

# **Technology Transfer and Entrepreneurial Innovations: Policies Across Continents<sup>1</sup>**

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## Chapter 1. Academic Tendencies in Policy Frameworks for Fostering Entrepreneurial Innovations<sup>3</sup>

Maribel Guerrero and David Urbano

### Abstract

This chapter provides a better understanding of the theoretical, managerial, and policy implications of entrepreneurial innovation policies. By examining the accumulation of literature published from 1970 to 2019, this chapter clarifies the definition of entrepreneurial innovations and the policy frameworks' role in fostering this phenomenon worldwide. We conclude by outlining an agenda for additional research on this topic and implications for different stakeholders.

### 1.1 Introduction

Entrepreneurship and innovation are strongly related topics since Schumpeter's (1942) seminal work about "creative destruction." Over the last eight decades, the entrepreneurship literature has been oriented to the individual or the firm, while the innovation literature has paid attention to the structure and policies (Zahra and Wright 2011). Despite this disconnection, convergent studies found insights about a positive relationship between robust technology transfer regulations and high-growth entrepreneurship characterized by higher innovation contributions and high-skilled human capital (Guerrero and Urbano 2017, 2019; Mosey et al. 2017; Urbano et al. 2018). The effect of policies may explain entrepreneurial innovation's dynamic rates across territories. According to Guerrero and Urbano (2019), the accumulation of knowledge about technology transfer policies has highlighted the replication of the US technology transfer system and legislative systems. Nevertheless,

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little is known about the effectiveness of the replicated technology transfer policies for fostering entrepreneurial innovation across the globe (Audretsch and Link 2012; Gorsuch and Link 2018; Guerrero and Urbano 2019; Link and van Hasselt 2019a). Current academic discussions claim to clarify questions related to policies, legislation, and strategies implemented by governments across countries/continents to stimulate entrepreneurial innovations; the effectiveness of replicated United States (U.S.) technology transfer programs (e.g., the Bayh-Dole Act; the Small and Business Innovation Research -SBIR-, and other programs); the measures implemented to evaluate the performance and the success of entrepreneurial innovations policies; and the novel theoretical approaches for a better understanding of the determinants/consequences of entrepreneurial innovations policies. Inspired by these academic discussions, this chapter addresses a literature review for a better theoretical-empirical understanding behind the (un)success of technology transfer policies and legislation that stimulates entrepreneurial innovation across the world. The two research objectives of this chapter are: (a) to provide a better understanding of entrepreneurial innovations across diverse organizational and geographical contexts; and (b) to provide intercountry evidence about the success of governments' interventions to promote entrepreneurial innovations through ecosystems' agents (e.g., replication of U.S. technology transfer policies or new legislation). We revised the accumulation of knowledge linking entrepreneurship, innovation, and policy from 1970 to 2019. Concretely, we identified 431 publications that examine what entrepreneurial innovations mean and which type of policy frameworks have been implemented to foster entrepreneurial innovations worldwide.

The remainder of this chapter is organized as follows. Section 1.2 clarifies the definitions of entrepreneurial innovations adopted in previous studies as well as their connection with a public policy perspective. Section 1.3 introduces a review of the existing literature adopting narrow criteria (entrepreneurship, innovation, and policies) to evidence the contextual focus of previous studies. Section 1.4 highlights an agenda for additional research on this topic. In the final section, we conclude by outlining policy implications.

## **1.2 Entrepreneurial Innovations and Policy Frameworks**

### ***1.2.1 Defining Entrepreneurial Innovations***

There is not a consensus about what entrepreneurial innovations mean (see Table 1.1). The concept of entrepreneurial innovation was introduced by Schumpeter (1942). In Schumpeter's perspective, entrepreneurial innovations represented the natural consequence of entrepreneurs' creative destruction when transforming the means into radical/marketable innovations. A plausible explanation was related to certain policies (e.g., tax or labor reforms or incentives) that directly or indirectly influenced the entrepreneurs' transformation of means into radical/marketable innovations. Sixty years later, Von Bargen et al. (2003, p. 315) extended the understanding of entrepreneurial innovations by analyzing a small group of high-growth companies that transformed their industries. The explanation of this transformation

