystem can also enable the start-ups that operate within it to extend their international scope to a broader range of value chain activities via offshoring and international procurement and outsourcing, in so doing leading to the emergence within it of another typology of early and rapidly internationalizing firms, namely *International New Ventures* [31]. Indeed, firms operating in foreign markets via an array of downstream as well as upstream international activities across the value chain from a *very early date* from their inception would develop a global scope of operations and a broad and diverse geographic footprint, characterizing them as *International New Ventures*, as these are defined as "business organizations that, from inception, seek to derive significant competitive advantage from the use of resources and sale of outputs in multiple countries" [31] (p. 49).

Indeed, research investigating the relationship between entrepreneurial ecosystems' evolution over time and firms' (international) behaviour has recently been advocated [32]. Hence, it is important to look into the "vehicles" enabling the establishment of an entrepreneurial ecosystem's connections with other ecosystems around the world and to gain insights on the way how such "vehicles" operate to drive and sustain over time the extent of such global connectedness. Drawing on multiple literature streams, this theoretical article proposes TCKF-Connect, a cross-disciplinary conceptual framework that enables the investigation of a research agenda addressing both of these calls.

The article is organized as follows. Firstly, I set the scene introducing an overview of the literature that led to the identification of the under-researched area that this paper addresses. Secondly, drawing on the literature streams examined, I present TCKF-Connect, the cross-disciplinary conceptual framework I developed in order to investigate how entrepreneurial ecosystems become globally connected and how, in turn, an ecosystem's global connectedness can potentially drive and sustain the internationalization processes of innovative start-up firms. Thirdly, I identify and discuss the specific research questions that the conceptual framework TCKF-Connect developed brings to the fore. Fourthly, I propose a research methodology to address the research agenda identified. The article concludes with a discussion of the significance of the research that can be conducted applying the conceptual framework TCKF-Connect developed, in academia as well as for policy-makers, practitioners and society at large.

2. Literature Overview

The under-researched phenomena associated with internationalization within the context of entrepreneurial ecosystems have been identified by conducting an extensive review of the International Business and Strategy literature on firms' internationalization and of the Entrepreneurship and Economic Geography literature on entrepreneurial ecosystems. In addition, the extant literature on industrial districts, clusters and innovation ecosystems was also reviewed as it was seen as linked to the entrepreneurial ecosystems' literature [26]. Moreover, it was also suggested that the findings accrued over several decades of research on these related constructs, if adequately reinterpreted, can be useful in advancing the understanding on how entrepreneurial ecosystems work [9].

The integration of the above literature streams revealed that the literature on the internationalization of firms within entrepreneurial ecosystems is quite scant and that the literature on the internationalization of entrepreneurial ecosystems is currently in its emergent phase. Moreover, the literature review conducted enabled the identification of the opportunity to make a pioneering contribution to the understanding of the interplay between the above two phenomena, whose investigation appears to still be in its nascent stage.

In fact, extant research on the influence of place and space on the emergence and in particular on the evolution and international expansion over time of new entrepreneurial ventures is not only scarce [28,33], but also primarily focused on the role played by clusters and industrial districts [34–41] that, despite some similarities, are conceptually different from entrepreneurial ecosystems [42]. In fact, industrial districts are place-based socio-economic entities [43] characterized by a single dominant industry whereby a significant number of small and medium-sized firms specialize in different stages of the same production process [44] and are therefore connected by substantial inter-firm linkages [45]. As a consequence, unlike what happens within entrepreneurial ecosystems, firms operating within an industrial district can benefit from a broad range of "Marshallian" external economies [46] originating from the firms' geographic concentration and sectoral specialization [44]. The related construct of (permanent) cluster is, in the conceptualization provided by Porter [47], a "geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities" [47] (p. 16). On the other hand, an innovation ecosystem is a multi-actor entity defined by the functional goal of fostering technology development and innovation and consisting of a complex network of relationships established among a diverse range of actors who share the common goal [48]. Indeed, recent reviews of the literature on firms' internationalization patterns advocate research to be undertaken to shed light on how industrial districts, clusters, and even more so, entrepreneurial ecosystems, advance the internationalization goals of young firms [49–51].

