Title

The sum of its parts: examining the institutional effects on entrepreneurial nodes in extensive innovation ecosystems

Abstract

Innovation ecosystems are intricate networks that provide opportunities to access resources, capabilities, and cooperating firms for value-creating knowledge transfer. While the literature has noted the complex nature of diverse innovation ecosystem actors, fewer studies have refined how macro-institutional pressures impact behavioral interactions among diverse entities. The innovation ecosystem research has yet to theoretically refine how micro-level complex components (entities) navigate environments, coalescence, and overcome barriers within varying institutional conditions. Ultimately, each entity behaves and is governed by diverse motivational drivers. Yet, the divergent impacts this has on key behaviors have not been covered by broader-scale empirical studies. Therefore, this study focused on the institutional mechanisms that influence the crucial role of entrepreneurial networking activities in ecosystems. Using a global sample, the study employed a multi-level logistic regression model and data developed from the Global Entrepreneurship Monitor, World Development Indicators, Index of Economic Freedom, and the World Governance Indicators to reveal certain forms of institutional settings that influence collaborative behavior in the ecosystem and entrepreneurial networks' emergence. It emphasizes the need for managers and policymakers to recognize these effects and enact strategies that promote value-creating entrepreneurial network behavior on the individual level to benefit the holistic ecosystem performance.

Keywords: Innovation Ecosystems, Institutional Theory, Entrepreneurial Networks, Innovation Networks, Ecosystem development, Entrepreneurial network emergence

Authors and Affiliation

Gabriel Plata

Durham University Business School

Department of Management

Mill Hill Lane, Durham, UK, DH1 3LB

luis.g.plata@durham.ac.uk

Dr Sebastian Aparicio

Universitat Autonoma de Barcelona

Department of Business

Edifici B, Campus UAB 08193, Cerdanyola del Valles, Spain

And

Centre for Entrepreneurship and Social Innovation Research

(CREIS). Edifici S, Campus Sabadell UAB, C/ Emprius 2, 08202,

Sabadell (Barcelona), Spain

sebastian.aparicio@uab.cat

Dr Stephanie Scott*

Durham University Business School

Department of Management

Mill Hill Lane, Durham, UK, DH1 3LB

s.a.scott@durham.ac.uk

+44 7599 64 3939

*Corresponding Author

1. Introduction

Based on the premise that interdependent firms and ventures can generate mutually beneficial insights, innovation ecosystems offer promising new avenues for producing, distributing, and scaling value-creating knowledge and resources (Adner & Kapoor, 2010; Agarwal et al., 2007; Autio & Thomas, 2014; Finegold, 1999; Shipilov & Gawer, 2020). It provides a conceptual framing for understanding how knowledge appropriation processes can facilitate collaboration and the development of potentially high growth innovations (such as developing new technologies, business models, services, and high growth entrepreneurial ventures) (Aarikka-Stenroos & Ritala, 2017; Agarwal et al., 2007; Autio & Thomas, 2014; Möller et al., 2020). Ecosystems are exemplifications of complex environments for value (co)creation and value appropriation, where diverse *actors* interact establishing collaborative networks towards an innovative outcome (Aarikka-Stenroos & Ritala, 2017; Autio & Thomas, 2014; Jacobides et al., 2018; Russell and Smorodinskaya, 2018; Shipilov & Gawer, 2020). Innovation ecosystems are formed by various complex inter-organizational interactions and dependencies in which different communication channels, resources, and knowledge-exchange activity occur (Aarikka-Stenroos & Ritala, 2017; Adner et al., 2017; Granstrand & Holgersson, 2020; Möller & Halinen, 2017).

Furthermore, relevant *actors* in ecosystems establish value-creating entrepreneurial networks established with other value creators (i.e., established firms, focal firms, platform owners, or other entrepreneurial ventures) (Nambisan & Baron, 2013). Entrepreneurial ventures are considered a vital source of innovation within ecosystemic environments (Adner & Kapoor, 2010; Autio et al., 2014; Jacobides et al., 2018; Li & Garnsey, 2014; Malecki & Spigel, 2017; Nambisan & Baron, 2013; Vargo et al., 2015). The *entrepreneurial networks* form part of the ecosystem(s) (Leendertse et al., 2021; Stam, 2015) as they become bridging entities and conduits for value creating information flows within the ecosystem they participate with (Fernandes & Ferreira, 2021; Shipilov & Gawer, 2020). Akin to research conducted on regional clustering and ecosystems, the value of these networked interactions are often dependent upon various spatial contexts and conditions; c.f., the role of geographies (Bichler et al., 2021; O'Connor et al., 2018; Huggins et al., 2018), co-location observations (Grillitsch & Nilsson, 2015), and industrial proximities (Mattes, 2012) that interact with other proximities (i.e., institutional and social) with mixed and paradoxical implications for the innovation output, the

entrepreneurs, their networks and the ecosystems in which they co-create value (Balland et al., 2015; Boschma, 2005).

These innovation-driven inter-organizational networks have become a cornerstone for the various national economic growth and resiliency agendas worldwide (please refer to the OECD 2016, UK Industrial Strategy 2017, USA Comprehensive Economic Development Strategy, among many others). Embedded within scores of recent political initiatives are clear signals that innovation ecosystems must be identified, supported, and cultivated to ensure innovative outputs are sustained (Dedehayir et al., 2018; Granstrand & Holgersson, 2020; Radicic et al., 2020). Undoubtedly, this notion has captured attention from policymakers, academics, and managers alike, as the potential of high-growth technological enterprises and entrepreneurship often leads to nations' social wealth and well-being through the generation of new markets (Aparicio et al., 2016; Uyarra & Ramlogan, 2016). Accordingly, innovation ecosystems play a pivotal role in economic growth agendas and organizational strategies (Granstrand & Holgersson, 2020; Mason & Brown, 2013; Russell & Smorodinskaya, 2018).

Collaborative innovation production processes established within ecosystems attract various entities, firms, and backgrounds to engage with innovation ecosystem structures (Jacobides et al., 2018; Laursen & Salter, 2014; Najafi-Tavani et al., 2018; Nambisan & Sawhney, 2011; Nambisan et al., 2018). Value is realized when ecosystemic environments provide appropriate conditions for relationships to form between participating entities (Autio & Thomas, 2014; Ritala et al., 2013). Participating entities behave and react to structural features affecting positively, or negatively, the ecosystem performance (Adner & Kapoor, 2010; Adner, 2017; Almpanopoulou et al., 2019). To engage effectively, firms must develop coordination strategies to interact within complex multi-level inter-organizational exchanges (Möller & Halinen, 2017; Pattinson et al., 2018) and over time (Granstrand & Holgersson, 2020; Scott et al., 2021, Spigel, 2017).

Consequently, theoretical approximations to ecosystemic structures identify crucial governing institutions that interact with the interdependent *actors* and their *innovative networks* (i.e., Adner, 2017; Isenberg, 2010; Shipilov & Gawer, 2020). The institutional environment creates a system of pressures and incentives enacted upon the participants (Autio et al., 2014; Granstrand & Holgersson, 2020; Möller & Halinen, 2017; Shøtt & Jensen, 2016) in what constitutes the institutional arrangements of society within national boundaries (Granstrand &

Holgersson, 2020; North, 1990; Scott, 2001; Stam, 2015; Vargo et al., 2015). It can dictate the propensity to engage within these exchanges and provide the implicit rules of engagement, mechanisms, and constraints (North, 1990, p.3). This external stimulus guides and shifts the innovation ecosystem actors' behaviors (Aarikka-stenroos et al., 2014; Dedehayir et al., 2018; Nambisan & Baron, 2013).

The importance of the institutional context is increasingly required to study the networked relationships of ecosystemic actors (Fernandes & Ferreira, 2021; Russell & Smorodinskaya, 2018; Koskela-Huotari et al., 2016). For example, seminal institutional theorists suggest that environmental and social contexts comprise a four-part and complex multi-level categorization with observable influences across collaborative and organizational activities (Williamson, 2000). The outermost layers of an institutional structure consist firstly of informal (i.e., cultural support) and secondly formal (i.e., government & regulatory framework) environmental mechanisms (North, 1990), which are often implied within the current body of research. The third and fourth layers are micro-level and consist of organizational capacity to align activities with government's rules, market transaction, and allowing the appropriate distribution of resources and decision-making within and among firms (Bylund & McCaffrey, 2017; Koskela-Huotari & Vargo, 2016; Vargo & Lusch, 2016).

Importantly, this interaction between institutional layers emphasizes the complex relationship between social structure and behavioral tendencies in pursuing innovation outcomes. Yet, there is a lack of work examining the fine-grained impact this has on each participating business. Each participating entity holds unique profiles and motivations that can influence value-creating activities within and across the network (Baraldi et al., 2019; Scott et al., 2021) that require further empirical examination. Nevertheless, the complexity of how institutional settings influence and dictate behaviors between diverse actors/participants are not well understood as asymmetric profiles, and the multiple motivations have been shown to encourage varying responses to environmental stimuli across the ecosystem (Aarikka-stenroos et al., 2014; Adner & Kapoor, 2010; Möller & Halinen, 2017). The inherent complexities associated with institutional conditions and structures' multi-faceted nature have yet to be fully explored. Still, the process at which a participant venture successfully navigates their institutional environments and approaches value-creating relationships remains a heavily debated concept (Mooi & Frambach, 2012; Schøtt & Jensen, 2016; Nambisan & Baron, 2013). Recent literature has also contributed to gauging the positive and negative influence of this institutional support

and influence upon entrepreneurial and collaborative outputs in ecosystems where proximities entail paradoxical effects for innovative networks and ecosystems (i.e., for knowledge transfer) (Letaifa & Rabeau, 2013; Yamamura and Lassalle, 2020). However, there continue to be disparate observations about the effectiveness and outcomes of such systems, regardless of the knowledge generated on the complex features and structures that have been collected from recent successful cases. The burgeoning evidence suggests that while firms acknowledge and attempt to access the potential opportunities that innovation ecosystems could provide, they often are met with disappointing return figures (Brown et al., 2019), varying degrees of success (Li & Garnsey, 2014; Pellikka & Ali-vehmas, 2019) and, in some extreme cases, outright failure to achieve any form value realization (Adner, 2012). Questions remain about the crucial institutional factors that foster, drive, and influence networked innovation *emergence*, understood as the active formation of business and innovation *networks* that innovative entrepreneurs establish with other ecosystem participants.

In accordance, this study proposes that innovation ecosystem performance can be better understood by examining how micro-level network behavior is enacted and developed within macro institutional contexts (i.e., within the environments created in ecosystems). It extends the debate of how formal and informal institutional settings motivate forms of collaborative actions within the innovation ecosystem context by more narrowly focusing on certain actor-level behaviors. While we acknowledge that diverse entities comprise innovation ecosystems and their performance, we focus specifically on reviewing entrepreneurs' propensity to establish networking within varying contexts to present a clearer picture of how and in what ways these environments influence value-creating activities.

The research questions focus on the link between institutional forms and mechanisms to critical components and actors. The analysis observes 3,535 individuals from 94 countries during the 2013-2016 period. With data are drawn from the Global Entrepreneurship Monitor (GEM), World Governance Indicators (WGI), Index of Economic Freedom (IEF), and World Development Indicators (WDI), the study used a multi-level model to investigate macro-level and micro-level factors on developing innovation ecosystems, entrepreneurial networks, and overarching development. The results suggest that macro-level formal institutions (i.e., public policies and regulatory variables) can be designed to optimize innovation ecosystem performance by optimizing collaborative system-level behaviors in innovative entrepreneurs, thereby benefiting the flow of resources, knowledge, and outputs embedded in entrepreneurial

networks and the aggregated level of innovation in a market. The findings also indicate that entrepreneurial actors operating at the micro-level and collaborating within networks directly influence innovation ecosystem performance through enhanced knowledge spillovers and collaborative activities. Therefore, the study emphasizes the urgent need for further examination into social and contextual institutions (i.e., cultural variables) that affect this activity.

2 Theoretical framework and hypotheses

2.1 Innovation ecosystem concept

The innovation ecosystem concept is still a developing field of study (Aarikka-Stenroos & Ritala, 2017; Granstrand & Holgersson, 2020; Still et al., 2014). It is typically understood as a complex system in which various firms, entities, and supporting mechanisms converge to create knowledge spillover activities (Agarwal et al., 2007; Khurana & Dutta, 2021) surrounding a value output, focal product or service or a focal firm (Adner, 2017; Autio & Thomas, 2014). These systems usually form due to regional and geographic proximity (Huggins et al., 2018) but often evolve beyond co-location as relationships develop and access to broader resources is shared between partnering entities (Mueller & Jungwirth, 2016; Scott et al., 2019). However, some ecosystemic interactions consolidate beyond location boundaries (i.e., via digital platforms) (Gawer, 2014; Jacobides et al., 2018). The innovation outcomes from these systems result from collaborative activities that emerge in non-linear, vertical, and horizontal relationships among value creation and appropriation processes. The platform owners, hubs, focal firms, suppliers, and complementors (Adner & Kapoor, 2010; Jacobides et al., 2018) must create a form of interdependence to generate focal novelty and innovative outcomes (Adner, 2017; Autio & Thomas, 2014; Carayanis & Campbell, 2009; Karlsson & Warda, 2014; Nambisan & Baron, 2013; Shipilov & Gawer, 2020). In doing so, the participants complement or supplement each other's knowledge generation activities through cooperation, collaboration, and coopetition (Autio & Thomas, 2014; Russell & Smorodinskaya, 2018; Möller & Halinen, 2017; Pattinson et al., 2018; Ritala et al., 2013).