resulted from the government intervention that enhanced intellectual property protection by implementing patent/copyright laws and judicial procurements (Von Bargen et al. 2003, p. 318). A few years later, Cohen (2006, p.1) introduced sustainability by assuming that entrepreneurial innovations contribute to a sustainable society's configuration. In this view, an entrepreneurial ecosystem and the government's interventions play a relevant role in fostering entrepreneurial innovations through tax, incentives, subsidies, and grants (Cohen 2006, p.4). Afterward, Norbäck and Persson (2012, 488) emphasized that the lower number of entrepreneurial innovations explained outsiders' existence within specific industries. In this vein, the intensity of competition policies may incentivize entrepreneurial innovations by a few entrepreneurs with high growth orientation (Norbäck and Persson 2012, p.490). Similarly, Haufter et al. (2014, p.13) explained entrepreneurial innovations as the link between public policies and the commercialization of inventions or business ideas; specifically how tax policies affect entrepreneurs' choice of riskiness (or quality) of an innovation project and their mode of commercializing the innovation (market entry vs. sale) (Haufter et al. 2014, p.14). Then, Autio et al. (2014) adopted an integral perspective to highlight the entrepreneurship ecosystem's intersection and the innovation ecosystem. This intersection was explained through multi-level processes among actors and specific contexts that regulate the development of disruptions of existing industries. In this view, entrepreneurial innovations were understood as the development of entrepreneurial initiatives focused on radical innovations based on the co-creation among multiple actors within a defined space/time (Autio et al. 2014, p.1100). Therefore, entrepreneurial innovations were the result of an effective policy that fosters entrepreneurship and innovation ecosystems. Likewise, Malerba and McKelvey (2018, p.15) extend entrepreneurial innovation definitions with a learning perspective of organizations and how ecosystems influence the generation and diffusion of marketable innovations. Over the last five decades, the literature on entrepreneurial innovations showed an underrepresentation of this phenomenon in the context of emerging economies. Guerrero and Urbano (2017, p.295) expand the definition of entrepreneurial innovations by introducing the relevance of context and how university-industry collaborations allow the emergence of this phenomenon in the context of emerging economies. Particularly, Guerrero and Urbano (2017, p.297) highlighted the crucial role of innovation and entrepreneurship policies and subsidies. Subsequently, Amorós et al. (2019, p. 1405) defined entrepreneurial innovations as innovative and ambitious entrepreneurial activities in emerging economies that emerge within environments characterized by favorable policy support towards entrepreneurs, government subsidies for new technology, as well as R&D policies. It inspired a few researchers to analyze the phenomenon in other emerging economies (Dossou and Ju 2019; Komlósi et al. 2019; Sharma and Sharma 2019; Ahworegba et al. 2020). In this chapter, based on these definitions, we defined entrepreneurial innovations as

“the generation of novel products, services, and technologies that emerged within an efficient interface among agents involved in entrepreneurial ecosystems and innovation ecosystems. Intuitively, entrepreneurial innovations could be considered as a proxy to measure the effectiveness of technology transfer policies, as well as responsible for higher social and economic impacts.”