As for the internationalization of the ecosystem itself, i.e., the processes through which entrepreneurial ecosystems become globally connected, to date very little academic research explores these phenomena (e.g., Carvalho, Camacho, Amorim and Esperança [52] that, technically, focuses on the internationalization of a single ecosystem actor, i.e., a start-up accelerator program, rather than that of the ecosystem as a whole). Indeed, most of the extant literature heavily focuses on the connections

established across other types of spatial agglomeration of firms—again, primarily *clusters* and *industrial districts*, rather than *entrepreneurial ecosystems* [53–57]—and/or focuses on the connections created due to the flows of physical goods linked to the establishment of Global Value Chains primarily on the part of large multinational firms—and, hence, they are examined through a Supply Chain lens. However, a quite substantial stream of research focuses on the flows of *knowledge* (rather than of physical goods) across space but, again, either in the context of *clusters* [58,59] rather than in *entrepreneurial ecosystems* or in terms of multinational corporations' intra-firm knowledge transfers across borders, i.e., within the context of a single organisation operating across a number of different country locations, that which makes such knowledge flows affected by a peculiar set of purposes and of promoting and hindering factors [60]. The paucity of literature on knowledge flows across entrepreneurial ecosystems highlights a significantly under-researched area whose advancement TCKF-Connect, the conceptual framework presented in this article, aims to contribute to.

3. Towards a Cross-Disciplinary Conceptual Framework

As mentioned above, this article highlights and addresses the need to look into the "vehicles" enabling the establishment of an entrepreneurial ecosystem's connections with other ecosystems around the world and to gain insights on how such "vehicles" operate to drive and sustain the extent of such global connectedness over time, potentially fostering the internationalization processes of start-up firms.

In today's knowledge economy, knowledge is of critical importance and its fundamental role in shaping competitiveness of firms, industries and countries is uncontested [61]. Hence, it is important to investigate the specific "vehicles" through which knowledge flows, as opposed to flows of physical goods, enable the establishment of an entrepreneurial ecosystem's connections with other ecosystems around the world (i.e., what in this article is labelled connectivity) and to gain insights on how such "vehicles" operate to drive and sustain over time the extent of the ecosystem's global connectedness, and, in turn, potentially also the internationalization of start-up firms.

Previous studies on knowledge flows have looked at transfers of codified knowledge, especially technical knowledge; for example, Mudambi, Mudambi, Mukherjee and Scalera [55] analysed the global connectivity of the polymers cluster in Northeast Ohio using patent data from the US Patent and Trademark Office (USPTO). In the development of a cross-disciplinary conceptual framework I embrace a broader perspective, encompassing technological as well as other types of knowledge (e.g., market knowledge, trade knowledge, consumer knowledge, etc.), including both codified and tacit knowledge. Moreover, the broad conceptualization of knowledge embraced also includes knowledge exchanged in informal and unofficial ways and knowledge that is co-created within temporary clusters. The focus is on people as knowledge carriers and vehicles of knowledge transfers and on the social and environmental conditions that, within the chosen context of temporary clusters, enable, facilitate or hinder knowledge sharing, knowledge co-creation and outward knowledge transfers generating and sustaining connectivity across ecosystems.

The specific "vehicle" this paper identifies and focuses on is represented by firms' short visits or temporary stays in start-up ecosystems outside of the firms' home country, within programs established and operated by private organizations or facilitated by government agencies at the federal, state or city level. This "vehicle" can be considered as an exemplar of what Maskell, Bathelt and Malmberg [62,63] conceptualized as "Temporary Clusters", i.e., connection-creating events or organized programs that imply actors' geographic mobility enabling knowledge connectivity via temporary co-location of cohorts in venues such as trade fairs, conferences and other professional gatherings. Maskell, Bathelt and Malmberg [62] suggest temporary clusters are hotspots of intense knowledge creation and dissemination, of network building and idea generation that enable exchanges of knowledge and the building and utilization of "pipelines", i.e., of connections among "pockets of knowledge" localized in distant part of the world [62]. However, to date very little is known about how these programs foster the internationalization of entrepreneurial ecosystems enabling knowledge transfers

across ecosystems that, in turn, can facilitate start-ups' innovation and internationalization. Hence, temporary clusters have been chosen as the "vehicle" and as the "core element" of the cross-disciplinary conceptual framework developed, conducive to a focused research approach and to the formulation of specific research questions. Specific types of temporary clusters appear to be particularly relevant in this context, namely, the co-location of firms within start-ups' incubators and accelerators, typically lasting for several months, and their participation in "foreign trade missions" whereby a cohort of firms is escorted through a program of company visits, seminars and other professional events in a foreign country, that usually last one or two weeks. These types of temporary clusters typically involve co-location of cohorts for periods of time longer than those of trade fairs and conferences, and as a consequence, they can be expected to provide opportunities for more and, potentially, deeper interactions among a more limited number of participants, and hence, more opportunities for sharing and co-creation of knowledge.