The innovation ecosystem concept provides a backdrop mechanism to explain why participating firms engage in knowledge-sharing activities and how they might accelerate innovation production. An effective innovation ecosystem offers multi-faceted and discrete benefits to a broad range of actor profiles based on their implicit needs at an individualistic level. For instance, the connectivity within the innovation ecosystem structure allows incumbent firms to maintain internal activities and accelerate insights into the emergence of

revolutionary technologies and opportunities enacted by the emerging and nimble, entrepreneurial activities that are creating new markets (Autio et al., 2014; Henderson, 2006; Hill & Rothaermel, 2003). The entrepreneurial firms and start-ups can use the innovation ecosystem to source partnership-type opportunities for scaling-up (Nambisan et al., 2018), accelerate production (Möller & Halinen, 2017), establish market knowledge (Agarwal & Shah, 2014). Therefore, this exchange activity in the innovation ecosystems is part of a social structure that provides legitimation and interaction boundaries to all participants, from technology leaders to eventual complementors (Almpanopoulou et al., 2019; Corsaro et al., 2012; Granstrand & Holgersson, 2020; Nooteboom, 2000; Pittaway, 2004; Mazzucato & Robinson, 2018; Yang & Su, 2014).

Building on this concept, insights into innovation ecosystem components and behaviors can help understand actors' innovative actions in these complex environments (Granstrand & Holgersson, 2020; Jacobides et al., 2018; Shipilov & Gawer, 2020). Effective ecosystem structures must consist of a mix of firm sizes and classifications, thereby embedding the system with diverse resource accessibility and different means for facilitating ongoing interactions (Russell & Smorodinskaya, 2018). However, it must be recognized that each actor within any innovation ecosystem is characterized by diversity in their modus operandi, cultures, and strategic focuses, which provides novelty benefits and presents significant complexities when attempting to predict how behaviors might shift or conform when influenced by environmental factors. While considerable work has been completed to provide a further descriptive account of these actors and their positions within the ecosystem itself (Möller & Halinen, 2017; Nambisan & Baron, 2013; Nambisan et al., 2018; Vargo et al., 2015), less work has sought evidence of how environmental factors influence the distinctive components. We view this as a critical oversight.

The institutional and social-contextual factors that influence the innovative actor-level behaviors embedded within distinctive components in the innovation ecosystem remain an under-explored theme within the literature. For instance, entrepreneurial firms (one of the crucial actor profiles within the ecosystem) possess a more agile nature to interact within these structures and can serve as a conduit for establishing, designing, and maintaining idea-generating interactions within the broader network (Baraldi et al., 2019; Gawer, 2014; Laage-Hellman et al., 2018; Nambisan & Baron, 2013). Yet, emphasizing the entrepreneurs' contribution to product and process innovation in innovation ecosystems remains scarce (Nambisan et al., 2018; Zahra & Nambisan, 2011). This is surprising given that entrepreneurial

firms and individuals enact particular characteristics that provide novelty and promote a vital interaction element for these systems through knowledge exchange and agile communication. While only one component within an ecosystem, we view their role as a crucial component to the system's performance and durability as a whole. Therefore, examining entrepreneurial behavior and interaction influences within the broader network structure is essential to further innovation ecosystem theory.

2.2 The Role of Entrepreneurial Networks in Innovation Ecosystem Development

Entrepreneurial activities and their capacity to generate networks can create and transform innovative ecosystems by breeding knowledge spillovers (Brown et al., 2019; Zahra & Nambisan, 2011). The reciprocal relationships of entrepreneurial actors and platform owners, or focal firms, within innovation ecosystems, inject dynamism and collaboration into the ecosystem participants (Agarwal et al., 2007; Brown et al., 2019; Li & Garnsey, 2014; Pellikka & Alivehmas, 2019; Zahra & Nambisan, 2012). Network-based relationships can offer resources and knowledge to sort out challenging market conditions from the early stages of technology development (Clarysse et al., 2014; Gawer, 2014; Zahra & Nambisan, 2011) through providing further resources and capabilities (Clarysse et al., 2014; Elfring & Hulsink, 2003; Naudé et al., 2014). The knowledge resources generated can help firms mitigate the typical start-up risks by establishing legitimacy and market experience (Hite, 2005; Laursen & Salter, 2014; Lechner & Dowling, 2003; Yang & Su, 2014). However, the entrepreneurial networks' effectiveness depends on careful orchestration, coordination, and recombination of human and market resources as the network evolves (Freytag & Young, 2014; Nambisan & Sawhney, 2011; Witt, 2004; Zahra & Nambisan, 2011). These dynamic environments require informal self-regulatory processes to ensure collaborative work (Nambisan & Baron, 2013). Still, well-integrated innovative entrepreneurs promote the evolution of knowledge flows (Clarysse et al., 2014).

Entrepreneurial ventures are crucial actors for innovation networks as they provide knowledge, inputs for innovation and increase the entrepreneurial propensity of innovation systems, which enriches the productive process and the innovation exploitation process (Aarikka-stenroos et al., 2014; Karlsson & Warda 2014; Nambisan et al., 2018; Radosevic & Yoruk, 2013) and how their networks influence innovation ecosystem performance has been suggested (Autio et al., 2014; Russell & Smorodinskaya, 2018; Spigel, 2017). However, research addressing entrepreneurial phenomena within innovation ecosystems has expanded the academic interest beyond the focal firm and the platform owner (Autio & Thomas, 2014; Möller & Halinen,

2017; Nambisan & Baron, 2013) to broader ways of value co-creation in innovation ecosystems (Frow et al., 2015; Jacobides et al., 2018). For instance, recent works have suggested that the dynamic nature of innovation ecosystem networked-relationships can encompass both stability and change needed for entrepreneurs to continually identify opportunities (Baraldi et al., 2019; Johannisson & Mønsted, 1997; Scott et al., 2019; Smith & Lohrke, 2008) and generate new ventures. However, the numerous factors regulate entrepreneurial actions (Autio et al., 2014; Granstrand & Holgersson, 2020; Kaartemo et al., 2020; Möller & Halinen, 2017; Nooteboom, 2000; Pittaway, 2004; Radosevic & Yoruk, 2013; Yang & Su, 2014) have not been linked within the debates. The innovative inputs that entrepreneurs bring to innovation ecosystems are undeniable, motivating them to participate. However, the complexities and conditions necessary to establish these links are fundamental to broader innovation ecosystem performance.

The micro-foundations of collaboration in innovative systems suggest that higher-level institutions influence network behavior (Kaartemo et al., 2020; Radosevic & Yoruk, 2013). institutional mechanisms influence behavioral interactions between firms (Autio & Thomas, 2014; Barile et al., 2016; Estrin et al., 2013a; Radicic et al., 2020; Scott et al., 2019; Vargo et al., 2015; Yang & Su, 2014). For instance, formal policies can also be designed to create or connect with institutional structures that leverage a regulatory system or framework that maximizes the ecosystem's coordination and operation (Autio & Thomas, 2014). However, hyperbolic regulation may become an obstacle for innovation activities, as overly rigid bureaucratic practices might dilute participation, expansion, and trust development (Granstrand & Holgersson, 2020). Thus, more work is needed to understand how different socio-political structures (formal institutions) and self-regulatory processes (informal institutions) influence entrepreneurial networks. Most innovative products and processes are crafted within collaborative, cooperative, and complex networks (Laursen & Salter, 2014; Pattinson et al., 2018; Radosevic, 2010). However, there remains a gap in how these entrepreneurial activities affect innovation ecosystems.

2.3 Institutional Effects on Entrepreneurial and Collaborative Behavior in Ecosystems

Institutions are the 'rules' that constrain and influence human decisions and interactions (North, 1990) with implications on the ways individuals and organizations interact and establish market related interactions (Scott, 2001; Schøtt & Jensen, 2016; Vargo et al., 2015). Accordingly, institutions can be formal (i.e., laws, regulations, norms, etc.) or informal (i.e., culture, habits, beliefs, etc.). Although most formal institutions remain at the country level due to national

policies and centralized regulations, some informal institutions can be found at the lower levels. For example, initial cognition processes depend on individuals' socialization within their families or other proximate environments (Hofstede, 2001). Individual cognition and beliefs can determine a common social perception about work, leisure, fair and unfair, fear, etc. (Kastanakis & Voyer, 2014). Based on this multi-level structure, Williamson (2000) suggests that formal and informal institutions interact with each other through the individual level's macro-level conditions. Formal institutions change more rapidly than informal institutions, deeper and more embedded in society (Williamson, 2000). There is a consensus about this framework's usefulness for further analysis of entrepreneurship, innovation (cf. Ács et al., 2014; Bruton et al., 2010; Grant, 1996; Iyer et al., 2006; Nordin et al., 2018; Yang & Su, 2014), and for collaborative networking (Li & Garnsey, 2014; Möller et al., 2020; Schøtt & Jensen, 2016).

Accordingly, institutions affect the aggregated outcome of innovation ecosystems insomuch these influence entrepreneurial networks' functioning and relationships with stakeholders, platform owners, or focal firms (Möller & Halinen, 2017; Ritala & Almpanopoulou, 2017). The institutional context plays a role in stimulating (or hampering), influencing, and facilitating ecosystem development by guiding individuals' behavior (Almpanopoulou et al., 2019; Barile et al., 2016; Dedehayir et al., 2018; Nooteboom, 2000). The forces interact with system-level and network-level value-creation practices (Aarikka-Stenroos & Ritala, 2017; Almpanopoulou et al., 2019; Autio et al., 2014; Hadjimanolis, 2003). Innovation ecosystems originate and develop through innumerable interrelationships of diverse actors, networks, stakeholders, and institutions during value co-creation and appropriation processes (Barile et al., 2016; Autio & Thomas, 2014; Dedehayir et al., 2018). These diverse relationships influence how participants navigate new technology domains and business model design in venture creation (Jabbouri et al., 2019; Wieland et al., 2016). The variances in profiles can create asymmetric roles and unbalanced managing participation within ecosystems. For example, an incumbent player firm's exceptional market leadership boosts higher bargaining power and power imbalance within the network (Adner & Kapoor, 2010; Nambisan & Sawhney, 2011). The same frictional relationships occur within platforms as complementors might have less influence than platform owners (Gawer, 2014). However, literature has also stated that scaled complementary can shift towards a competitive behavior for other participants within the network and thus in the innovation ecosystem (Gawer, 2014; Nambisan & Sawhney, 2011). Formal and informal mechanisms designed to promote densification of entrepreneurial cooperative networks favor

aggregate levels of innovation and entrepreneurship, through the expansion of knowledge, fast learning, and spillovers (Ács & Virgill, 2010), and can be linked to innovative outputs (Agarwal et al., 2007; Content et al., 2020; Henrekson & Stenkula, 2010; Schøtt & Jensen, 2016). The institutional setting will govern ecosystems and the interactions of all actors, entrepreneurial networks and other entities that exist where the ecosystem lacks explicit regulatory entities; on the contrary these higher-level norms and rules will co-govern if there are explicit system-level regulations (Jacobides et al., 2018)

Research on the institutional influence upon innovation, entrepreneurship and collaborative value creation has evolved for more than 2 decades (Autio et al., 2014; Dedehayir et al, 2018; Vargo & Lusch, 2016; Vargo et al., 2015). It has been investigated the positive correlation with levels of growth, survival, and the quality of entrepreneurial outputs with established evidence (Urbano et al., 2019). Nonetheless, there are still more questions to be observed in the relationship between institutions, entrepreneurship, and networked collaborative innovation, for instance, by investigating different institutional configurations (Stephan et al., 2015; Vargo et al., 2015) that change across national boundaries (Zahra & Nambisan, 2011). There is a need to deepen the knowledge about how expressions of formal institutions and cultural/societal imaginaries (i.e., informal institutions) affect the cognitions and behavioral responses of entrepreneurs to advance in their paths towards innovation, via networks and by creating/joining innovation ecosystems (Stam, 2015; Vargo et al., 2015; Zahra & Nambisan, 2011). In consonance with these ideas, this study is focused on understanding how institutional factors affect entrepreneurial networks in ecosystems (Lechner & Dowling, 2003; Zahra & Nambisan, 2011). It will focus on the dichotomy of formal and informal institutions (North, 1990), further discussed in the next section.