**Table 1.1** Entrepreneurial Innovations Fostered by Policy Frameworks

| Entrepreneurial innovations  | Policy focus  | Authors                     |
|--|---|-----------------------------|
| “creative destruction as an inherent consequence of the means of production in the hands of entrepreneurs.”  | “approached issues of tax policy, wage formation, monetary policy in a pragmatic way.”  | Schumpeter (1942)           |
| “a small group of high-growth entrepreneurial companies that transformed the industries they entered” p. 315   | “how Federal policy changes have steadily pushed the pendulum back in favor of enhancing intellectual property protection for entrepreneurial innovations through myriad changes to the patent and copyright laws” p. 318   | Von Barga et al. (2003)     |
| “entrepreneurial firms that contribute towards a more sustainable society through innovation” p. 1   | “how governments can foster or hinder them through tax, incentives, subsidies, and grants” p.4  | Cohen (2006)                |
| “innovations made by outsiders to a specific industry, constitute a crucial ingredient in a well-functioning market economy” p. 488  | “how the intensity of competition and competition policy affects the incentive for entrepreneurial innovations” p. 490  | Norbäck and Persson (2012)  |
| “as involving the disruption of existing industries and creation of new ones through multi-level processes and stakeholders, multiple actors and multiple contexts that constitute different entrepreneurial ecosystems” p. 1100 | “how contexts regulate entrepreneurial innovation ... and contexts are (1) industry and technological contexts; (2) organizational contexts; (3) institutional and policy contexts (distinguishing between formal and informal institutions); and (4) social contexts” p.1100 | Autio et al. (2014)         |
| “entrepreneurs that commercialize their inventions or business ideas not only by entering the product market but also by selling them to incumbent firms” p.13   | “how tax policies affect entrepreneurs’ choice of riskiness (or quality) of an innovation project, and on their mode of commercializing the innovation (market entry versus sale).” p.14  | Haufler et al. (2014)       |
| “enterprises that develop disruptive innovations adopting an entrepreneurial orientation -risk-taking, proactiveness, and innovativeness-... as well as, high-growth orientation” p. 295   | “how subsidized public policy programs provide resources for collaborative projects involving universities and enterprises in emerging economies” p. 297  | Guerrero and Urbano (2017)  |
| “as new learning organizations that use and transform existing knowledge and generate new knowledge in order to innovate within innovation systems” p.15   | “how National innovation systems affect the generation and diffusion of knowledge and the formation of entrepreneurship through universities and the educational system, public policy, national regulation, and standardization” p. 15                                       | Malerba and McKelvey (2018) |
| “as the novel products/services/technologies that have been the outcome of an efficient interface between the agents from local entrepreneurial ecosystems and innovation ecosystems” p. 1350                                    | “intuitively, entrepreneurial innovations could be a proxy to measure the effectiveness of technology transfer policies/legislations” p. 1350   | Guerrero and Urbano (2019)  |
| “as innovative and ambitious entrepreneurial activities in emerging economies” p.1405  | “that emerge within environments characterized by favorable policy support towards entrepreneurs, government subsidies for new technology, and R&D transfer” p. 1405  | Amorós et al. (2019)        |

Source: Author

### 1.2.2 Policy Frameworks

Given the relevance of entrepreneurial innovations, worldwide governments have intervened through several policy frameworks and instruments that directly or indirectly have fostered entrepreneurial innovations. The first analysis reviewed the funding agents acknowledged in the 431 published papers related to entrepreneurial innovations (see Table 1.3).

**Table 1.2** Funding Agents Fostering Entrepreneurial Innovations

| Focus   | Funding agents   | Country             |
|---|--|---------------------|
| Entrepreneurship and Innovation (169)               | <i>University centers:</i> Cornell, Connecticut, Kansas, Massachusetts Institute of Technology, Northwestern, University California Irvine, Utah, Stanford, Virginia, Washington, Warton, Carnegie Mellon, Toronto, and others. <i>Government:</i> National Science Foundation, National Institutes of Health, NASA, National Bureau of Economic Research, Atlantic Canada Opportunity Agency, Canadian Social Science Council, and others. <i>Other foundations:</i> Alfred P Sloan, Kaufmann, Sorenson Legacy, Bankcard Fund for Political Economy, and others   | Canada and the U.S. |
|   | <i>University centers:</i> Shanghai, Beijing, and among others. <i>Government:</i> National Science Foundation, Innovation, and Entrepreneurship, Ministry of Education – training programs, special provincial grants.  | China               |
|   | <i>European Commission:</i> Research and Innovation FP7 program, Horizon 2020 program, EU2inno program, and among others. <i>Governments:</i> Agency for innovation and entrepreneurship (Belgium), Danish Social Science Research Council, Finish Innovation Agency, French National Research Agency, German Research Foundation, Greek National Funds, Swedish National Science, Swedish Agency for Economic and Regional Growth, Spanish Ministry of Economics and Competitiveness, and others. <i>Other foundations:</i> Broman (Sweden), WIHURI (Finland). <i>Universities:</i> Aalto, St. Gallen, Turin, Bocconi, Gothenburg, and others | Europe              |
| Intellectual property and technology transfer (262) | <i>Government:</i> National Science Foundation, Department of Health, Department of Energy, Department of Defense, Department of Agriculture, U.S. Army, U.S. patent, and trademarks. <i>Universities:</i> Technology Transfer Offices, IP Offices, and others. <i>Other foundations:</i> Google, Microsoft, Mayo Clinics, Third frontier program, Leonardo Davinci fellowships, Thomas Edison fellowship, and others  | Canada and the U.S. |
|   | <i>Government:</i> National Science Foundation; National Intellectual Property Office; Council of Scientific Industrial Research; Bureau of Science, Technology and Intellectual Property per provinces, Ministry of Education, Ministry of Defense, and others <i>Other foundations:</i> Scholarship Council, Petro China, and others   | China               |
|   | <i>European Commission:</i> European Patent Organization, European Science Foundation (ESF), World Intellectual Property Organization (Geneve), and specific community programs. <i>Government:</i> Intellectual Property Offices in the EU25 countries. <i>Other foundations:</i> Spain Bank, Max Planck Institutes, and others   | Europe              |