Furthermore, whilst extant research is focused on how entrepreneurial ecosystems facilitate the emergence of start-up firms, and in particular, of early internationalizing firms (e.g., [2,28]) qualifying as Born Globals [29,30] and/or International New Ventures [31], less is known about whether and how an ongoing engagement over time with entrepreneurial ecosystems impacts on the evolution of these start-ups as they scale and mature, in particular whether and how such ongoing engagement plays a role in sustaining their early and rapid internationalization processes over time.

This article identifies the need to answer both of these calls, investigating the phenomenon of internationalization within the context of entrepreneurial ecosystems, including both the internationalization of start-up firms operating within the ecosystem and the internationalization of the ecosystem itself. In particular, future research should investigate how entrepreneurial ecosystems become globally connected and how their global connectedness impacts on the international growth dynamics of start-up firms. It is important to note that, while in the literature connectivity and connectedness appear to be used interchangeably as synonyms, I propose and adopt a more fine-grained approach distinguishing between the two. Specifically, in this article *connectivity* is conceptualized in relation to the building and establishment of a connection between two actors and/or two ecosystems, while *connectedness* is expressed in relation to the ongoing state of "being connected", and thus, connectivity is instrumental to connectedness by being a necessary but not sufficient condition to achieve it. As previously mentioned, a high level of connectivity among actors within an entrepreneurial ecosystem has indeed been widely acknowledged as quintessential to the effective working of the ecosystem and to its growth over time [6,13]; however, such connectivity may prove elusive as there is no guarantee it actually translates into connectedness. Therefore, achieving the "ongoing state of being connected" that in this paper is qualified as *connectedness* requires a two-step process: first, the establishment of connectivity, connecting the ecosystem actors with one another (metaphorically speaking, building a "hub-and-spoke" road system), and second, the establishment of actual, ongoing two-way communication flows across ecosystems (metaphorically speaking, "incoming and outgoing traffic on the roads"). Hence, the need to look into both the ways how connectivity can be ensured via the establishment of relationships among actors within and across ecosystems and, more importantly, the ways how the established connectivity can translate into actual, ongoing *connectedness* via two-way movements of knowledge between them, including investigating any conditions and drivers that could potentially lead to such knowledge flows being mostly unilateral, i.e., either primarily inbound or primarily outbound [64].

In particular, the abovementioned objectives are pursued advocating research that investigates the role played by temporary clusters, a specific "vehicle" capable of enabling knowledge transfers across entrepreneurial ecosystems, in so doing fostering the ecosystem's global connectivity and, potentially, also its connectedness and, in turn, impacting on the innovation and internationalization processes of the start-ups operating within them. As previously mentioned, temporary clusters are connection-creating events or organized programs that imply actors' geographic mobility enabling knowledge connectivity via temporary co-location of cohorts in venues such as trade fairs, conferences

and other professional gatherings [62,63] and, as such, are not to be confused with (permanent) clusters as conceptualized by Porter [47] as there are significant differences between the two constructs. In fact, as previously mentioned, according to Porter [47], a (permanent) cluster is a "geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities" [47] (p. 16). What is most relevant to highlight here is the temporal dimension of the construct: what is temporary in a "temporary cluster" is the stay within it of individuals and firms, which can vary from just a few days, as it is the case for trade shows and conferences, to a few weeks for "trade missions" or even a few months for co-location in start-ups' incubators and accelerators. On the contrary, the program, conference or trade show which represents the embodiment of the temporary cluster and hosts the temporary cluster's participants (individuals and the firms they represent) is normally an ongoing entity that operates over longer periods of time.

This ultimately leads to the construction of TCKF-Connect, a cross-disciplinary conceptual framework that contributes to the literature by helping unpack different aspects of the complex phenomena associated with internationalization within the context of entrepreneurial ecosystems, illuminating them from the unorthodox perspective of temporary clusters, identified as "vehicles" of ecosystems' *connectivity* and focusing on knowledge flows as drivers of ecosystems' global *connectedness* (Figure 1).