2.3.1 Formal institutions and entrepreneurial/collaborative networks

Macro-level structures such as formal institutions can influence entrepreneurial networks' emergence and innovation outcomes (Aidis et al., 2008; Autio & Thomas, 2014; Estrin et al., 2013a; Wieland et al., 2016), which ultimately affects the ecosystem (Vargo & Lusch, 2016; Vargo et al., 2015; Li & Garnsey, 2014). Formal institutions are over-arching governance mechanisms that incentivize collaborative behavior between participating entities, entrepreneurs, and firms. However, it is known that these regulatory pressures may hinder or foster the quality and especially the number of innovative relationships within an ecosystem (Autio et al., 2014; Henrekson & Stenkula, 2010; Radicic et al., 2020; Schøtt & Jensen, 2016;). Regulatory norms govern transactions and relationships within ecosystems and networks

(Nooteboom, 2000; Vargo & Lusch, 2016; Wieland et al., 2016), and entities gain legitimacy by conforming to sanctioned laws rules (Almpanopoulou et al., 2019; Scott, 2001). This regulative force is crucial when developing ecosystems, as "viable collaborative networks" may not exist without proper conditions (Dedehayir et al., 2018, p. 18). However, they should be viewed as enablers rather than an intervening force that manages the markets (Schøtt & Jensen, 2016); as it has been noted, the design of these forces impact the volume of sustained interaction (Lechner & Dowling, 2003) and innovation performance (Matinheikki et al., 2017).

The formal context sets the path for growth and innovation development for new ventures, as technology adoption, industrial result, and absorptive capacity are dependent on the regulatory environment, the education system, support programs for economic growth, and the setting of technical standards (Brown & Mason, 2014; Reynolds & Uygun, 2018). Several different formal institutions are used to assess innovation opportunities within ecosystem contexts. For example, perceptions of freedom affect creating new business opportunities (Bradley et al., 2021; Sobel, 2008).

Property rights are also viewed as a core formal institution (Pittaway, 2004). The means to which property rights are enforced impacts perceptions of opportunities, i.e., to what extent is product/strategy imitation is permitted and regulated between new firms and incumbent firms (Ács, 2010). Well-designed property rights mechanisms may enable value co-creation within a collaborative innovation ecosystem to occur; as they can cooperate without the risk of mistrust and opportunistic behavior; thus, reducing the chances of zero-sum benefits for parts involved in the entrepreneurial network (Corsaro et al., 2012; Estrin et al., 2013a; Pattinson et al., 2018; Pittaway, 2004; Radicic et al., 2020). Nevertheless, this is a balancing act, as over or under regulative institutions hamper innovative entrepreneurship. Innovation outputs flourish primordially in entrepreneurial and private ventures that evolve spontaneously within complex environments such as networks/ecosystems (Letaifa & Rabeau, 2013; Yamamura and Lassalle, 2020).

Additionally, property rights insecurity impacts knowledge-sharing environments (Henrekson & Stenkula, 2010). Furthermore, perverse incentives are also created to "grease the wheels" (to employ unscrupulous tactics) to overcome these environments (Dutta & Sobel, 2016). Entrepreneurial networks can substitute or cover contractual vacuums when there is a perception of weak property rights enforcement or accrued corruption levels from public entities (Aidis et al., 2008). This study will consider corruption as a dimension of formal

institutions as this is a factor that affects the relationship of public agents with market actors in an ecosystem (Content et al., 2020; El-Harbi & Anderson, 2010; Simón-Moya et al., 2014). Nevertheless, there is an ongoing debate whether the definition and institutional dimensions for corruption contrast and are considered as an outcome of the frictions of formal and informal institutions (Tonoyan et al., 2010) caused by absent or weak formal institutions (Levie & Autio, 2011; Puffer et al., 2010; Uslaner, 2005) opposing other lines of research that pose a direct influence of corruption upon entrepreneurial behavior, as a dimension of formal institutions (Anokhin, & Schulze, 2009; Chowdhury et al., 2015). However, network creation and innovative entrepreneurship under adverse property rights enforcement, corruption, or different freedom levels in markets are not well understood.

Therefore, it is essential to understand how external barriers to innovation can cause inadequate performance or rigidity (Hadjimanolis, 2003) within entrepreneurial boundary-spanning activities. This study will analyze the four dimensions mentioned above of formal institutions, namely considering public sector corruption (Content et al., 2020), property rights enforcement, business freedom (regulatory efficiency), and investment freedom (market openness) as contextual dimensions that affect the emergence of entrepreneurial networks in innovation ecosystems (Aidis et al., 2013; Baumol et al., 2007; Content et al., 2020; Stam, 2015). In the quest to analyze formal institutions' effect on the emergence of entrepreneurial networks, we set the following hypothesis.

> ***H1****: There is a set of macro-level formal institutions (such as property rights enforcement, corruption, business freedom, and investment freedom) that affects entrepreneurship networks positively.*

2.3.2 Informal institutions and entrepreneurial/collaborative networks

Informal institutions also influence the way individuals behave within ecosystems (Autio et al., 2014). Informal mechanisms often promote trust development and flexible relationships (Scott et al., 2019). They can play a central role in the way participants interact and counteract the adverse effects of formal barriers. Individual actions are influenced by common mechanisms such as norms, beliefs, and cultural references; thus, the decision to create a venture or participate through collaboration in a network (or an ecosystem) also occurs through a group of cultural considerations (Autio et al., 2013). In addition to formal regulatory mechanisms, informal forces also act as incentive structures for legitimacy and social desirability in

collaborative relationships (Johannisson & Mønsted, 1997; Meyer & Peng, 2016; Scott, 2001; Suchman, 1995).

Social values and normative behaviors affect individuals' economic decisions, such as choosing to become an entrepreneur, collaborate, and reactions to policies (Estrin et al., 2013a; Shane, 1994). It has long been known that culture influences national rates of innovation (Shane, 1993). However, recent studies have further explored how uncertainty affects entrepreneurs and their suppliers' network-based relationships across cultural contexts (Liu & Almor, 2016). Cross-national differences possess other informal elements (trust and collectivism) that impact networks' emergence in innovative environments (Schøtt & Jensen, 2016).

The socio-cultural status of entrepreneurs in a country impacts the decision to engage in venture creation and innovative activities (Shane, 2003). This status regarded for successful entrepreneurs, along with the perceptions about an entrepreneurial career choice (Cassar, 2007) and the fear of failure (Wennberg et al., 2013), vary across cultural environments, affecting the legitimacy of entrepreneurs within society. Consequently, these socio-cultural beliefs, regarded as framework conditions for ecosystems, can affect the quality and quantity of innovative entrepreneurship in network-based environments (Content et al., 2020). However, the prevalence of these micro-level processes has not been widely explored in the ecosystem and network literature. Therefore, this paper follows a configurational view of institutions and examines the impact of informal elements on entrepreneurial network emergence. It hypothesizes:

> ***H2****: A set of informal institutions (such as fear of failure, considering entrepreneurship a suitable career choice, and the high status and respect for successful entrepreneurs) positively affect entrepreneurship networks.*

2.3.3 The Interplay of Formal and Informal Institutions on Entrepreneurial Networks Emergence

There is an ongoing debate regarding formal and informal institutional effects when explaining networks' collaborative participation. On the one hand, some authors contend that entrepreneurial networks' formation is contingent on a country's cultural profile (Fuentelsaz et al., 2019). The literature argues that informal institutions ultimately influence how formal institutions materialize and translate into operation on this line of thought. Customs, traditions, and religious norms are hierarchically higher than formal rules. These are deeply embedded within society and because of the slower speed of change compared to written rules. As a result,

contextual analysis requires considering a nation's cultural fabric (Estrin et al., 2013a; Williamson, 2000).

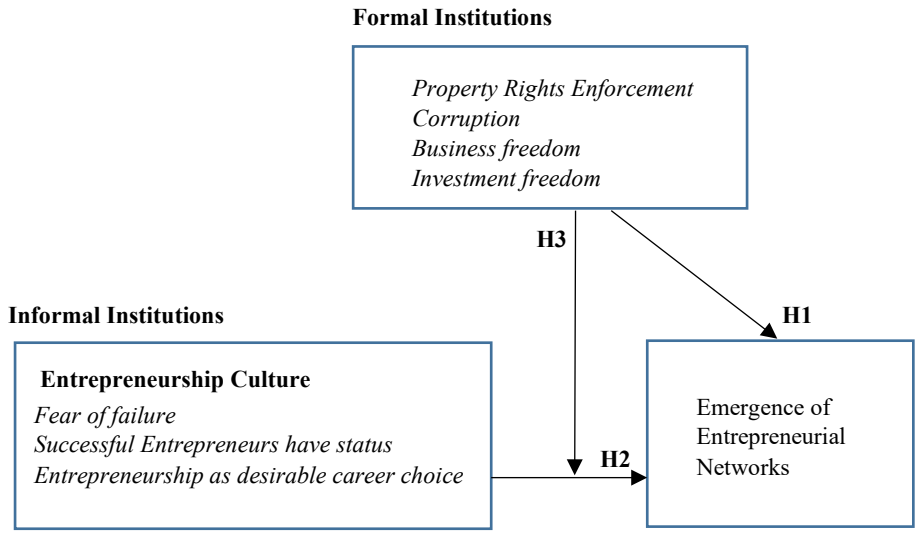
On the other hand, the literature identifies the influence of public policy and written laws on entrepreneurs' decision-making process (Audretsch et al., 2002). It is known that governments at different levels, local, regional, and national, are keen on actively supporting economic growth by formulating different sets of policies, and regulative initiatives, to permeate cultural beliefs to promote entrepreneurial activities in networks. Public policy has been regarded to affect culture (norms and attitudes) over time (Henrekson & Stenkula, 2010). Governments from emerging and developed economies formulate holistic policies to promote the culture of entrepreneurship and policy frameworks for supporting innovation ecosystems by constructing institutional bridges for innovative entrepreneurs, fostering collaborative relationships, and reinforcing market-supporting institutions (OECD, 2016). For example, governments in emerging markets have been focusing public policy and support programs on potential high-growth sectors such as the innovation ecosystem for fintech start-ups (Mittal, 2019).

Nonetheless, this study considers this debate vital to understand if formal institutions moderate the relationship between culture and the emergence of entrepreneurial networks. For example, studies show that some policies such as bankruptcy laws along with favorable regulations for closing and liquidating failed ventures have an impact on the country's entrepreneurial culture (i.e., fear of failure and entrepreneurship considered a suitable career choice), thus affecting further collaborative objectives (Henrekson & Stenkula, 2010). Similar effects of public initiatives, such as fierce protection of property rights, can trigger positive and negative socio-cultural responses towards collaborative projects and relationships (i.e., indirectly incentivizing shadow economies or hindering entrepreneurial innovation). This study investigates the extent of formal institutions' moderating effect on informal institutions' relationships (culture of entrepreneurship) and the emergence of entrepreneurial networks.

> **H3**: Formal institutions moderate the informal effects on entrepreneurial networks positively.

Figure 1 summarizes the suggested relationships.

Figure 1 - Conceptual Model Entrepreneurial Networks in Innovation Ecosystems



3 Method

To begin theorizing how institutional structures might influence innovation ecosystem development, the study analyses formal and informal institutions' relationships upon entrepreneurial network emergence using a multi-level logistic statistical modeling strategy. This approach considers country-level and individual-level effects upon the emergence of entrepreneurial networks. The set of variables is guided by recent studies that consider ecosystems are constituted by a taxonomy of framework-related conditions and systemic conditions (Ács et al., 2014; Content et al., 2020). Framework conditions include formal and informal institutions (the chosen predictors for this study), physical infrastructure, and demand (represented in the control variables). Systemic conditions include social capital (represented as personal networks in the set of control variables), knowledge creation (described as R&D), and relevant demographic controls explained later on in the variables section's description. Also, as referred to earlier, this study considers corruption a representation of formal institutions. This factor affects public agents' relationship with market actors in an ecosystem (Content et al., 2020; El Harbi & Anderson, 2010; Simón-Moya et al., 2014).

This study's main driver understands the development of innovative ecosystems by studying the institutional environment's interrelationship and the networks entrepreneurs build. For this matter, the dataset integrates data from the annual entrepreneurial activity survey from the Global Entrepreneurship Monitor (GEM) that measures the country's individual-level entrepreneurial activity. These data come from the GEM Adult Population Survey (APS). GEM looks at the "characteristics, motivations, and ambitions of individuals starting businesses and social attitudes towards entrepreneurship" (Bosma et al., 2020). This survey also includes

information from diverse phenomena related to creating ventures and other relevant elements surrounding entrepreneurs, such as building networks.

The GEM survey is performed in about 94 countries worldwide, with many participants aged 18 to 64 years in rural and urban areas. Notably, we identify 3,535 individuals from the APS. To supplement further opportunity for analysis, the GEM data was merged with macro-level indicators from the World Development Indicators, Index of Economic Freedom, and the World Governance Indicators, crucial, as explained at the beginning of this methodological section, for studying the aggregated consolidation of ecosystems (Content et al., 2020). The dataset is selected for the years 2013 to 2016 in all mentioned datasets. The year 2013 denotes a year of economic recovery after the global crisis of 2008, and the year 2016 is the last year publicly available from central dataset source GEM.

3.1 Dependent Variable

3.1.1 Entrepreneurial Network Emergence

The individual-level dependent variable captures entrepreneurial networking, entrepreneurs working together with other enterprises or organizations to produce goods or services, therefore collaborating in entrepreneurial networks to co-create value. This variable denotes the resulting collaborative relationships that emerge for exploitation purposes (Jensen and Schøtt, 2014; Schøtt and Jensen. 2016; Yamakawa et al., 2011). This variable comes from the GEM data set, APS survey, and is operationalized to represent entrepreneurial behavior towards creating entrepreneurial networks for product development (Bosma, 2013). This dichotomous variable is measured: working together with other organization(s) to produce goods or services, yes = 1, not producing along with other firms, No = 0.