Source: Authors

The majority of funding agents were related to university centers, government agencies, and other types of foundations in Canada, the U.S., China, and European

countries. The constructive signal of analyzing funding agents is that we provide insights into the integration between agents involved in innovation and entrepreneurship ecosystems, especially over the last decade. First, we observe a certain grade of imitation from the U.S. frameworks related to entrepreneurial innovation, innovation, intellectual property, and technology transfer. The best example has been replicating the National Science Foundation structure/organization at national and regional levels across countries. Second, China provides a good example of the democratization of frameworks/instruments (e.g., entrepreneurship, innovation, and technology transfer) for fostering entrepreneurial innovations across provinces and cities. This strategy is positively related to the socio-economic development and growth of China. Third, the European zone has also provided a good example of integrating policy frameworks for fostering entrepreneurial innovations based on specific instruments/programs. It represented a good strategy for allocating adequate funds for innovation and entrepreneurship by all members, especially after the 2008-2010 financial crises. These efforts have contributed to the persistence and resilience within the Eurozone. Fourth, this analysis also reveals the underrepresentation of funding agencies based in emerging African, Latin-American, and Asiatic economies. Plausible explanations may be related to the limited sources of funding, the absence of publication associated with the funded projects' outcomes, as well as the lack of acknowledgment.

The second analysis reviewed the reports from funding agents in the Organization for Economic Cooperation and Development (OECD) countries (see Table 1.3). The positive signal of this analysis was the recognition of different instruments from a supply-side (direct funding for R&D firms, fiscal measures, debt schemes, technology services), a demand-side (innovation procurement schemes), and connectivity (clusters) associated with elements that facilitated the development of entrepreneurial innovations. Moreover, the implementation of regulatory frameworks focused on intellectual property rights, product market regulation, administrative procurements, and complementary frameworks on financing, market, labor, and transference of knowledge reveal the government interest in technology, innovation, knowledge transfer-commercialization, and entrepreneurship. The negative signal was the limited, mixed, and inconclusive evidence regarding the effectiveness of these listed policy frameworks and instruments (WIPO 2004; OECD 2008; 2009, 2010, 2011, 2012a, 2012b, 2012c, 2012D). As a consequence, nowadays, it is not possible to understand if the objectives have been achieved, if the impacts generated per each dollar beyond them have covered the expectation, or if the metrics are measuring the outcomes correctly (Winters and Stam 2007; Wölfl et al. 2010; Shapira et al. 2011; Torner 2011; Steen 2012; Westmore 2013; Cunningham et al. 2016). By considering the identified dual effects within the policy frameworks, the most critical gap identified in the literature has been the lack of evaluating studies about the effectiveness of technology transfer policies, programs, and legislation. A plausible explanation is the lack of metrics about how each dollar/euro invested in these public mechanisms has been transformed into entrepreneurial innovations and how these entrepreneurial innovations have impacted the regional and economic growth (Guerrero and Urbano 2019).