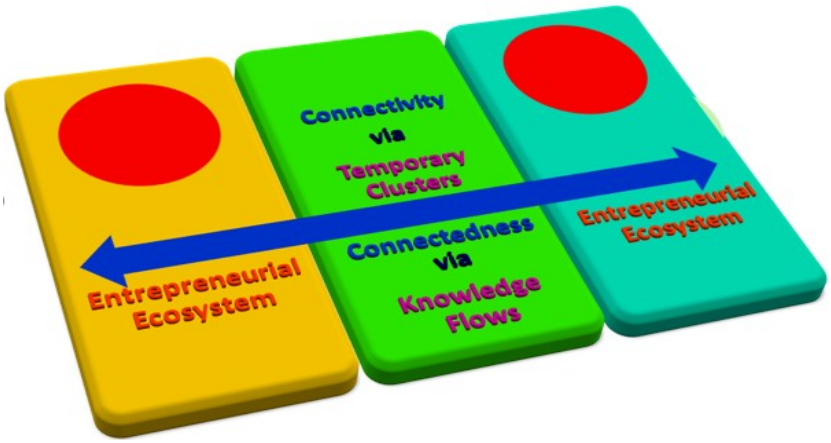

Figure 1. TCKF-Connect (Temporary-Clusters-Knowledge-Flows-Connect), a cross-disciplinary conceptual framework.

4. Proposed Research Agenda

In essence, the broad purpose of the research that the application of the cross-disciplinary conceptual framework TCKF-Connect developed enables is to shed light into how knowledge flows emanating from temporary clusters allow entrepreneurial ecosystems to become globally connected and how the extent of their global connectedness impacts on the internationalization of innovative start-up firms. Ultimately, TCKF-Connect is a cross-disciplinary conceptual framework that allows to shed light on the interplay between the internationalization of an entrepreneurial ecosystem and the internationalization of the start-ups operating within it.

The specific research questions that the application of the cross-disciplinary conceptual framework TCKF-Connect brings to the fore are listed in Table 1 and discussed in the following subsections.

Table 1. Proposed research agenda.

Research Areas	Research Questions	Research Sub-Questions
Internationalization of Entrepreneurial Ecosystems via Temporary Clusters	RQ1—What specific types of knowledge generation and knowledge sharing occur within temporary clusters?	RQ1.1—Which specific types of knowledge are generated within a temporary cluster? RQ1.2—Which specific types of knowledge are shared within a temporary cluster?
	RQ2—How is knowledge generated and shared within temporary clusters?	RQ2.1—What specific social and environmental conditions are conducive to knowledge creation/co-creation within temporary clusters? RQ2.2—Which specific social and environmental conditions are conducive to knowledge sharing within temporary clusters?
	RQ3—How do knowledge outflows originating from temporary clusters connect entrepreneurial ecosystems?	RQ3.1—How does the knowledge acquired, created, co-created and shared within a temporary cluster create connections (i.e., *connectivity)* within and across entrepreneurial ecosystems? Which specific social and environmental conditions enable, facilitate or hinder the establishment of these connections? RQ3.2—What helps sustain connections across ecosystems over time, enabling their *connectedness?*
Internationalization of Start-Up Firms Participating in Temporary Clusters	RQ4—What specific types of knowledge generation and knowledge sharing occurring within temporary clusters facilitates the internationalization of start-up firms?	RQ4.1—How does the knowledge acquired, created, co-created and shared while participating in a temporary cluster within an entrepreneurial ecosystem influence the start-ups' internationalization process?
		RQ4.2—How does the knowledge acquired, created, co-created and shared while participating in a temporary cluster influence the start-up firms' degree of internationalization (DOI) across its three dimensions of scale, scope and speed of Internationalization?
		RQ4.3—How does the knowledge acquired, created, co-created and shared while participating in a temporary cluster within an entrepreneurial ecosystem influence other dimensions of the start-ups' internationalization process over time?
Interplay between Internationalization of Entrepreneurial Ecosystems and Internationalization of Start-Up Firms Participating in Temporary Clusters	RQ5—What is the interplay between the internationalization of an entrepreneurial ecosystem and the internationalization of the start-up firms that operate within it?	RQ5.1—How does the extent of entrepreneurial ecosystems' *global connectedness* impact on the internationalization process over time of the start-up firms that participated in a temporary cluster?

4.1. Internationalization of Entrepreneurial Ecosystems via Temporary Clusters

The application of the cross-disciplinary conceptual framework TCKF-Connect starts with the identification of the specific types of knowledge (technical, market, trade, consumer, etc.) that is *generated* within the context of temporary clusters and of the specific social and environmental conditions that can enable, foster or hinder the creation or co-creation of such types of knowledge in that context.

Then it proceeds with the identification of the specific types of knowledge that are *shared* among the participants in temporary clusters and on the specific social and environmental conditions that are conducive to the sharing of such knowledge or potentially hinder it.