3.2 Independent Variables

3.2.1 Formal Institutions: Control of Corruption Index

This variable captures the dimension of governance related to public power exercise for improper gain. This variable is available from the Worldwide Governance Indicators (WGI) project, which includes indicators for 200 countries in different continents and regions of the world (Anokhina & Schulze, 2009; Content et al., 2020; Dutta & Sobel, 2016; El-Harbi & Anderson, 2010; Simón-Moya et al., 2014). According to the World Bank this variable captures "the extent to which public power is exercised for private gain, including both petty and grand forms of corruption and "capture" of the state by elites and private interests." It also shows the risk of individuals facing bribery to deal with public environment entities. This score ranges

from -2.5 to 2.5, where positive scores closer to 2.5 are given to countries with lower levels of corruption, thus corresponding to better governance levels.

3.2.2 Formal Institutions: Property Rights Index

This variable is available publicly in the Index of Economic Freedom, IEF, from The Heritage Foundation. This variable represents the pillar of the rule of law and property rights enforcement effectively through different countries. Higher levels of property rights secure lower transaction costs. This variable scores 0 to 100, where higher numbers express better institutional conditions for protecting property in the market. Institutional research has broadly applied this variable (Aidis et al., 2012; Estrin et al., 2009; Fuentelsaz et al., 2020)

3.2.3 Formal Institutions: Business Freedom

This variable represents the dimension of regulatory efficiency (efficacy of the government regulating business) also available through the Index of Economic Freedom. Regulatory business efficiency is regarded as an indicator of business friendliness. This variable also explains if, for instance, governments introduce measures to secure conditions for attracting the creation, operation, and closure of ventures; it also represents the overall burden of regulation for business (Aidis et al., 2012; El-Harbi &Anderson, 2010; Simón-Moya et al., 2014).

3.2.4 Formal Institutions: Investment Freedom

This variable is available through the IEF. This variable represents a measure for the openness of a market, for instance, if tariffs or other constraining policies affecting foreign or domestic ventures, or organizations, invest in the economy. The higher the index, from 0 to the ideal score of 100, the more open a market is for attracting capital into the economy (Aidis et al., 2012; El-Harbi & Anderson, 2010; Simón-Moya et al., 2014).

3.2.5 Informal Institutions: Fear of Failure

This variable is available from the GEM survey. It represents cultural idiosyncrasies about the perception of loss and how this prevents people from starting a business or envisions risk related to collaborative relationships with other ventures (Content et al., 2020; Vaillant & Lafuente 2007; Wennberg et al., 2013). This variable is equal to 1 if the individual manifest as being afraid of failing; 0 otherwise.

3.2.6 Informal Institutions: Entrepreneurship is a desirable career choice

This variable also comes from the GEM survey and is intended to capture cultural definitions of creating new ventures as the right career choice. People in different countries see entrepreneurship as a desirable option (Content et al. 2020). Like the previous variable, entrepreneurship as a desirable career is a dummy if the individual says yes; 0 otherwise.

3.2.7 Informal Institutions: Successful entrepreneurs have status and respect

This variable from the GEM adult survey represents the perception of the respect and high status that successful entrepreneurs gain in society (Content et al., 2020). This variable equals one if the respondent says that successful entrepreneurs have status and respect; 0 otherwise.

3.3 Control Variables

Control variables include analyzing the infrastructure and systemic conditions such as physical infrastructure, demographic variables, Demand Production growth, R&D indicators, and social networks (Content et al., 2020; Stam, 2015).

3.3.1 Individual-level: Networks

This individual-level variable indicator is available from the GEM survey and represents whether an entrepreneur knows another entrepreneur was starting a new firm in the past two years (Content et al., 2020; Estrin et al., 2013a). This variable is operationalized as a dichotomous variable, No=0, Yes =1.

3.3.2 Individual-level: Demographic.

The control variables set Age, Squared Age, and Gender as demographic indicators capturing individual-level specifics from survey participants. Age and age squared are from each respondent. Gender is a dichotomous variable taken from the respondent survey

3.3.3 Country-level: Physical infrastructure.

This variable considers infrastructure for innovation, such as fixed broadband subscriptions per 100 people in each country and the number of individuals capable of accessing the Internet. These variables are available from the World Development Indicators, WDI, the World Bank dataset (Content et al., 2020; Stam, 2015).

3.3.4 Country-level: R&D, creation of new knowledge.

Controls for the creation of new knowledge with applications for patents by residents and the High technology exports. These variables are available from the World Development Indicators dataset from the World Bank (Content et al., 2020; Stam, 2015) and include R&D's GDP participation.

3.3.5 Country-level: Demand

Entrepreneurship literature has demonstrated the relationship between development, aggregated demand, and venture creation (Wennekers et al., 2005). Thus, there is a control for the level of development as measured by GDP in purchasing power parity in current international currency (Autio et al., 2013) and the GDP growth per year. The model also controls for density in population and increase in population. These variables are available from the World Development Indicators dataset from the World Bank. Table 1 summarizes the dependent, independent, and control variables.

Table 1 - Dependent, Predictor, and Control Variables

	Variable	Source	Description	Previous Studies	Theoretical Significance
Dependent Variable	*Entrepreneurial Network emergence*	*GEM*	*captures entrepreneurs working together with other enterprises or organizations to produce goods or services, therefore collaborating in networks to co-create value*	***Jensen & Schøtt, 2014; Schøtt & Jensen. 2016***	*Entrepreneurial behavior towards creating entrepreneurial networks*
Formal Institutions	*Corruption*	*World Governance Index*	According to the World Bank, this variable captures "perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests."	***Aidis et al., 2008; Anokhina & Schulze, 2009; Content et al, 2020; El-Harbi & Anderson, 2010; Simón-Moya et al., 2014;***	*Macro-level effects of weak institutions upon the emergence of entrepreneurial networks and ecosystem development*
	Property Rights	*Index of Economic Freedom, IEF, from The Heritage Foundation*	This variable represents the pillar of the rule of law and property rights enforcement effectively through different countries. Higher levels of property rights secure lower transaction costs.	***Aidis et al., 2012; Estrin et al., 2009; Fuentelsaz et al., 2020***	*Regulative role of institutions within ecosystems, impartiality, Opportunity identification*
	Business freedom	*IEF*	Represents the dimension of regulatory efficiency (efficacy of the government regulating business).	***Aidis et al., 2012; El-Harbi & Anderson, 2010; Simón-Moya et al., 2014;***	*Quality of government, regulation of business, framework condition for the development of ecosystems and networks*

	Investment freedom	*IEF*	Represents a measure for the openness of a market, i.e., if tariffs or other constraining policies affect foreign or domestic ventures or organizations to invest in the economy.	***Aidis et al., 2012; El-Harbi & Anderson, 2010; Simón-Moya et al., 2014;***	*Framework conditions for funding entrepreneurs in an ecosystem*
Informal Institution	*Fear of failure*	*Global Entrepreneurship Monitor (GEM) APS Survey*	The perception of loss and how this prevents people from starting a business.	***Content et al., 2020; Vaillant & Lafuente 2007; Wennberg et al., 2013***	*Entrepreneurship Culture, framework conditions*
	Entrepreneurship is a good career choice	*GEM (APS Survey)*	Captures cultural definitions about choosing to create new ventures as a good choice of career.	***Content et al., 2020***	*Entrepreneurship Culture, legitimation*
	Successful entrepreneurs have status and respect	*GEM (APS Survey)*	Represents the perception of the respect and high status that successful entrepreneurs gain in society.	***Content et al., 2020***	*Entrepreneurship Culture, legitimation*
Controls	*Personal Networks (Knows another entrepreneur)*	*GEM (APS Survey)*	Represents whether an entrepreneur knows another entrepreneur was starting a new firm in the past two years.	***Content et al., 2020; Estrin et al., 2013a***	*Social Capital, Legitimation, systemic conditions*
	Physical infrastructure (Access to internet and broadband subscriptions)	*World Development Indicators, WDI, from the World Bank*	Includes infrastructure for innovation with Fixed broadband subscriptions per 100 people in each country and the number of individuals using the Internet.	***Content et al., 2020; Stam, 2015***	*Framework conditions for ecosystem development*
	R&D, creation of new knowledge (Patent applications per resident, R&D exports as % of GDP)	*World Development Indicators*	Captures creation of new knowledge with applications for patents by residents and high technology exports.	***Content et al., 2020; Stam, 2015***	*Systemic conditions, sources of knowledge*
	Demand (GDP growth, population density, GDP PPP)	*World Development Indicators*	level of development as measured by GDP in purchasing power parity in current international currency and GDP growth per year. The model also controls for density in population and increase in population.	***Autio et al., 2013; ; Content et al., 2020; Wennekers et al., 2005***	*Framework conditions*

	Demographic controls (Age, Squared Age, and gender of respondents)	*GEM (APS Survey)*	Adds into the control variables set Age, Squared Age, and Gender as demographic indicators capturing country-level specifics	***Content et al., 2020***	*Individual-level survey participant characteristics*

3.4 Modeling Strategy

This research analyzes relationships among national and individual-level variables; therefore, it requires a statistical multi-level mixed-effects logistic regression modeling as the estimation method (Estrin et al., 2013b; Kwon & Arenius, 2010). Multi-level modeling establishes a hierarchical structure where the individual level is level 1, and the National level is level 2 (Estrin et al., 2013b). Before carrying the multi-level logistic regression mentioned above, a linear mixed-effects multi-level analysis was held to evaluate the estimations' results as a baseline for posterior comparisons with the logistic model regressions[1]. After this preceding statistical exercise, the next step taken in the method was applying the multi-level logistic regression, seen in Table 3, which is more adequate for the dependent variable's nature. Accordingly, Model 1 in Table 3 shows the logistic regression without including predictor variables or controls to obtain a null model (Estrin et al., 2016). This first model was a multi-level regression-based analysis as the estimated Intra-class Correlation (ICC), used to evaluate if multi-level modeling is supported statistically (Estrin et al., 2013b), satisfactory. The second estimation step took all the control variables at the individual and national levels (Model 2). The next step is a model that includes the first hypothesis, H1, where a relationship of formal institutions such as corruption, property rights, regulatory efficiency (business freedom), and market openness (investment freedom) affects the emergence of entrepreneurial networks in different countries (Model 3). Model 4 describes the next step in the estimation, where it tests how the cultural level affects the emergence of entrepreneurial networks, which refers to H2. Model 5 includes all predictor variables, formal and informal institutions, in the regression to evaluate the estimates. Regarding hypothesis 3, Table 4, found in the appendix, displays three models obtained to assess formal institutions' interactions with the respective set of cultural representations.

Insert Table 2 Descriptive Statistics Here

[1] The baseline results of this prior linear regression can be seen in table 5 in the Appendix. Results from this initial benchmark regression show some similar significances and direction of relationships in the formal and informal predictors.

Insert Table 3 Multilevel Logistic Regression Results Here

4 Data Analysis Results

The multi-level mixed-effects logistic regression models included in the analysis are shown in Table 3. They were first examining whether multi-level modeling was supported by testing a null model. The obtained ICC (0.163) in Model 1 indicates statistical support for the mixed-effects logistic regression modeling. Results in Model 2 show three principal coefficients with a solid relationship to the dependent variable. These three significant controls indicated networks with positive effects: gender with opposite direction and physical infrastructure indicators, individuals using the internet per 100 habitants, and positive effects. Models 3, 4, and 5 show estimation results with coefficients (*b*) and marginal effects (dy/dx) to complement the relationships' prediction.

4.1 Formal Institutions (Macro-level) as predictors of entrepreneurial networks emergence (H1)

Regarding hypothesis testing, hypothesis 1 posited a set of formalized macro-level structures (formal institutions) that positively affect the emergence of entrepreneurial networks and innovative outcomes within innovation ecosystems. Models 3 and 5 in Table 3 show the variables associated with H1. Model 3 included all individual-level control variables and macro-level control variables for physical infrastructure, R&D, demographic, and aggregated demand. It also shows significant results for all of the macro-level predictors. In this model, Corruption presents a negative and significant relationship with the emergence of entrepreneurial networks (b =-1.340, p<0.005). The marginal effect of this variable is also significant (p<0.005) and displays a magnitude (dy/dx = -0.251). There is a positive relationship between property rights enforcement with the emergence of entrepreneurial networks (b = 0.121, p<0.001) with also a significant marginal effect (dy/dx = 0.023, p<0.001). Model 3 also displayed negative and significant relationships for business freedom (the proxy for business regulatory efficiency) (b= -0.145, p<0.001) with the marginal effect (dy/dx = -0.027, p<0.001), and for investment freedom, (the indicator of market openness and investment regulation), showing results of (b = 0.053, p<0.005) with also a significant marginal effect with magnitude (dy/dx = 0.010, p<0.005). Model 5 included all predictors at the country and individual level for formal institutions and also informal institutions. This model showed results with the same direction and significance as Model 3 in each formal institution's variables. Accordingly, corruption presented a negative and significant relationship with the emergence of entrepreneurial networks (b =-1.354, p<0.005). The marginal effect of this

variable is also significant (p<0.005) and displays a magnitude (dy/dx = -0.253). There is a positive relationship between property rights enforcement with the emergence of entrepreneurial networks (b = 0.118, p<0.001) with also a significant marginal effect (dy/dx = 0.022, p<0.001). Moreover, Model 5 also displayed negative and significant relationships for business freedom (b= -0.145, p<0.001) with the marginal effect (dy/dx = -0.027, p<0.001), and for investment freedom, (b = 0.053, p<0.005) with also a significant marginal effect with magnitude (dy/dx = 0.010, p<0.005). To sum up, Models 3 and 5 are significant to support hypothesis 1, (H1), along with the research question that this research intends to address.