**Table 1.3** Policy Frameworks for Innovative Entrepreneurship in OECD Countries

| Policy works                       | frame-Objective (expectation)  | Evidence (reality)  | Countries  | Source   |
|------------------------------------|--|---|--|--|
| SS: Direct funding of R&D firms    | To induce an “additional effect” in firms, with the result that investing more of their resources in R&D   | The rationale of the intervention’s continued relevance and its implementation performance; mainly focused on output additionality—no conclusive evidence.    | 17 OECD members                                    | Cunningham et al. (2016); OECD (2012a); Steen (2012) |
| SS: Fiscal measures                | To encourage firms to invest in R&D through tax incentives.  | Insights underestimate the increasing generosity of R&D tax incentives; full cost is not always transparent.  | 27 OECD members                                    | Westmore (2013)                                      |
| SS: Debt and risk-sharing schemes  | To reduce the risk for lenders/ investors to facilitate access to external finance for innovative firms. Include subsidized loans and credit guarantees. | Scarce and mixed evidence; mainly focused on the “additional effect.” Poor credit culture without sufficient discipline and substantial administrative costs. | Denmark, Norway, Finland, U.K.                     | OECD (2011)  |
| SS: Technology extension services  | To expand the diffusion/adoption of existing technology and to increase the absorptive capacity of targeted firms  | The importance where geographically dispersed firms operate far from international best practices in their industries.  | U.S., Japan, Germany, Canada, Spain, and Argentina | Shapira et al. (2011)                                |
| DS: Innovation procurement schemes | To stimulate the demand, the commercialization, the critical mass, and the access to funding easier.   | Evidence is scarce and no conclusive.   | Australia, Finland, Germany, Sweden, U.K.          | OECD (2012b)   |
| DS: Clusters                       | To facilitate collaboration on complementary economic activities (e.g., smart specialization)  | Most countries have implemented platforms, international and specialized clusters. Scarce evidence.   | OECD   | OECD (2009); OECD (2012c)                            |
| RF: Intellectual property rights   | Allow innovative entrepreneurs to protect their inventions   | An effective IPR system allows entrepreneurs to have more time to grow their businesses before their ideas are imitated                                       | OECD   | OECD (2011); WIPO (2004)                             |
| RF: Product market                 | To promote or inhibit competition  | The economic effects of PMR are heterogeneous   | OECD   | Wölfl et al. (2010)                                  |
| RF: Administrative                 | Seek to enter markets and also to grow   | Evidence is the annual Doing Business report  | OECD   | OECD (2012d)   |
| CF: Market for technology          | Domestic, Foreign, competition   | A few evidence on how to get access to technologies   | Cross-country                                      | OECD (2010)  |
| CF: Labor and capabilities         | Business support, attitudes, skilled capital   | Firms suffer from a shortage of skilled labor   | OECD   | Torner (2011)  |
| CF: Access to finance              | Access to debit, venture capital, and other  | A few evidence on how innovative businesses are financing their innovations   | OECD   | OECD (2008)  |
| CF: Access to knowledge            | ICT, cooperation, public/private investment  | Evidence about networks of knowledge flows  | OECD   | Winters and Stam (2007)                              |

Note: SS=Supply-side; DS = Demand-side; RF- Regulatory frameworks; CF= Complementary frameworks

Source: Authors

The third analysis reviewed the globalization of the technology transfer legislation across the globe (see Table 1.4). In North America, Link and van Hasselt (2019b)

argue that the 1980 Bayh-Dole Act provided an incentive for universities to establish a TTO and position themselves for formally transferring faculty inventions through patent licensing. In Europe, the policy framework focused on supporting entrepreneurial innovations via intellectual property (Harvey 1992; Azagra-Caro 2011; Kilger and Bartenbach 2019), technology-based firms (Gallochat 2003), and research commercialization (Milthers 2003). In the rest of the world, the emergence of technology transfer policies that supported entrepreneurial innovations started in the 1990s and 2000s. Inspired by the Bayh-Dole Act, Chile and Colombia promoted intellectual property legislation (Reichelt 2007; Castro Peñarrieta and Canavire-Bacarrea 2019), while Brazil and Mexico fostered technology innovation legislation (Pojo et al. 2013; Guerrero and Urbano 2017). Likewise, Asian and African countries implemented patent law (Zolotykh 2003), High technology programs (Guo 2007), Industrial Revitalization programs (Takenaka 2005), technology transfer law (Asmoro 2017), and intellectual property Law (Kochupillai 2010; Reichelt 2007).

