

University-Industry joint undertakings with high societal impact:

A micro-processes approach

Jason Roncancio-Marin^{a*1}, Nikolay Dentchev^a, Maribel Guerrero^{bc}, Abel Díaz-González^a, Thomas Crispeels^a

^a Department of Business, Management and Strategy, Vrije Universiteit Brussel, Brussels 1050, Belgium.

^b Facultad de Economía y Negocios, Universidad del Desarrollo, Santiago, Chile

^c Northumbria Centre for Innovation Regional Transformation and Entrepreneurship (iNCITE), Newcastle Business School, Northumbria University, Newcastle, United Kingdom.

Acknowledgment

Great thanks to the respondents that contributed with their time and inputs in this research

Funding

No funding was received to conduct this research

Proposed citation

Roncancio-Marin, J., Dentchev, N., Guerrero, M., Díaz-González, A., and Crispeels, T. (2021).

University-Industry joint undertakings with high societal impact: A micro-processes approach.

Technology Forecasting and Social Change, In press.

¹ Corresponding author: jason.jahir.roncancio.marin@vub.be

University-Industry joint undertakings with high societal impact:

A micro-processes approach

Abstract

University-Industry collaboration (UIC) literature is largely documented with Western European or North-American evidence, where universities are rich in resources and have well-developed R&D infrastructure. Likewise, our knowledge remains limited about UIC in emerging countries, where research resources and R&D are scarce. In this article, we address the research question “What are the individual micro-processes involved in UICs with social impact in emerging economies” and argue that uncovering the individual micro-processes involved in university-industry joint undertakings contribute to understanding how entrepreneurial universities promote social impact in emerging economies. The ideas presented in this paper are based on exploratory qualitative research consisting of 33 semi-structured interviews, eight focus groups, and six participatory observations in Bolivia and Colombia. Our findings suggest that UICs in emerging economies are driven by the need to solve major social challenges and are often a consequence of the individual micro-processes of low subjective norm, pro-social behavior, deontic justice, social identity, entrepreneurial culture, and championing of social welfare.

Keywords: Micro-processes, Entrepreneurial Universities, University-Industry Collaboration, Social Impact, Emerging Economies.

1. INTRODUCTION

University-industry collaborations (UIC) in developed countries are supported by a sophisticated research infrastructure and vast resources for R&D (De Silva et al., 2021b; Guerrero and Urbano, 2012). For example, in Europe and North America, the high volume of scientific publications and intellectual property, the availability of financial resources, institutional capacities for research, knowledge transfer policies, and government support facilitate UICs (Meissner and Shmatko, 2017).

In emerging economies, particularly Latin American countries (LATAM), the UIC dynamic is in the early development stages (Fischer et al., 2020, 2019a). LATAM academics cannot benefit from internal solid institutional support, as technology transfer and UIC policies are underdeveloped (Fischer et al., 2019a, 2019b; Guerrero et al., 2018). Additionally, LATAM universities lack modern research infrastructure, and scientific publications often fall short of international quality standards (Calderón-Hernández et al., 2020). Nevertheless, despite the limited resources, support, and capabilities of LATAM universities, UICs exist and take place in an environment that abounds in societal needs, institutional voids, market failures, high unemployment, and poverty rates (Aguinis et al., 2020; de-Oliveira and Rodil-Marzábal, 2019; Fischer et al., 2020). Consequently, such collaborations often seek to benefit society through frugal innovations or social entrepreneurship (Fischer et al., 2020; Rinaldi et al., 2018).

Scholars have studied UICs from various perspectives, with different units of analysis and research methods (Ankrah and AL-Tabbaa, 2015; Link et al., 2015; Meng et al., 2019), and mainly in several developed contexts (Fischer et al., 2018; Guerrero et al., 2019; Minguillo and Thelwall, 2015). Although most research in UIC and entrepreneurial universities have a macro-level

orientation, some micro-level investigations analyze academics' intentions to address relationships with industry, technology transfer determinants, and spin-off creation precursors, particularly in developed countries (Abreu and Grinevich, 2013; Clarysse et al., 2011; D'Este and Perkmann, 2011; Perkmann et al., 2015, 2013).