4.2 Entrepreneurship culture as a predictor of entrepreneurial networks emergence (H2)

Regarding hypothesis 2, this hypothesis posited that entrepreneurial culture understood as a set of informal institutions affects entrepreneurial network emergence within innovation ecosystems—model 4 and Model 5 in the regression Table 3 show variables associated with this hypothesis. The results in Model 4 displayed that fear of failure has a positive relationship with creating entrepreneurial networks. This is statistically significant at (p < 0.10, with an estimated coefficient of b = 0.181) the magnitude of the marginal effect is (dy/dx = 0.034, p<0.001). The relationship of entrepreneurship as a good career choice and the dependent variable is also significant and shows a negative direction (b= -0.142, p < 0.10) and an obtained magnitude of (dy/dx = -0.027, p<0.010). Model 5 also displayed a positive and significant relationship for fear of failure (p<0.10) with a coefficient of (b=0.197) and magnitude of marginal effect (dy/dx = 0.037, p<0.010). The variable entrepreneurship as a good career choice shows a significant (p<0.10) and negative relationship with the creation of entrepreneurial networks (b=-0.152) and the marginal effect of (dy/dx = -0.028, p<0.010). Additionally, the variable "status and respect for successful entrepreneurs" is not significant according to the results of models 4 and 5. Nonetheless, the variables fear of failure and entrepreneurship as a good career choice were significant, as shown above.

4.3 Moderating effect of formal institutions H3

Regarding Hypothesis 3, Table 4 (found in the appendix) displays the models with the results for interactions to analyze the formal institutions' moderating effect upon the relationship between the cultural environment for entrepreneurship and the emergence of entrepreneurial networks. Table 4 shows that only the moderating influence of corruption's perception on entrepreneurs' status showed a significance level equal or lower than p<0.10, which otherwise would permit suggesting that this hypothesis was statistically significant (Lieber, 1990). We considered this hypothesis, H3, was not supported. In general, the remaining interactions of

perception of corruption in formal institutions, property rights enforcement, and business and investment freedom did not present significance when interacting individually with institutions' informal dimensions.

5. Discussion of Empirical Results

This study contributes to the literature by analyzing institutional forces' relationships influencing the emergence of entrepreneurs' networks, affecting innovation ecosystem development (Adner & Kapoor, 2010). Previous literature establishes the relevance of including institutions in innovation ecosystem studies (Granstrand & Holgersson, 2020; Möller & Halinen, 2017), calling for empirical demonstration of the impact institutions bring to ecosystems by affecting actors such as entrepreneurial innovators in innovation networks (Corsaro et al., 2012; Nooteboom, 2000; Pittaway, 2004). This study presents the results as the emergence of entrepreneurial networks in ecosystems permits new insights into ecosystems' emergence. As previous literature suggests, ecosystems are originated when different parties start trying out new strategies for production, such as modularization of a process, but further explanations are required in the study of the development of innovation ecosystems (Jacobides et al., 2018). This study's institutional approach offers contextual reasons for facilitating ecosystem formation through relationships with entrepreneurial actors.

Regarding the four dimensions of formal institutions studied, this study has firstly found support in the influence of corruption, understood as a measure of formal institutions (Content et al., 2020; El-Harbi & Anderson, 2010; Simón-Moya et al., 2014) where the private sector exploits public power resources, upon the emergence of entrepreneurial networks. This indirect relationship can be interpreted as higher levels of corruption perception incentive entrepreneurs to establish networks as protective measures, comparable to the construction of a safe "microcosmos" that helps isolate the ecosystem participants from corrupt government practices such as bribery pressures. By collaborating in networks, entrepreneurs' access to collaborative resources, legitimacy, and experience from their counterparts, and an informal structure for self-regulating and offering stability in the ecosystem (Aidis et al., 2008; Clarysse et al., 2014; Elfring & Hulsink, 2003; Zahra & Nambisan, 2011), to navigate adverse institutional environments that govern ecosystems (Jacobides et al., 2018). At the same time, and inferring a more direct effect of institutions, this relationship is seen in the light of previous literature where certain levels of corruption enable innovative collaborations as it offers a fast-track to overcome other types of excessive regulation (Ács & Virgill, 2010; Dutta & Sobel, 2016; Estrin et al., 2013a).

Second, the positive relationship between property rights enforcement and the emergence of networks presents relevant elements. These results show that the regulative role of formal institutions concerning property rights offer, when virtuous, offers security for entrepreneurs, incumbents or platform owners, to establish industrial collaborations with peers, even competitors (i.e., coopetition), as their contributions or value-added to the network will be protected by macro-level regulative structures (Ács & Virgill, 2010; Dedehayir et al., 2018; Nooteboom, 2000). Technological-based start-ups are more hesitant than traditional sector entrepreneurs to establish cooperative relationships when the regulative environment does not protect patents, conducing to failure of cooperation (Radicic et al., 2020). These results confirm that when property rights are well-protected, imitation levels decrease, and collaborative innovation becomes the gate for access to knowledge for entrepreneurial innovation (Ács, 2010; Nambisan et al., 2018). Coopetition and collaboration processes result after evaluating the environment and internal capabilities to open the innovation process. This internal evaluation also concerns assessing property protection (Nooteboom, 2000; Pattinson et al., 2018; Pittaway, 2004). Regarding the two remaining dimensions studied, regulatory efficiency (business freedom) presents a significant but negative relationship with entrepreneurial networks' emergence. The same association was found for investment freedom, representing an open market for foreign or domestic investment capital.

We can support the argument with evidence that entrepreneurial networks can emerge when the institutional environment is less favorable, over-regulated, and complicated for the creation, operation, and closure of ventures and quickly finding sources/opportunities of funding/investment. Nonetheless, this cannot infer that highly competitive markets hamper the emergence of entrepreneurial networks. Formal institutions convey messages through regulation to provide conditions for market activities, but networks that emerge as autonomous initiates consolidate better in innovative relationships (Letaifa & Rabeau, 2013; Yamamura and Lassalle, 2020). At the same time, institutional actors may convey institutional proximities (alongside other proximities) that may pose a paradoxical supply of conditions and factors that may also hinder or foster the emergence of networks within ecosystems (Balland et al., 2015; Boschma, 2005). Collaborative innovation cannot be artificially imposed by public policy. Literature also has shown adopting value creation under collaborative business networks, or R&D projects offer a behavioral margin of maneuver and adapting plasticity to participants even when external pressures (macro-level governing structures, such as institutional

environments) cause uncertainty or difficulty to comply with industrial rules or norms (Jabbouri et al., 2019; Matinheikki et al., 2017).

Integrating a cultural view of the emergence of entrepreneurial networks aligns with the notion that fear of failure exerts collective and collaborative intentions in entrepreneurs. The influence of these micro-level informal governance structures is validated from the results of this study. This can be understood along with the idea that collective beliefs can undermine the risk-propensity of failure by sharing efforts and sharing risks. Failure-adverse cultures tend to consider and favor collaborating relationships (Schøtt & Jensen, 2016). Concerning other representations of cultural beliefs in the micro-level, we found a negative relationship between considering entrepreneurship as a suitable career choice and consolidating collaborative, entrepreneurial efforts. This is congruent with Johannisson and Mønsted (1997) and Zahra and Nambisan (2011). When legitimacy is scarce, meaning when venturing is not culturally regarded as a secure career path, entrepreneurial networks offer this legitimacy to enact the innovative venture.

This study also considered the extent of moderation of formal institutions on the relationship between cultural cognition and the emergence of entrepreneurial networks. One reason might give validity to the stream of literature, posing that informal institutions ultimately influence how formal institutions materialize and translate into operation (Estrin et al., 2013a).

6 Conclusion

This study showed how formal and informal institutional mechanisms influence networking activities between new ventures and incumbent organizations within the innovation ecosystems context. Combining the innovation ecosystem concept (Autio & Thomas, 2014) with institutional economics (North, 1990) set the basis to further comprehend entrepreneurial networks' emergence as a tangible outcome of innovation ecosystems. Using a sample of 3,535 individuals from 94 countries during the 2013-2016 period upon a multi-level logistic regression approach, we found that all dimensions of formal institutions studied significantly influence the emergence of entrepreneurial networks. The study found that only the cultural concept of fear of failure and the positive appreciation of entrepreneurship influence entrepreneurial networks' emergence. Analyses from the results can lead to insightful implications for theory, policy, and practice.

6.1 Contribution to literature

Innovation ecosystems are virtuous environments for relations of the platform, open and collaborative innovation with innovative entrepreneurship (Aarikka-stenroos et al., 2014; Agarwal et al., 2007; Agarwal & Shah, 2014; Laursen & Salter, 2014; Li & Garnsey, 2014; Nambisan & Baron, 2013; Nambisan et al., 2018). This premise has opened a significant stream of research linking entrepreneurial innovation and entrepreneurial networks as fundamental elements for developing innovation ecosystems. This research contributes to innovative ecosystem development literature by examining institutions' interface and entrepreneurial networks' emergence under an institutional prism. This study also contributes by applying a configurational view of institutions, considering the complementarity of formal and informal structural dynamics upon the phenomena (Stephan et al., 2015). The study examined the distinct levels of institutions that Williamson (2000) proposed from an empirical lens. It observed that broader levels, informal and formal institutions, create further constraints in subsequent levels where ecosystems and networks. The methodological analysis found that some formal and informal macro-level institutional configurations create incentives to avoid or establish collaborative value-creation relationships. It provides empirical evidence to evaluate how formal institutions' four dimensions impact participants' behaviors for the emergence of entrepreneurial networks. By applying quantitative cross-national analysis, this study assessed how formal and informal institutions affect entrepreneurs' networks to co-evolve and inhabit an ecosystem of complex actors and relationships. As recent literature has demonstrated, industrial marketing is not a vacuum-environment phenomenon. It can be nurtured by studying the emergence of the entrepreneurial network(s) that create, modify and enrich innovation ecosystems. This paper also contributes to the understanding of contextual barriers and enablers to ecosystem development. This macro-to-micro approach to the study of institutions remains relevant for analyzing complex macro-level and micro-level structures, posited in the research question of this research, and its impact on innovative outcomes within networks and ecosystems value-creation environments. Finally, we further understand entrepreneurs' crucial role and networks in innovation ecosystems, a somewhat less apparent field than a more related field, the entrepreneurial ecosystems literature.

6.2 Managerial and Public Policy Implications

Contextual environment factors, such as formal macro-level governing structures, are essential when considering strategic actions such as exploring innovation ecosystems or the emergence of entrepreneurial networks for growth or gaining access to knowledge, resources, legitimacy, or technology. Regarding micro-level structures, entrepreneurs and managers can also consider

integrating ecosystems by creating relationships with other nascent ventures to capitalize on new opportunities or to overcome adverse institutional environments. Through this study, managers and entrepreneurs can find analytical elements for evaluating these venture decisions with a holistic approach in native or foreign markets. For instance, including the analysis of the level of protection for intellectual property in a market (local or foreign) or the status entrepreneurs hold in society can affect managers' or entrepreneurs' intention to embark (or not) in collaborative innovation or value co-creation. These strategic decisions influence the early and future industrial production stages by giving more elements to mitigate failure risks and obtain the network-based benefits studied in this research.

Public policy should aim to configure a corresponding institutional setting towards strengthening business and entrepreneurship culture, and to strengthen formal institutions for appropriate ecosystem development. Some effects and incentives from institutions cannot be directly transferred to market actors from institutional actors. Still, it is relevant that the cultural and formal environment is considered in public action in a holistic approach and acknowledging that institutional support is not the sole mechanism, and is affected by diverse dimensions (i.e., diverse types proximities) that create paradoxical conditions to the emergence and development of ecosystems (Balland et al., 2015; Yamamura and Lassalle, 2020).

Public initiatives also need to focus on advancing formal institutions' quality, such as improving corruption control measures, property rights enforcement, and securing better openness and regulative indicators in an economy. As this study evidences that the quality of institutions is an essential condition for the development of innovation ecosystems, public policy needs to prioritize formulations that improve the quality of the most representative institutions, such as theses studied in this research, at the government level through Ex Ante and Ex Post Evaluation. Additionally, increased trust culture and legitimation for collaborative value creation can be obtained by refining entrepreneurship beliefs. For example, through creating supportive programs, such as beneficial bankruptcy laws, to mitigate the culture of fear of failure or other public initiatives that improve innovative entrepreneurship's status and appreciation as an optimal career decision. Rules and norms that foster the culture of cooperative creation of value can materialize virtual spirals to develop the expected innovation ecosystems within a national, regional, or local context.