**Table 1.4** Globalization of Technology Transfer Policies that Support Entrepreneurial Innovations

| Continents    | Legislation   | Entrepreneurial innovations support |
|---------------|---|-------------------------------------|
| North America | USA – 1980 Bayh-Dole Act (Link and Hasselt 2019b)                                     | Via Patents                         |
| Latin America | Chile – 1991 Intellectual Property Law (Castro Peñarrieta and Canavire-Bacarrea 2019) | Via intellectual property           |
|               | Colombia – 1995 Intellectual Property Law (Reichelt 2007)                             | Via intellectual property           |
|               | Brazil – 2004 Innovation Law (Pojo et al. 2013)                                       | Via innovation and exports          |
|               | Mexico – 2009 Technology innovation Law (Guerrero and Urbano 2017).                   | Via technology-based firms and TTOs |
| Europe        | UK – 1985 Kingman Letter (Harvey, 1992)   | Via intellectual property           |
|               | Spain – 1986 Science Law (Azagra-Caro 2011)   | Via intellectual property           |
|               | France – 1999 Innovation Act (Gallochat 2003)   | Via technology-based firms          |
|               | Denmark 1999 Inventions Act (Milthers 2003)   | Via research commercialization      |
|               | Germany – 2002 Employee Invention Law (Kilger and Bartenbach 2019)                    | Via intellectual property           |
| Asia          | Russia – 1992 Patent Law (Zolotykh 2003)  | Via intellectual property           |
|               | China - 1994 High technology program (Guo 2007)                                       | Via intellectual property           |
|               | Japan -1999 Industrial Revitalization (Takenaka 2005)                                 | Via technology transfer             |
|               | Korea -2000 Technology transfer law (Asmoro 2017)                                     | Via patenting                       |
|               | India – 2008 Intellectual property Law (Kochupillai 2010)                             | Via intellectual property           |
| Africa        | South Africa – 2008 Intellectual property Law (Reichelt 2007)                         | Via intellectual property           |

Source: Authors

### 1.3 The Link Between Entrepreneurship, Innovation, and Policy Frameworks On Published Research

After observing the lower number of publications about “entrepreneurial innovation,” we decided to adopt a comprehensive analysis of research published in the Web of Science database better to understand the links between entrepreneurial innovations and public policies. We extend the research adopting the following criteria: (1) using three selecting keywords related to entrepreneurship, innovation, and policies in the title and abstract included per paper; (2) including the analysis of funding agencies acknowledged in the paper; and (3) the period of analysis was from 1971 (since the publication of Schumpeter’s seminal work in 1942) to 2019. After the cleaning process, we identified 431 articles, mostly concentrated in the last decade.

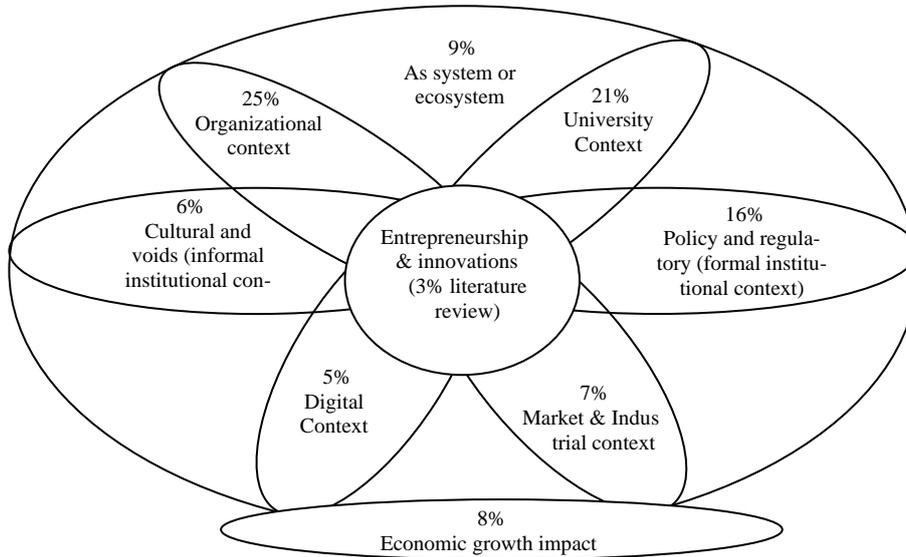
By adopting the Autio et al.’s (2014, p. 1098) framework, we coded into one of ten categories—organizational context (strategies), market conditions (industry effects), social context (societal effects), institutional context (informal institutional conditions), public policy (formal institutional conditions), digital context (digitalization effects), university context (university effects), ecosystem (system effect), economic growth (geographical effects), and literature review papers. There are two rational arguments behind the configuration of the framework’s categories. First, the framework identifies each contextual dimension, where public regulations and policies could produce influences that provide insights about their effectiveness. Second, the framework allows mapping the geographic research settings where those public regulations and policies.