Finally, the focus moves to the knowledge outflows originating from temporary clusters and on the way(s) how they connect with entrepreneurial ecosystems, i.e., how they connect the ecosystem where the studied temporary cluster is located to other ecosystems in other parts of the world. Here, reflecting the distinction I propose between entrepreneurial ecosystems' connectivity and ecosystem's connectedness, the focus is, in the first instance, on the investigation of how connections across ecosystems are created (i.e., the establishment of *connectivity)* and the underlying conditions that enable, facilitate and hinder their establishment. Then, in the second instance, the focus moves to the factors that help sustain connections across ecosystems over time, enabling their ongoing *connectedness.*

4.2. Internationalization of Start-up Firms Participating in Temporary Clusters

The application of the cross-disciplinary conceptual framework TCKF-Connect enables the identification of the specific types of knowledge generation and knowledge sharing occurring within temporary clusters that influence the internationalization process of the participating start-up firms. The investigation can go beyond the impact on start-ups' degree of internationalization (DOI) [65] across its three dimensions of scale, scope and speed of internationalization to also include other dimensions of the internationalization process, in so doing capturing more nuanced aspects of start-ups' international performance.

4.3. Interplay between Internationalization of Entrepreneurial Ecosystems and Internationalization of Start-up Firms Participating in Temporary Clusters

Finally, the application of the cross-disciplinary conceptual framework TCKF-Connect can also shed light on the interplay between the two phenomena, i.e., illuminate whether and how the extent of entrepreneurial ecosystems' global connectedness impacts on the internationalization process over time of the start-up firms that participate in temporary clusters.

5. Proposed Research Methodology

This conceptual paper proposes a methodology to address the research agenda identified applying the cross-disciplinary conceptual framework TCKF-Connect.

Considering that this research area is still under-theorized, I propose a Grounded Theory approach in order to generate theory that is "grounded" in data that has been systematically obtained and equally systematically analysed [66]. In particular, since the purpose of the investigation is to shed light on complex phenomena still largely under-researched, I argue for the proposed study to be conducted adopting qualitative methodologies [67] and to be designed as a multi-method study revolving around the utilization of Grounded Theory as overarching research methodology, operationalized via in-depth interviews and analysis of secondary data in the form of documentary evidence as data collection methods.

The investigation underpinned by the cross-disciplinary conceptual framework TCKF-Connect involves a diverse mix of ecosystem actors, primarily cohorts of start-up firms temporarily co-located across an equally diverse mix of entrepreneurial ecosystems around the world as exemplars of temporary clusters, as conceptualized by Maskell, Bathelt and Malmberg [62,63]. In particular, the research design nests start-up firms and other ecosystem actors acting as "knowledge vehicles" within each temporary cluster across a diverse range of start-up ecosystems, providing information from multiple organizations at multiple levels of analysis [66]. In so doing, the research design reflects the multi-layered nature of the entrepreneurial ecosystem phenomenon, where activities are undertaken at multiple levels and simultaneously influence individuals, firms, industry sectors and regions [9], as well as the multi-faceted and multi-layered social processes underpinning most international business phenomena [68]. Furthermore, since to date, only a limited number of International Business studies have adopted Grounded Theory [68] (e.g., [69]), it is argued that the methodology offers International Business scholars the potential to move the discipline into new territories, "boosting originality, insightfulness and utility of International Business theory" [68] (p. 103) as well as offering the opportunity to interweave multiple research streams from diverse disciplines within the International Business field, that which is exactly what the proposed research is aiming at, i.e., generating theory at the nexus of International Business, Entrepreneurship, Strategy and Economic Geography via the application of the cross-disciplinary conceptual framework TCKF-Connect.

The primary data collection method is represented by semi-structured in-depth interviews conducted with managers of the programs and events representing specific temporary clusters, the start-up founders participating in the chosen temporary clusters and other relevant ecosystems' actors, across a number of ecosystems around the world. I argue for the inclusion in the research of a broad and diverse range of ecosystem actors, from venture capitalists to public and private institutions such