6.3 Limitations and Future Research

This paper aimed to further theoretical debates into macro-institutional structures' influence on the entire innovation ecosystem micro-level behaviors. Yet, within the framing and scope of the paper's intended contribution, important further questions emerged and suggested many opportunities to develop this line of inquiry further. First, the interactions of the set of variables for hypothesis 3 regressions did not find statistical significance. This presents new opportunities for further research with new approaches for understanding formal and informal institutions (Henrekson & Stenkula, 2010). One opportunity that these results offer is the simultaneous study of moderations of informal and formal institutions on the interaction of micro-level and macro-level representations with the emergence of entrepreneurial networks. Future research can also consider broader representations of institutional configurations to understand institutions' supportive role for innovation ecosystems on a regional or a localized level for further comparisons. At the same time, extant literature posits that local and regional levels can be more influential than more aggregated groups, presenting opportunities to look at this phenomenon in more detail (Johannisson & Mønsted, 1997). Institutional studies can also consider other spatial and time dimensions to analyze change and effects upon analysis units.

Secondly, different characteristics and phases of entrepreneurial networks can be included in this stream of research. The paper's exploratory nature simply sought evidence of an entrepreneur's propensity to establish networks within the ecosystem. However, this variable is complex within its right. Further studies aiming to develop more insights into how institutions influence this phenomenon could be expanded to include a vast arrangement of perception-based psychometric and sociological variables. Other paths to advance knowledge about this nexus of entrepreneurial networks and its relevance for ecosystems include analyzing the quality and scope of networks that entrepreneurs develop when joining or creating innovation ecosystems. Additional contributions could also explore the social and economic value added by entrepreneurs' interfaces. The networks they establish as collaborative and innovative participation in innovation ecosystems is a promising line of research.

Finally, future research will also benefit from extended datasets as they become available for researchers over time. For example, the dataset used in this study presents a national-level nature, which can offer new insights and research opportunities as the data becomes more localized, delivering more detailed differences at the regional level (Content et al., 2019).

References

Aarikka-Stenroos, L., and Ritala, P. (2017). Network management in the era of ecosystems: Systematic review and management framework. *Industrial Marketing Management, 67*, 23-36

Aarikka-Stenroos, L., Sandberg, B., and Lehtimäki, T. (2014). Networks for the commercialization of innovations: A review of how divergent network actors contribute. *Industrial Marketing Management, 43*(3), 365-381.

Acs, Z. J. (2010). High impact entrepreneurship. In Z. J. Acs, and D. B. Audretsch (Eds.), Handbook of Entrepreneurship Research (2nd Ed.) (pp. 165–182). New York: Springer.

Ács, Z. J., Autio, E., and Szerb, L. (2014). National systems of entrepreneurship: measurement issues and policy implications. *Research Policy, 43*(3), 476–494.

Ács, Z., and Virgill, N. (2010). Entrepreneurship in Developing Countries. *Foundations and Trends in Entrepreneurship, 6*(1), 1-68.

Adner, R. (2012). *The wide lens: A new strategy for innovation*. London: Penguin UK.

Adner, R. (2017). Ecosystem as structure: An actionable construct for strategy. *Journal of Management*, *43*(1), 39-58.

Adner, R., and Kapoor, R. (2010). Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal, 31*(3), 306-333.

Agarwal, R., and Shah, S. K. (2014). Knowledge sources of entrepreneurship: Firm formation by academic, user, and employee innovators. *Research Policy*, *43*(7), 1109-1133

Agarwal, R., Audretsch, D., and Sarkar, M. B. (2007). The process of creative construction: knowledge spillovers, entrepreneurship, and economic growth. *Strategic Entrepreneurship Journal, 1*(3-4), 263-286.

Aidis, R., Estrin, S., and Mickiewicz, T. M. (2012). Size matters: entrepreneurial entry and government. *Small Business Economics, 39*(1), 119-139.

Almpanopoulou, A., Ritala, P., and Blomqvist, K. (2019). Innovation ecosystem emergence barriers: Institutional perspective. In Proceedings of the 52nd Hawaii International Conference on System Sciences. 6357-6366.

Anokhin, S., and Schulze, W. S. (2009). Entrepreneurship, innovation, and corruption. *Journal of Business Venturing, 24*(5), 465-476

Aparicio, S., Urbano, D., and Audretsch, D. (2016). Institutional factors, opportunity entrepreneurship, and economic growth: Panel data evidence. *Technological Forecasting and Social Change, 102*, 45-61.

Audretsch, D. B., Thurik, R., Verheul, I., and Wennekers, S. (Eds.). (2002). *Entrepreneurship: determinants and policy in a European-US comparison* (Vol. 27). Springer Science and Business Media.

Autio, E. and Thomas, L.. (2014). Innovation Ecosystems: Implications for Innovation Management. In *the Oxford Handbook of Innovation Management*

Autio, E., Kenney, M., Mustar, P., Siegel, D., and Wright, M. (2014). Entrepreneurial innovation: The importance of context. *Research Policy*, 43(7), 1097-1108.

Autio, E., Pathak, S., and Wennberg, K. (2013). Consequences of cultural practices for entrepreneurial behaviors. *Journal of International Business Studies, 44*(4), 334-362.

Balland, P. A., Boschma, R., & Frenken, K. (2015). Proximity and innovation: From statics to dynamics. *Regional Studies*, *49*(6), 907-920.

Baraldi, E., Havenvid, M. I., Linné, Å., and Öberg, C. (2019). Start-ups and networks: Interactive perspectives and a research agenda. *Industrial Marketing Management*, *80*, 58-67.

Barile, S., Lusch, R., Reynoso, J., Saviano, M., and Spohrer, J. (2016). Systems, networks, and ecosystems in service research. *Journal of Service Management*, *27*(4), 652-674.

Baumol, W. J., Litan, R. E., and Schramm, C. J. (2007). *Good capitalism, bad capitalism, and the economics of growth and prosperity*. Yale University Press.

Boschma, R. (2005). Proximity and innovation: a critical assessment. *Regional studies*, *39*(1), 61-74.

Bosma, N., Hill, S., Ionescu-Somers, A., Kelley, D., Levie, J., and Tarnawa, A., (2020). GEM Global Report 2019/2020.

Bradley, S. W., Kim, P. H., Klein, P. G., McMullen, J. S., & Wennberg, K. (2021). Policy for innovative entrepreneurship: Institutions, interventions, and societal challenges. *Strategic Entrepreneurship Journal*, *15*(2), 167-184.

Brown, R., and Mason, C. (2014). Inside the high-tech black box: A critique of technology entrepreneurship policy. *Technovation, 34*(12), 773-784

Brown, R., Mawson, S., and Rowe, A. (2019). Start-ups, entrepreneurial networks, and equity crowdfunding: A processual perspective. *Industrial Marketing Management, 80*, 115-125

Bruton, G. D., Ahlstrom, D., and Li, H.-L. (2010). Institutional theory and entrepreneurship: where are we now, and where do we need to move in the future? *Entrepreneurship Theory and Practice, 34*(3), 421–440.

Bylund, P. L., and McCaffrey, M. (2017). A theory of entrepreneurship and institutional uncertainty. *Journal of Business Venturing*, *32*(5), 461-475.

Carayannis, E. G., & Campbell, D. F. (2009). 'Mode 3'and'Quadruple Helix': toward a 21st century fractal innovation ecosystem. *International journal of technology management*, *46*(3-4), 201-234.

Cassar, G. (2007). Money, money, money? A longitudinal investigation of entrepreneur career reasons, growth preferences, and achieved growth. *Entrepreneurship and Regional Development, 19*(1), 89-107.

Chowdhury, F., Audretsch, D. B., and Belitski, M. (2015). Does corruption matter for international entrepreneurship?. *International Entrepreneurship and Management Journal*, *11*(4), 959-980.

Clarysse, B., Wright, M., Bruneel, J., and Mahajan, A. (2014). Creating value in ecosystems: Crossing the chasm between knowledge and business ecosystems. *Research Policy, 43*(7), 1164-1176.

Content, J., Bosma, N., Jordaan, J., and Sanders, M. (2020). Entrepreneurial ecosystems, entrepreneurial activity, and economic growth: new evidence from European regions. *Regional Studies, 54*(8), 1007-1019.

Corsaro, D., Ramos, C., Henneberg, S. C., and Naudé, P. (2012). The impact of network configurations on value constellations in business markets—The case of an innovation network. *Industrial Marketing Management*, *41*(1), 54-67.

Dedehayir, O., Mäkinen, S. J., and Ortt, J. R. (2018). Roles during innovation ecosystem genesis: A literature review. *Technological Forecasting and Social Change, 136*, 18-29.

Dutta, N., and Sobel, R. (2016). Does corruption ever help entrepreneurship?. *Small Business Economics*, *47*(1), 179-199.

Elfring, T., and Hulsink, W. (2003). Networks in entrepreneurship: The case of high-technology firms. *Small Business Economics, 21*(4), 409-422.

El-Harbi, S., and Anderson, A. R. (2010). Institutions and the shaping of different forms of entrepreneurship. *The Journal of Socio-Economics, 39*(3), 436-444.

Estrin, S., Korosteleva, J., & Mickiewicz, T. (2009). *Better means more: property rights and high-growth aspiration entrepreneurship*. (IZA discussion paper series; No. DP No. 4396). IZA.

Estrin, S., Korosteleva, J., and Mickiewicz, T. (2013a). Which institutions encourage entrepreneurial growth aspirations? *Journal of Business Venturing, 28*(4), 564-580.

Estrin, S., Mickiewicz, T., & Stephan, U. (2016). Human capital in social and commercial entrepreneurship. *Journal of Business Venturing*, *31*(4), 449-467.

Estrin, S., Mickiewicz, T., and Stephan, U. (2013b). Entrepreneurship, social capital, and institutions: Social and commercial entrepreneurship across nations. *Entrepreneurship Theory and Practice, 37*(3), 479-504.

Fernandes, A. J., & Ferreira, J. J. (2021). Entrepreneurial ecosystems and networks: a literature review and research agenda. *Review of Managerial Science*, 1-59.

Finegold, D. (1999). Creating self-sustaining, high-skill ecosystems. *Oxford Review of Economic Policy, 15*(1), 60-81.

Freytag, P., and Young, L. C. (2014). Introduction to Special Issue on innovations and networks: Innovation of, within, through, and by networks. *Industrial Marketing Management*, *43*(3), 361-364.

Frow, P., Nenonen, S., Payne, A., & Storbacka, K. (2015). Managing co-creation design: A strategic approach to innovation. *British Journal of Management*, *26*(3), 463-483.

Fuentelsaz, L., González, C., and Maicas, J. P. (2019). Formal institutions and opportunity entrepreneurship. The contingent role of informal institutions. *BRQ Business Research Quarterly, 2*2(1), 5-24.

Fuentelsaz, L., González, C., and Maícas, J. P. (2020). High-growth aspiration entrepreneurship and exit: the contingent role of market-supporting institutions. *Small Business Economics*, 1-20.

Gawer, A. (2014). Bridging differing perspectives on technological platforms: Toward an integrative framework. *Research Policy, 43*(7), 1239-1249.

Granstrand, O., and Holgersson, M. (2020). Innovation ecosystems: A conceptual review and a new definition. *Technovation*, *90*, 102098.

Grant, R. M. (1996). Prospering in dynamically-competitive environments: Organizational capability as knowledge integration. *Organization Science*, *7*(4), 375-387.

Grillitsch, M., & Nilsson, M. (2015). Innovation in peripheral regions: Do collaborations compensate for a lack of local knowledge spillovers?. *The Annals of Regional Science*, *54*(1), 299-321.

Hadjimanolis, A. (2003). The Barriers Approach to Innovation. In L. V. Shavinina (Ed.), The International Handbook on Innovation (pp. 559–573). Oxford: Elsevier Science

Henderson, R. (2006). The innovator's dilemma as a problem of organizational competence. *Journal of Product Innovation Management, 23*(1), 5-11.

Henrekson, M., and Stenkula, M. (2010). Entrepreneurship and public policy. In: Acs, Z.J., Audretsch, D.B. (Eds.), Handbook of Entrepreneurship Research (pp. 595–637). Springer, New York.

Hill, C. W., and Rothaermel, F. T. (2003). The performance of incumbent firms in the face of radical technological innovation. *Academy of Management Review*, *28*(2), 257-274.

Hite, J. M. (2005). Evolutionary processes and paths of relationally embedded network ties in emerging entrepreneurial firms. *Entrepreneurship Theory and Practice, 29*(1), 113-144.

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations*. Sage publications.

Huggins, R., Waite, D., and Munday, M. (2018). New directions in regional innovation policy: a network model for generating entrepreneurship and economic development. *Regional Studies*, *52*(9), 1294-1304.

Iyer, G. R., LaPlaca, P. J., and Sharma, A. (2006). Innovation and new product introductions in emerging markets: Strategic recommendations for the Indian market. *Industrial Marketing Management*, *35*(3), 373-382.

Jabbouri, R., Truong, Y., Schneckenberg, D., and Palmer, M. (2019). Institutional means-ends decoupling work in industrial R&D project implementation. *Industrial Marketing Management*, *80*, 296-311.

Jacobides, M. G., Cennamo, C., and Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal, 39*(8), 2255-2276.