Fig. 1.1 illustrates the published papers’ representative trends about the categories related to entrepreneurial innovations from 1971 to 2019. The first trend shows that 47% of publications are concentrated on organizational context (24%) and university context (21%). In the organizational context, the studies focused on analyzing how organizations design strategies, configure networks and modify their governance structures. More concretely, how these organizational actions are positively related to the achievement of sustainable outcomes by adopting orientations towards innovation (R&D and IPR) and entrepreneurship (corporate venturing) (e.g., see Burgelman 1986; Studdard and Darby, 2008; Dunlap-Hinkler et al. 2010; Ryan and Giblin 2012; Nathan and Lee 2013; Mrożewski and Kratzer 2017; Urbaniec 2018). However, we also observed a reduced number of publications related to understanding how external technology transfer frameworks are positively associated with the highest organizational performance. Likewise, the published studies contextualized into universities reveal insights about the university capabilities responsible for transforming knowledge into disruptive/commercial innovations. Also, the studies show how university capabilities are conditioned by IPR laws such as copyright, patents, licenses, trademarks, trade secrets, and among others (e.g., see Goldsmith and Kerr 1991; Zenie 2003; Sáez-Martínez et al. 2014; Thongpravati et al. 2016; Guerrero et al. 2016; Marozau and Guerrero 2016; Guerrero and Urbano 2017; Guerrero et al. 2019; Eesley and Miller 2018; Qian et al. 2018).

The second trend, at the institutional context, shows that 16% of published studies focused on evaluating the efficiency of specific policy frameworks, country regulations, and governmental instruments (formal institutional context) that enhance or diminish the development/commercialization of entrepreneurial innovations (e.g., see Lo et al. 2005; Tomes et al. 2008; Woolley and Rottner 2008; Audretsch and Link 2012; Batabyal and Nijkamp 2012; Alcalde and Guerrero 2016; Langhorn 2014; Audretsch et al. 2016; Nnakwe et al. 2018). Moreover, matching informal institutional context, a set of published studies (6%) has explored how certain institutional voids, ethical issues, and culture affect the development of entrepreneurship and innovations (e.g., see Golodner 2001; Brenkert 2009; Letaifa and Rabeau 2013).

The last trend shows that the rest of the published studies explored entrepreneurial innovations associated with ecosystem contexts (9%), digital contexts (5%), market context (7%), and the link with economic development (8%).

**Fig. 1.1** Linking Entrepreneurship, Innovation, and Policy Frameworks

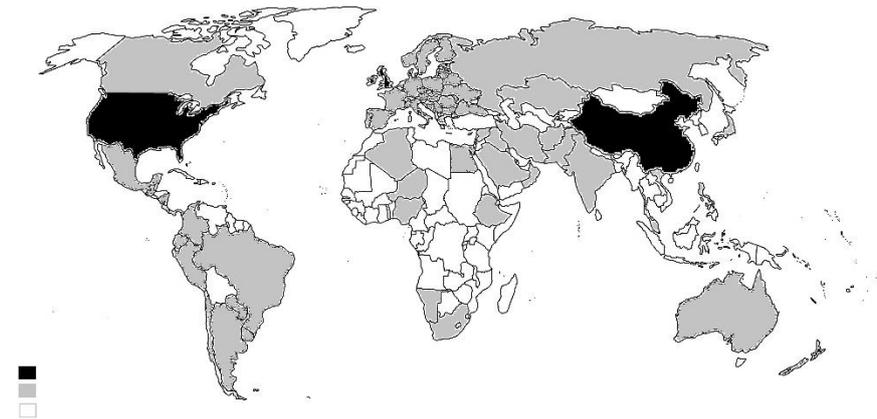


Source: Authors

By type of economy, Fig. 1.2 shows the geographic view of published papers. Over the last four decades, the most represented context is related to the high-income economies (49%) followed by middle-income economies (21%) and low-income economies (18%). More concretely, over the last decade, we observed an increasing trend in analyzing simultaneously mixed-income economies (12%) in one academic publication. However, cross-country studies are still underrepresented in the literature. Being marked in black represents the most analyzed research settings during our revised period. Therefore, being marked in grey means a few studies

(e.g., at least one) in these research settings. This book will contribute with relevant insights about entrepreneurial innovations and policy frameworks worldwide.