as universities and relevant government agencies at the international, national, state and city level. This is advocated not only to reflect the complexity and heterogeneity of actors/stakeholders that characterize an entrepreneurial ecosystem, but also because, as discussed in the Introduction, such diverse actors play a role that goes beyond the provision of a support infrastructure that can facilitate the emergence and growth of start-up firms (e.g., [9–22]). Indeed, it is argued that the actors that characterize an entrepreneurial ecosystem are *active contributors* to the processes by which firms *recognize* as well as *create* and/or *co-create* entrepreneurial opportunities and, therefore, it follows that they have a role to play in the knowledge creation and dissemination processes that enable connectedness across entrepreneurial ecosystems. In other words, the knowledge flows relevant to advance the research agenda proposed in this article are not limited to those that connect firms across ecosystems, but also include the knowledge flows that connect firms with other ecosystem actors/stakeholders, as well those that connect ecosystem actors (other than firms) among one another. By arguing this, I go beyond the consideration of "knowledge pipelines" as these are conceptualized by Maskell, Bathelt and Malmberg [63] as formations between *firms* and, as such, "knowledge pipelines" are only a sub-set of the broader types of "roads" that I advocate be looked into, to investigate the nature of their "traffic", i.e., the knowledge flows that connect firms with other firms, firms with ecosystem actors and ecosystem actors among one another. The broader yet more fine-grained approach I advocate, capturing the knowledge flows that, by passing through "temporary clusters" [62] connect virtually all types of actors within an entrepreneurial ecosystem is well aligned with the conceptualization of an entrepreneurial ecosystem as a "set of interconnected entrepreneurial actors" [6] (p. 5). Moreover, postulating all ecosystem actors (including firms) to collectively represent the ecosystem as a whole allows a more refined as well as more comprehensive understanding of the *extent* of an entrepreneurial ecosystem's connectedness, as well as of the root causes and drivers of such connectedness.

Consistent with prior research employing grounded theory methodology, the proposed research involves analysis of relevant secondary data in the public domain [70], including news articles, websites and social media entries of start-up firms and of other ecosystem actors. The utilization of documentary information within a Grounded Theory study is also advocated insofar it is a source of useful information about the context within which the research participants operate [71], and, as such, capable of providing valuable data about the environmental conditions that may influence the phenomena being investigated [72]. This would appear to be particularly pertinent given the broad, yet fine-grained approach to the conceptualization of an entrepreneurial ecosystem's extent of global connectedness that I propose above.

Depending upon the specificities of the temporary clusters chosen as settings for the empirical investigation, observation could also be conducted, to complement in-depth interviews as a method for data gathering. In fact, the specific combination of interviews and secondary data analysis is well documented in the qualitative research literature with observation seen as complementary to in-depth interviews of key informants thanks to the opportunity it provides to contextualize the findings within their real-world settings, delving deeper into the environmental factors underpinning decision making, in a variety of settings [70,71]. Such additional insights can be expected to be relevant as studies conducted within the context of (permanent) clusters indicate that the transferability of knowledge among firms within a (permanent) cluster is influenced not only by the nature of the knowledge itself in terms of its degree of tacitness resulting by the occurrence of path dependencies, causal ambiguities and/or social complexities, but also broadly affected by the specific characteristics of the firms involved [73], including their *absorptive capacity* [65], i.e., the firms' ability to learn from the knowledge acquired, assimilated, adapted and applied [73]. Within certain types of temporary clusters, observations could provide first hand insights on the specific type of knowledge generated and exchanged in those settings, including tacit knowledge, and on the specific ways in which knowledge is exchanged, formally or informally, within individual temporary clusters. Indeed, observation has been acknowledged to be particularly useful to researchers aiming to illuminate knowledge exchanges, especially when they are informally conducted and/or involve forms of

tacit knowledge [74,75]. Furthermore, observations could complement in-depth interviews insofar they could allow the researchers to immerse themselves in the culture of each temporary cluster, breathing its atmosphere and gaining on-the-field insights on the social relations among its participants. Such insights can be expected to be valuable to the investigation of the knowledge exchanges occurring within temporary clusters as research conducted on the cross-country flows and transfers of knowledge within multinational corporations suggest that the willingness to share knowledge is associated with the mechanics of interpersonal relations among individuals and on the specific organisational and environmental contextual factors underlying the knowledge-exchange opportunities [76].

The cross-disciplinary conceptual framework TCKF-Connect can be effectively applied in an empirical setting composed of an array of innovative start-up firms nested within *temporary clusters*, in turn nested within a range of diverse entrepreneurial ecosystems across the world.

6. Significance of the Cross-Disciplinary Conceptual Framework TCKF-Connect

The research originating from the application of the cross-disciplinary conceptual framework TCKF-Connect developed is expected to make an original contribution to academic knowledge, as well as to have an impact above and beyond academia, for policy-makers, practitioners and society at large.

The specific expected contributions are summarized in Figure 2 and discussed in the following subsections.