Jensen, K. W., and Schøtt, T. (2014). Firms' innovation embedded in their networks of collaboration: China compared to the world. *Journal of Chinese Economic and Business Studies, 12*(3), 273-292.

Johannisson, B., and Mønsted, M. (1997). Contextualizing entrepreneurial networking: The case of Scandinavia. *International Studies of Management and Organization, 27*(3), 109-136.

Kaartemo, V., Coviello, N., and Nummela, N. (2020). A kaleidoscope of business network dynamics: Rotating process theories to reveal network micro-foundations. *Industrial Marketing Management, 91*, 657-670.

Karlsson, C., and Warda, P. (2014). Entrepreneurship and innovation networks. *Small Business Economics, 43*(2), 393-398.

Kastanakis, M. N., and Voyer, B. G. (2014). The effect of culture on perception and cognition: A conceptual framework. *Journal of Business Research, 67*(4), 425-433.

Khurana, I., and Dutta, D. K. (2021). From latent to emergent entrepreneurship in innovation ecosystems: The role of entrepreneurial learning. *Technological Forecasting and Social Change*, *167*, 120694.

Koskela-Huotari, K., and Vargo, S. L. (2016). Institutions as resource context. *Journal of Service Theory and Practice, 26*(2), 163-178.

Kwon, S. W., and Arenius, P. (2010). Nations of entrepreneurs: A social capital perspective. *Journal of Business Venturing, 25*(3), 315-330.

Laage-Hellman, J., Landqvist, M., and Lind, F. (2018). Business creation in networks: How a technology-based start-up collaborates with customers in product development. *Industrial Marketing Management, 70*, 13-24.

Laursen, K., and Salter, A. J. (2014). The paradox of openness: Appropriability, external search, and collaboration. *Research Policy, 43*(5), 867-878.

Lechner, C., and Dowling, M. (2003). Firm networks: external relationships as sources for the growth and competitiveness of entrepreneurial firms. *Entrepreneurship and Regional Development, 15*(1), 1-26.

Leendertse, J., Schrijvers, M., & Stam, E. (2021). Measure twice, cut once: Entrepreneurial ecosystem metrics. *Research Policy*, 104336.

Leendertse, J., Schrijvers, M., & Stam, E. (2021). Measure twice, cut once: Entrepreneurial ecosystem metrics. *Research Policy*, 104336.

Letaifa, S. B., and Rabeau, Y. (2013). Too close to collaborate? How geographic proximity could impede entrepreneurship and innovation. *Journal of Business Research, 66*(10), 2071-2078.

Levie, J., and Autio, E. (2011). Regulatory burden, rule of law, and entry of strategic entrepreneurs: An international panel study. *Journal of Management Studies*, *48*(6), 1392-1419.

Li, J. F., and Garnsey, E. (2014). Policy-driven ecosystems for new vaccine development. *Technovation*, *34*(12), 762-772.

Lieber, R. L. (1990). Statistical significance and statistical power in hypothesis testing. *Journal of Orthopaedic Research*, *8*(2), 304-309.

Liu, Y., and Almor, T. (2016). How culture influences the way entrepreneurs deal with uncertainty in inter-organizational relationships: The case of returnee versus local entrepreneurs in China. *International Business Review, 25*(1), 4-14.

Malecki, E. J., & Spigel, B. (2017). Innovation and entrepreneurship. In *The Elgar Companion to Innovation and Knowledge Creation*. Edward Elgar Publishing.

Mason, C., and Brown, R. (2013). Creating good public policy to support high-growth firms. *Small Business Economics, 40*(2), 211-225.

Matinheikki, J., Pesonen, T., Artto, K., and Peltokorpi, A. (2017). New value creation in business networks: The role of collective action in constructing system-level goals. *Industrial Marketing Management, 67*, 122-133.

Mattes, J. (2012). Dimensions of proximity and knowledge bases: innovation between spatial and non-spatial factors. *Regional Studies*, *46*(8), 1085-1099.

Mazzucato, M., and Robinson, D. K. (2018). Co-creating and directing Innovation Ecosystems? NASA's changing approach to public-private partnerships in low-earth orbit. *Technological Forecasting and Social Change*, *136*, 166-177.

Meyer, K. E., and Peng, M. W. (2016). Theoretical foundations of emerging economy business research. *Journal of International Business Studies, 47*(1), 3-22.

Mittal, Varun. (2019). Colombia FinTech Landscape. Ernst and Young Report.

Möller, K., and Halinen, A. (2017). Managing business and innovation networks—From strategic nets to business fields and ecosystems. *Industrial Marketing Management, 67*, 5-22.

Möller, K., Nenonen, S., & Storbacka, K. (2020). Networks, ecosystems, fields, market systems? Making sense of the business environment. *Industrial Marketing Management*, *90*, 380-399.

Mooi, E. A., and Frambach, R. T. (2012). Encouraging innovation in business relationships—A research note. *Journal of Business Research*, *65*(7), 1025-1030.

Mueller, E. F., and Jungwirth, C. (2016). What drives the effectiveness of industrial clusters? Exploring the impact of contextual, structural, and functioning determinants. *Entrepreneurship and Regional Development*, *28*(5-6), 424-447.

Najafi-Tavani, S., Najafi-Tavani, Z., Naudé, P., Oghazi, P., and Zeynaloo, E. (2018). How collaborative innovation networks affect new product performance: Product innovation capability, process innovation capability, and absorptive capacity. *Industrial Marketing Management, 73*, 193-205.

Nambisan, S., and Baron, R. A. (2013). Entrepreneurship in innovation ecosystems: Entrepreneurs' self–regulatory processes and their implications for new venture success. *Entrepreneurship Theory and Practice, 37*(5), 1071-1097.

Nambisan, S., and Sawhney, M. (2011). Orchestration processes in network-centric innovation: Evidence from the field. *Academy of Management Perspectives, 25*(3), 40-57.

Nambisan, S., Siegel, D., and Kenney, M. (2018). On open innovation, platforms, and entrepreneurship. *Strategic Entrepreneurship Journal, 12*(3), 354-368.

Naudé, P., Zaefarian, G., Tavani, Z. N., Neghabi, S., and Zaefarian, R. (2014). The influence of network effects on SME performance. *Industrial Marketing Management, 43*(4), 630-641.

Nooteboom, B. (2000). Institutions and forms of coordination in innovation systems. *Organization Studies*, *21*(5), 915-939.

Nordin, F., Ravald, A., Möller, K., and Mohr, J. J. (2018). Network management in emergent high-tech business contexts: Critical capabilities and activities. *Industrial marketing management*, *74*, 89-101.

North, D. (1990). *Institutions, Institutional Change and Economic Performance (Political Economy of Institutions and Decisions)*. Cambridge: Cambridge University Press.

O'Connor, A., Stam, E., Sussan, F., & Audretsch, D. B. (2018). Entrepreneurial ecosystems. *Place-Based Transformations and Transitions. NY: Springer*.

OECD (2016), Start-up Latin America 2016: Building an Innovative Future, Development Centre Studies, OECD Publishing, Paris

Pattinson, S., Nicholson, J., and Lindgreen, A. (2018). Emergent coopetition from a sensemaking perspective: A multi-level analysis. *Industrial Marketing Management, 68*, 25-35.

Pellikka, J., and Ali-Vehmas, T. (2019). Fostering techno-entrepreneurship and open innovation practices in innovation ecosystems-the case of Nokia. In Thérin, F., Appio, F. P., and Yoon, H. (Eds.), *Handbook of Research on Techno-Entrepreneurship*, Third Edition (pp. 175–200). Edward Elgar Publishing.

Pittaway, L., Robertson, M., Munir, K., Denyer, D., and Neely, A. (2004). Networking and innovation: a systematic review of the evidence. *International Journal of Management Reviews, 5*(3-4), 137-168.

Puffer, S. M., McCarthy, D. J., and Boisot, M. (2010). Entrepreneurship in Russia and China: The impact of formal institutional voids. *Entrepreneurship Theory and Practice, 34*(3), 441-467.

Radicic, D., Pugh, G., and Douglas, D. (2020). Promoting cooperation in innovation ecosystems: evidence from European traditional manufacturing SMEs. *Small Business Economics*, *54*(1), 257-283.

Radosevic, S. (2010). What makes entrepreneurship systemic. In Malerba, F. (Ed.), Knowledge-Intensive Entrepreneurship and Innovation Systems: Evidence from Europe. (pp. 52–76) London. Routledge

Radosevic, S., and Yoruk, E. (2013). Entrepreneurial propensity of innovation systems: Theory, methodology, and evidence. *Research Policy, 42*(5), 1015-1038.

Reynolds, E. B., and Uygun, Y. (2018). Strengthening advanced manufacturing innovation ecosystems: The case of Massachusetts. *Technological Forecasting and Social Change, 136*, 178-191.

Ritala, P., Agouridas, V., Assimakopoulos, D., and Gies, O. (2013). Value creation and capture mechanisms in innovation ecosystems: a comparative case study. *International Journal of Technology Management, 63*(3-4), 244-267.

Ritala, P., and Almpanopoulou, A. (2017). In defense of 'eco' in innovation ecosystems. *Technovation, 60*, 39-42.

Russell, M. G., and Smorodinskaya, N. V. (2018). Leveraging complexity for ecosystemic innovation. *Technological Forecasting and Social Change*, *136*, 114-131.

Schøtt, T., and Jensen. K. W., (2016). Firms' innovation benefiting from networking and institutional support: A global analysis of national and firm effects. *Research Policy, 45*(6),1233–46

Schøtt, T., and Sedaghat, M. (2014). Innovation embedded in entrepreneurs' networks and national educational systems: A global study. *Small Business Economics, 43*(2), 463-476.

Scott, S., Hughes, M., and Kraus, S. (2019). Developing relationships in innovation clusters. *Entrepreneurship and Regional Development, 31*(1-2), 22-45.

Scott, S., Hughes, M., and Ribeiro-Soriano, D. (2021). Towards a network-based view of effective entrepreneurial ecosystems. *Review of Managerial Science*, 1-31.

Scott, W. R. 2001. Institutions and organizations (2nd ed). Thousand Oaks, CA: Sage.

Shane, S. (1993). Cultural influences on national rates of innovation. *Journal of Business Venturing, 8*(1), 59-73.

Shane, S. (1994). The effect of national culture on the choice between licensing and direct foreign investment. *Strategic Management Journal, 15*(8), 627-642.

Shane, S. A. (2003). A general theory of entrepreneurship: The individual-opportunity nexus. A General Theory of Entrepreneurship. Northampton, MA. Edward Elgar.

Shipilov, A., and Gawer, A. (2020). Integrating research on inter-organizational networks and ecosystems. *Academy of Management Annals*, *14*(1), 92-121.

Simón-Moya, V., Revuelto-Taboada, L., and Guerrero, R. F. (2014). Institutional and economic drivers of entrepreneurship: An international perspective. *Journal of Business Research, 67*(5), 715-721.

Smith, D. and Lohrke, F. (2008). Entrepreneurial Network Development: Trusting in the Process. *Journal of Business Research, 61*, 315–322

Spigel, B. (2017). The relational organization of entrepreneurial ecosystems. *Entrepreneurship Theory and Practice*, *41*(1), 49-72.

Stam, E. (2015). Entrepreneurial ecosystems and regional policy: a sympathetic critique. *European Planning Studies, 23*(9), 1759-1769.

Stam, E. (2015). Entrepreneurial ecosystems and regional policy: a sympathetic critique. *European Planning Studies*, *23*(9), 1759-1769.

Stephan, U., Uhlaner, L. M., and Stride, C. (2015). Institutions and social entrepreneurship: The role of institutional voids, institutional support, and institutional configurations. *Journal of International Business Studies, 46*(3), 308-331.

Still, K., Huhtamäki, J., Russell, M. G., and Rubens, N. (2014). Insights for orchestrating innovation ecosystems: the case of EIT ICT Labs and data-driven network visualizations. *International Journal of Technology Management 23*, *66*(2-3), 243-265.

Suchman, M. C. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of Management Review, 20*(3), 571-610.

Tonoyan, V., Strohmeyer, R., Habib, M., and Perlitz, M. (2010). Corruption and entrepreneurship: How formal and informal institutions shape small firm behavior in transition and mature market economies. *Entrepreneurship Theory and Practice, 34*(5), 803-832.

Urbano, D., Aparicio, S., and Audretsch, D. (2019). Twenty-five years of research on institutions, entrepreneurship, and economic growth: what has been learned? *Small Business Economics, 53*(1), 21-49.

Uslaner, E. M. (2005). The bulging pocket and the rule of law: Corruption, inequality, and trust. In *Conference on the Quality of Government: What it is, how to Get it, Why it Matters,* 17-19.

Uyarra E., and Ramlogan R. (2016). The Impact of Cluster Policy on Innovation, in J. Edler P. Cunningham A. Gök P. Shapira (eds), *Handbook of Innovation Policy Impact,* (pp. 279–317) Cheltenham, Edward Elgar.

Vaillant, Y., and Lafuente, E. (2007). Do different institutional frameworks condition the influence of local fear of failure and entrepreneurial examples over entrepreneurial activity?. *Entrepreneurship and Regional Development, 19*(4), 313-337.