**Fig. 1.2** Mapping Research about Entrepreneurial Innovations Worldwide



Source: Authors

## 1.4 Discussing a Research Agenda

Future research agendas on entrepreneurial innovations open a window for investigating the four un-explored contexts.

*First, thinking about governmental context*, knowledge accumulation demands clarification about the policy frameworks' effectiveness. In particular, frameworks that stimulate entrepreneurial innovations at national and regional levels. It is also crucial to understand the (un)effectiveness in replicating/implementing the U.S. policy frameworks (e.g., Bayh Dole Act, SBIR, and other programs) in other countries, especially in the context of emerging economies. Given the current budget restrictions, it is critical to allocate public resources in innovation, entrepreneurship, and research areas that maximize society's return (e.g., the U.K. excellence framework).

*Second, thinking about the emergence of digital contexts*, we suggest that future studies analyze digital entrepreneurial innovations (e.g., platforms, technological artifacts, digital ecosystems, and digital entrepreneurship). The unexpected events (e.g., the COVID-19 pandemic and natural disasters) have especially promoted collaboration and disruptive entrepreneurial innovations to respond to the rapidly. We assume that this research line will continue growing in the following years in multiple perspectives (e.g., operational, strategic, open innovation, intellectual management). We also believe that entrepreneurial innovations in digital scenarios may represent a good alternative for emerging economies' socio-economic development.

*Third, thinking about the university context*, an interesting question may be related to how universities' participation in entrepreneurial and innovation ecosystems has increased entrepreneurial innovations. Indeed, universities' role in stimulating policy frameworks related to intellectual property, technology transfer, entrepreneurship, and universities' role in developing entrepreneurial innovation capabilities in the city, region, or country.

*Fourth, thinking about policy-makers context*, continue transparency, and follow-up of policy frameworks are crucial for ensuring their effectiveness. It implies robust metrics in both real-time and historical time for evaluating results and reconduct the direction. Future research should propose novel conceptual approaches (e.g., dynamic, evolutionary, and stakeholder) and methodological (e.g., longitudinal) approaches to defining/measuring entrepreneurial innovations and the effectiveness of instruments/programs that stimulate them.

## 1.5 Conclusions

This chapter represents an effort to draw together research that examines the policy framework's effectiveness that fosters entrepreneurial innovation across continents. Previously, a significant body of empirical research has been contributed to the effectiveness of U.S. technology transfer policies and legislation such as the Bayh-Dole Act and the Small Business Innovation Research Programme (see Audretsch et al. 2002; Mowery et al. 1999; Shane 2004; Siegel et al. 2003). Based on our literature review, the academic debate about policies' effectiveness still demands evidence at country, cross-country, and cross-continent with rigorous methodologies and robust datasets. Consistent with this, we dissect the literature of entrepreneurship and innovation for evidencing the numerous disruptive innovations introduced by entrepreneurial firms and how entrepreneurial innovation could be considered an outcome of effective regulations across regions, countries, and continents (Autio et al. 2014).

Previous studies provide policy-makers with evidence to inform and shape future legislative and technology transfer policies. However, there is a dearth of similar studies in other geographic regions that examine technology transfer policies' effectiveness. National governments in other regions have used a mix of policy approaches to encourage higher technology transfer levels between different actors in national economies. Some government interventions are cross-country, such as Europe's Horizon 2020, the OECD countries, and previous framework programs. Simultaneously, some of these policy initiatives are implemented without any legislative support, as is the case with significant technology transfer policy initiatives in the U.S. This chapter encourages the academic community to explore policies and legislation's effectiveness in a non-U.S. context to develop new empirical insights into technology transfer policies' effectiveness across continents.

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