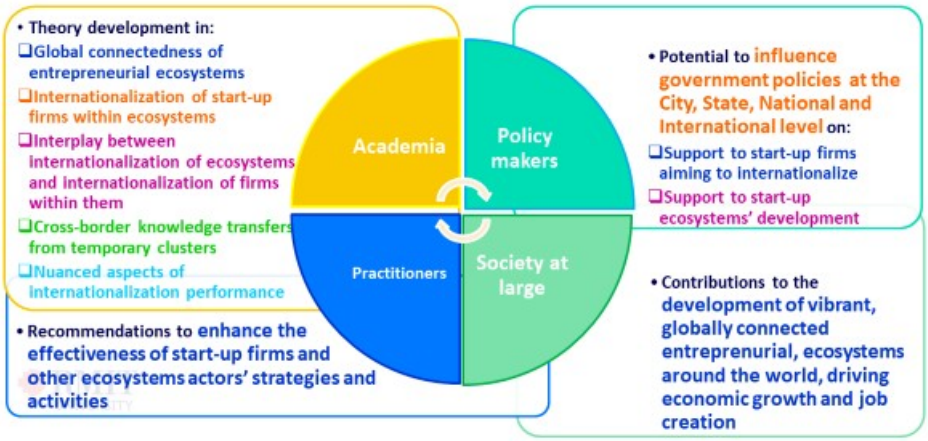

Figure 2. Significance of the cross-disciplinary conceptual framework TCKF-Connect.

6.1. Significance in Academia

As mentioned, the purpose of the research advocated is to shed light on how temporary clusters generate knowledge flows enabling connections (conceptualized in this paper in terms of *connectivity* and *connectedness)* among entrepreneurial ecosystems across the world and on how these knowledge flows are captured and leveraged by start-up firms aiming to expand internationally.

As such, the overarching objective of the research that can be conducted applying the cross-disciplinary framework TCKF-Connect is to make a contribution to theory development in the field of International Entrepreneurship building on the still scant literature on the internationalization of firms operating within entrepreneurial ecosystems. Moreover, the framework TCKF-Connect has also been designed to enable pioneering contributions to the nascent academic literature on the global connectedness of entrepreneurial ecosystems, a phenomenon that, so far, has primarily been investigated empirically by economic and market research organizations, resulting in non-academic publications such as the *Global Startup Ecosystem Report* [1–3].

In addition, by investigating the two-way organization-based linkages between individual firms across ecosystems conceptualized by Maskell, Bathelt and Malmberg [62,63] as *global pipelines* as well as two-way linkages between firms and other ecosystem actors and among actors, the research that

can be conducted applying the cross-disciplinary conceptual framework TCKF-Connect addresses a research question that Reuber, Dimitratos and Kuivalainen [77] recently advocated International Entrepreneurship scholars to answer, i.e., whether and how firms that pursue international opportunities can change the nature of their local or regional context. In so doing, the application of TCKF-Connect embraces the "co-evolutionary view of the dynamic relationships between organizations, places, spaces and people" that was recently identified as a priority area for International Business scholars over the next few years [78] (p. 261).

Moreover, the application of the cross-disciplinary framework TCKF-Connect enables the extension of the extant International Business literature on *cross-border knowledge transfers* that has been traditionally focused on intra-company knowledge transfers within multinational corporations, international joint-ventures and strategic alliances, contributing novel insights originating from the unorthodox contexts of *temporary clusters within entrepreneurial ecosystems.* Furthermore, the research conducted applying TCKF-Connect does so by looking beyond the transfers of technical, codified knowledge investigated in previous studies, embracing a broader, more contemporary perspective that encompasses all types of knowledge, codified as well as tacit, generated, co-generated and shared formally or informally as well as officially and unofficially. What is more, any field work that may be undertaken could also unveil the "human side" of those connections, shedding light on the social and environmental factors that enable, facilitate, sustain or hinder them over time and across locations. This innovative approach deployed within an unorthodox setting has the potential to result in an original contribution to knowledge on *knowledge transferability in an international context.*

Furthermore, leveraging a large number of in-depth interviews with start-up founders from different industries who share a strong intent to take their business global, research conducted applying the TCKF-Connect cross-disciplinary conceptual framework is also well placed to potentially capture nuanced aspects of international performance, that could ideally be encapsulated within a metric going beyond the traditional degree of internationalization (DOI) revolving around the three dimensions of scale, scope and speed of internationalization developed by Zahra and George [65]—and in doing so, answering a call shared by several International Business scholars [79].