Vargo, S. L., and Lusch, R. F. (2016). Institutions and axioms: an extension and update of service-dominant logic. *Journal of the Academy of Marketing Science, 44*(1), 5-23.

Vargo, S. L., Wieland, H., and Akaka, M. A. (2015). Innovation through institutionalization: A service ecosystems perspective. *Industrial Marketing Management*, *44*, 63-72.

Wennberg, K., Pathak, S., and Autio, E. (2013). How culture molds the effects of self-efficacy and fear of failure on entrepreneurship. *Entrepreneurship and Regional Development, 25*(9-10), 756-780.

Wennekers, S., van Stel, A., Thurik, R., and Reynolds, P. (2005). Nascent Entrepreneurship and the Level of Economic Development. *Small Business Economics, 24*(3), 293-309

Wieland, H., Koskela-Huotari, K., and Vargo, S. L. (2016). Extending actor participation in value creation: an institutional view. *Journal of Strategic Marketing, 24*(3-4), 210-226.

Williamson, O. E. (2000). The new institutional economics: taking stock, looking ahead. *Journal of Economic Literature, 38*(3), 595–613.

Witt, P. (2004). Entrepreneurs' networks and the success of start-ups. *Entrepreneurship and Regional Development, 16*(5), 391-412.

Yamakawa, Y., Yang, H., & Lin, Z. J. (2011). Exploration versus exploitation in alliance portfolio: Performance implications of organizational, strategic, and environmental fit. *Research Policy*, *40*(2), 287-296.

Yamamura, S., & Lassalle, P. (2020). Proximities and the emergence of regional industry: Evidence of the liability of smallness in Malta. *European Planning Studies*, *28*(2), 380-399.

Yang, Z., and Su, C. (2014). Institutional theory in business marketing: A conceptual framework and future directions. *Industrial Marketing Management, 43*(5), 721-725.

Zahra, S. A., and Nambisan, S. (2011). Entrepreneurship in global innovation ecosystems. *AMS Review*, 1(1), 4-17.

Zahra, S. A., and Nambisan, S. (2012). Entrepreneurship and strategic thinking in business ecosystems. *Business Horizons, 55*(3), 219-229.

Table 2 - Descriptive Statistics

Variable	*Obs.*	*Mean*	*Std. Dev.*
Entrepreneurial Network Emergence	3,535	0.259	0.438
Corruption	3,535	0.482	0.944
Property Rights	3,535	57.568	24.974
Business Freedom	3,535	71.720	15.683
Investment Freedom	3,535	66.433	22.134
Fear of failure	3,535	0.350	0.557
Entrepreneurship good career choice	3,535	0.509	0.630
Status for successful entrepreneurs	3,535	0.573	0.614
Knows another entrepreneur	3,535	0.357	0.508
Age	3,535	40.424	15.070
Age squared	3,535	1861.213	1288.186
Gender	3,535	1.500	0.500
Fixed broadband subscriptions I	3,535	1.39E+07	3.65E+07
Individuals using the Internet	3,535	63.341	22.475
High technology exports current	3,535	3.76E+10	9.57E+10
GDP growth	3,535	2.855	2.910
GDP PPP current international	3,535	1.83E+12	3.52E+12
Population density	3,535	180.624	638.232
Population growth	3,535	0.838	0.990
Patent applications residents	3,535	31904.390	141243.400
R&D exports % of GDP	3,535	1.276	0.931

Table 3 - Estimation results (Mixed-effects Multi-level Logistic Regressions).

	m1	***m2***	***m3***		***m4***		***m5***	
	b/se	***b/se***	***b/se***	***dy/dx*[2]**	***b/se***	***dy/dx***	***b/se***	***dy/dx***
Dependent variable								
Formal Institutions								
Corruption			**-1.340****	**-0.251****			**-1.354****	**-0.253****
			(0.444)	(0.083)			(0.446)	(0.083)
Property Rights Enforcement			**0.121*****	**0.023*****			**0.118*****	**0.022*****
			(0.035)	(0.006)			(0.035)	(0.007)
Business Freedom			**-0.145*****	**-0.027*****			**-0.151*****	**-0.028*****
			(0.033)	(0.006)			(0.033)	(0.006)
Investment freedom			**-0.053****	**-0.010****			**-0.051****	**-0.010****
			(0.017)	(0.003)			(0.017)	(0.003)
Cultural Context								
Fear of failure					**0.181***	**0.034***	**0.197***	**0.037***
					(0.078)	(0.015)	(0.079)	(0.015)

[2] Standard errors in parenthesis below each marginal effects. Also, for models 4 and 5.

Entrepreneurship is a good career choice					**-0.142***	**-0.027***	**-0.152***	**-0.028***
					(0.072)	(0.014)	(0.072)	(0.014)
Entrepreneurs have status					0.001	0.000	0.011	0.002
					(0.080)	(0.015)	(0.081)	(0.015)
Controls								
Knows another entrepreneur		0.390***	0.395***	0.074***	0.407***	0.077***	0.414***	0.077***
		(0.080)	(0.080)	(0.015)	(0.080)	(0.015)	(0.080)	(0.015)
Age		0.007	0.006	0.001	0.005	0.001	0.005	0.001
		(0.020)	(0.020)	(0.004)	(0.020)	(0.004)	(0.020)	(0.004)
Age squared		-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gender		-0.337***	-0.332***	-0.062***	-0.347***	-0.066***	-0.342***	-0.064***
		(0.083)	(0.083)	(0.015)	(0.083)	(0.016)	(0.084)	(0.015)
Fixed broadband subscriptions		0.000	0.000***	0.000***	0.000	0.000***	0.000***	0.000***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Individuals using the Internet		0.044***	0.091***	0.017***	0.043***	0.008***	0.089***	0.017***
		(0.011)	(0.017)	(0.003)	(0.012)	(0.002)	(0.017)	(0.010)
High technology exports current		0.000	-0.000	-0.000	-0.000	-0.000**	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP growth		-0.023	-0.035	-0.007	-0.018	-0.003	-0.036	-0.007
		(0.032)	(0.054)	(0.010)	(0.033)	(0.006)	(0.054)	(0.010)
GDP PPP current international		0.000	-0.000***	-0.000	0.000	0.000**	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population density		-0.001	-0.005**	-0.001**	-0.001	-0.000	-0.006**	-0.001**
		(0.001)	(0.002)	(0.000)	(0.001)	(0.000)	(0.002)	(0.000)
Population growth		-0.127	-0.375	-0.070	-0.124	-0.023	-0.307	-0.057
		(0.101)	(0.230)	(0.043)	(0.107)	(0.020)	(0.231)	(0.043)
Patent applications residents		-0.000	-0.000***	-0.000**	-0.000	-0.000***	-0.000***	-0.000**
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R&D export % of GDP		-1.084*	-2.304**	-0.432**	-1.030	-0.195	-2.095*	-0.392*
		(0.521)	(0.864)	(0.161)	(0.544)	(0.103)	(0.871)	(0.162)
N		3535	3535	3535	3535	3535	3535	3535
Constant	-0.965***	-1.938***	4.800*		-1.856**		5.304**	
	(0.179)	(0.563)	(1.915)		(0.588)		(1.928)	
/ var(_cons[~)	0.641**	0.025	0.000		0.031		0.000	
	(0.218)	(0.023)	(0.000)		(0.026)		(0.000)	

*p<0.10**p<0.05 ***p<0.01

Appendix

Table 4 - Moderating effects of Formal Institutions H3

	m6	***m7***	***m8***
	b/se	*b/se*	*b/se*
Dependent Variable			
Formal Institutions			
Corruption	-1.462**	-1.216*	-1.086*
	(0.451)	(0.474)	(0.462)
Property Rights	0.125***	0.110**	0.106**
	(0.036)	(0.037)	(0.036)
Business Freedom	-0.153***	-0.152***	-0.149***
	(0.033)	(0.033)	(0.033)
Investment freedom	-0.053**	-0.048**	-0.048**
	(0.017)	(0.018)	(0.018)
Cultural Context			
Fear of failure	0.690	0.199*	0.190*
	(0.553)	(0.079)	(0.079)
Entrepreneurship good choice of career	-0.150*	-0.709	-0.166*
	(0.072)	(0.519)	(0.073)
Entrepreneurs have status	0.010	0.004	-0.957
	(0.081)	(0.081)	(0.596)
Controls			
Knows another entrepreneur	0.416***	0.418***	0.398***
	(0.080)	(0.080)	(0.081)
Age	0.005	0.005	0.003
	(0.020)	(0.020)	(0.020)
Age squared	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Gender	-0.341***	-0.341***	-0.344***
	(0.084)	(0.084)	(0.084)
Fixed broadband subscriptions	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Individuals using the Internet	0.090***	0.089***	0.089***
	(0.017)	(0.017)	(0.017)
High technology exports current	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
GDP growth	-0.039	-0.032	-0.011
	(0.055)	(0.055)	(0.055)
GDP PPP current international	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)
Population density	-0.006**	-0.006**	-0.006**
	(0.002)	(0.002)	(0.002)
Population growth	-0.364	-0.305	-0.364
	(0.234)	(0.233)	(0.235)

Patent applications residents	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)
R&D export of GDP	-2.206*	-2.032*	-1.936*
	(0.883)	(0.878)	(0.878)
Fear of fail x Corruption	0.304		
	(0.227)		
Fear of fail x Property Rights	-0.003		
	(0.010)		
Fear of fail x Business Freedom	-0.001		
	(0.009)		
Fear of fail x Investment Freedom	-0.006		
	(0.005)		
Entrepreneurship is a good career choice x Corruption		-0.154	
		(0.218)	
Entrepreneurship is a good career choice x Property Rights		0.006	
		(0.011)	
Entrepreneurship is a good career choice x Business Freedom		0.007	
		(0.008)	
Entrepreneurship is a good career choice x Investment Freedom		-0.003	
		(0.005)	
Entrepreneurs have status x Corruption			-0.549*
			(0.233)
Entrepreneurs have status x Property Rights			0.018
			(0.011)
Entrepreneurs have status x Business Freedom			0.009
			(0.010)
Entrepreneurs have status x Investment Freedom			-0.008
			(0.005)
Constant	5.283**	5.583**	5.364**
	(1.945)	(1.944)	(1.963)
/			
var(_cons[~)	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)

*p<0.10 **p<0.05 ***p<0.01

Table 5 - Baseline Mixed-effects multi-model

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	b/(se)	*b/(se)*	*b/(se)*	*b/(se)*	*b/(se)*
Dependent Variable					

Formal Institutions					
Corruption			-0.322***		-0.324***
			(0.089)		(0.089)
Property Rights			0.028***		0.028***
			(0.007)		(0.007)
Business Freedom			-0.033***		-0.034***
			(0.006)		(0.006)
Investment freedom			-0.013***		-0.012***
			(0.003)		(0.003)
Cultural Context					
Fear of failure				0.034*	0.036*
				(0.01477)	(0.015)
Entrepreneurship good career choice				-0.029*	-0.030*
				(0.01389)	(0.014)
Status for entrepreneurs				-0.000	0.002
				(0.01534)	(0.015)
Controls					
Knows another entrepreneur		0.076***	0.076***	0.079***	0.079***
		(0.015)	(0.015)	(0.015)	(0.015)
Age		0.001	0.001	0.001	0.001
		(0.004)	(0.004)	(0.004)	(0.004)
Age squared		-0.000	-0.000	-0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)
Gender		-0.062***	-0.061***	-0.064***	-0.063***
		(0.015)	(0.015)	(0.015)	(0.015)
Fixed broadband subscriptions		0.000	0.000***	0.000	0.000***
		(0.000)	(0.000)	(0.000)	(0.000)
Individuals using the Internet		0.009***	0.021***	0.009***	0.020***
		(0.002)	(0.003)	(0.002)	(0.003)
High technology exports current		-0.000	-0.000*	-0.000	-0.000*
		(0.00000)	(0.000)	(0.000)	(0.000)
GDP growth		-0.001	-0.004	0.000	-0.004
		(0.007)	(0.011)	(0.007)	(0.011)
GDP PPP current international		0.000	-0.000***	0.000	-0.000***
		(0.000)	(0.000)	(0.000)	(0.000)
Population density		-0.000	-0.001**	-0.000	-0.001**
		(0.000)	(0.000)	(0.000)	(0.000)
Population growth		-0.037	-0.096*	-0.036	-0.083
		(0.022)	(0.046)	(0.023)	(0.047)
Patent applications residents		-0.000	-0.000***	-0.000	-0.000***
		(0.000)	(0.000)	(0.000)	(0.000)
R&D exp of GDP		-0.185	-0.512**	-0.175	-0.469**
		(0.104)	(0.173)	(0.108)	(0.173)
Constant	0.300***	0.066	1.522***	0.086	1.617***
	(0.033)	(0.116)	(0.382)	(0.120)	(0.382)
lns1_1_1					

_cons	-1.898***	-3.209***	-21.414***	-3.136***	-21.888**
	(0.164)	(0.358)	(5.379)	(0.335)	(6.653)
lnsig_e					
_cons	-0.866***	-0.835***	-0.837***	-0.837***	-0.838***
	(0.011)	(0.012)	(0.012)	(0.012)	(0.012)

*p<0.10 **p<0.05 ***p<0.01