6.2. Significance for Policy-Makers

The research originating from the application of the cross-disciplinary conceptual framework TCKF-Connect has significance for both policy-making and policy-implementing agencies at the city, state, national and international level.

Indeed, shedding light on the specific ways how global connectedness of entrepreneurial ecosystems can be enhanced and sustained over time has the potential to generate insights capable of contributing to policy debates around the world, in so doing, influencing national, state and city government policies aimed at stimulating their respective start-up ecosystems' further growth.

Furthermore, investigating how participation in a temporary cluster can facilitate start-ups' innovation, global reach, overall growth and competitiveness has the potential to generate insights capable of influencing national, state and city government policies aimed at stimulating the international expansion and growth of innovative new ventures.

6.3. Significance for Practitioners

Naturally, value is also expected to be directly captured by start-up firms operating within entrepreneurial ecosystems and by other ecosystems' actors, including start-up accelerators, venture capitalists and universities, in the form of recommendations on how to enhance the effectiveness of their internationalization strategies and activities and, in so doing, contributing to increase their ecosystem's overall socioeconomic impact.

6.4. Significance for Society at Large

Last, but certainly not least, in more general terms, the research findings generated by the application of the cross-disciplinary conceptual framework TCKF-Connect are also expected to create value for society at large insofar as they contribute to the development of vibrant and thriving entrepreneurial ecosystems around the world, driving economic growth and job creation at an international level [33].

Ultimately, the overall development of start-up ecosystems around the world, and in particular their enhanced global connectedness can also be expected to entail larger numbers of highly skilled start-up founders, resulting in growing numbers of high-growth, knowledge-intensive businesses that are globally connected and globally competitive.

7. Conclusions

This paper introduces and illustrates TCKF-Connect, a cross-disciplinary conceptual framework developed to investigate the phenomena associated with *internationalization within the context of entrepreneurial ecosystems*, including both the internationalization of entrepreneurial ecosystems as well as the internationalization of the start-up firms that operate within them. Moreover, the paper also includes the research agenda that TCKF-Connect brings to the fore and suggests a methodology for its empirical application.

The cross-disciplinary conceptual framework TCKF-Connect (Temporary-Clusters-Knowledge-Flows-Connect) is developed to address the paucity of research on internationalization within the context of entrepreneurial ecosystems and contributes to the literature by helping unpack different aspects of the complex phenomena under investigation, illuminating them from the unorthodox perspective of temporary clusters, identified as "vehicles" of ecosystems' connectivity and focusing on knowledge flows as drivers of ecosystems' global connectedness. Indeed, the cross-disciplinary conceptual framework TCKF-Connect incorporates a novel, fine-grained conceptualization of entrepreneurial ecosystems' internationalization whereby ecosystems' (global) *connectivity* and (global) *connectedness* are identified as distinct phenomena where the former is purported as a necessary but not sufficient condition to achieve and sustain the latter.

Moreover, being cross-disciplinary in nature, TCKF-Connect is an overarching conceptual framework that combines different perspectives and approaches to the same phenomena, integrating multiple literature streams across International Business, Strategy, Entrepreneurship and Economic Geography and, in so doing, allowing the achievement of a broader as well as a deeper understanding of the micro-foundations of the multi-faceted and multi-layered phenomena under investigation. Versatile in its application, the cross-disciplinary conceptual framework TCKF-Connect can be applied in a diverse range of empirical settings, comprising different combinations of diverse types of temporary clusters nested within entrepreneurial ecosystems across diverse countries around the world.

Finally, the cross-disciplinary conceptual framework TCKF-Connect opens up new avenues for future research, bringing to the fore a research agenda to help advance our understanding of the two phenomena under investigation, as well as of their interplay, highlighting the importance of taking into consideration the social and environmental conditions that characterize the context where these phenomena occur.

After almost a decade of research on entrepreneurial ecosystems, the phenomena related to their internationalization are still understudied and it is hoped that the versatility of the cross-disciplinary conceptual framework TCKF-Connect illustrated in this paper, coupled with the broad research agenda emanating from it, will inspire other scholars around the world to explore this important area of research by applying TCKF-Connect in diverse empirical settings, across a large number of countries around the world. All the more as, for all the reasons listed in Figure 2 and illustrated in Section 6, the research originating from the application of the cross-disciplinary conceptual framework TCKF-Connect is expected to not only make an original contribution to academic knowledge, but to

also have an all-important impact above and beyond academia, for policy-makers, practitioners and society at large.

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