However, there is a significant lack of scientific literature for emerging economies to explain the micro-processes involved when universities participate in UICs, given the absence of resources for R&D and innovation. Therefore, and in line with Fischer et al. (2020), “[w]e still lack a clear understanding of how entrepreneurial universities are managing their knowledge capabilities to effectively promote societal impacts in emerging economies” (p. 2). To address this gap and focus on “*societal impacts in emerging economies*”, we explore how UICs promote social impact in such economies. Our aim is precisely to identify the individual micro-processes involved. We argue that uncovering such individual micro-processes broadens our understanding of how entrepreneurial universities can bolster social impact in emerging economies. To develop our argument, we have conducted exploratory qualitative research (with data from 33 semi-structured interviews, eight focus groups, and six participatory observations) in Bolivia and Colombia.

The remainder of this paper is structured as follows. First, we elaborate on the differences of UICs between developed and emerging economies. Second, we explain the relevance of certain micro-processes in understanding UICs with high societal impact. The third section describes the methodology, the research setting, the case selection, and the data analysis. In the fourth section, we present the findings of the qualitative data and methodological triangulation. The fifth section

discusses the results and proposes implications and a future research agenda, while the sixth and final section concludes our study.

2. THEORETICAL BACKGROUND

2.1. UIC in emerging countries

University-industry collaboration (UIC) refers to the interaction between higher education and industry. By exchanging knowledge/technologies or practices, UICs generally pursue commercial purposes that benefit all parties involved (Ankrah and AL-Tabbaa, 2015; Link et al., 2015). However, both types of activity are characterized by different organizational missions, cultures, and administrative structures (Munari et al., 2016). Therefore, it is understandable that individuals involved in either often pursue different objectives.

Some authors suggest that academics participate in the transfer of knowledge in order to gain recognition from their peers or to see the actual application of a research result (Centobelli et al., 2019; Llopis et al., 2018). On the industry side, some studies mention that economic return is generally sought through the private appropriation of knowledge in the form of patents and licenses, the establishment of joint laboratories, or the purchase of university spin-off companies (Fischer et al., 2019b, 2018; Soetanto and van Geenhuizen, 2019).

For developed economies, UIC literature is extensive and describes the collaboration from different perspectives, such as UIC determinants, consequences, mechanisms, and the actors involved (Baier-Fuentes et al., 2021; D'Este and Perkmann, 2011; De Silva et al., 2021a; Filippetti and Savona, 2017; Perkmann and Walsh, 2007a). Most scientific studies on UIC suggest that the

high injection of capital to strengthen and mature technological developments facilitates their transfer to society through collaboration with industry (Ankrah and AL-Tabbaa, 2015; Bruneel et al., 2010; Fuster et al., 2019). Other triggers for engaging in a UIC can be that academics and industry receive incentives (Yigitcanlar et al., 2019), have personal connections in the industry, wish to create a joint venture with the industry, do exchanges or internships in the industry, and may have joint R&D projects (Jones and Coates, 2020; Kafouros et al., 2020; Mahdad et al., 2020, 2018). In such developed contexts, the industry often seeks to acquire patents, purchase a licensing permit, develop or improve a product to increase revenues through UICs. In general, the literature reports that in developed countries, UICs are driven by commercial reasons that benefit the researcher in reputation and the industry in economic return (Perkmann et al., 2021; Wit-de Vries et al., 2019; Wright, 2018). Thus, both academics and industry members coexist in an environment where policies, incentives, and socioeconomic conditions set the norm by which UICs are driven and performed (Fischer et al., 2019a; Meissner and Shmatko, 2017; Suh et al., 2019).

In emerging countries, however, UICs occur in conditions often governed by different social norms (Fischer et al., 2019b; Vega-Jurado et al., 2008; Zavale and Langa, 2018). Both universities and industries find themselves coexisting in an ecosystem where it is difficult for universities to generate technological developments that can be marketable due to low investment in R&D (Sánchez-Barrioluengo and Benneworth, 2019), lack of incentives for technology transfer, low production, and quality of patents, and other obstacles (Fischer et al., 2020, 2019b, 2018; Vega-Jurado et al., 2008). Vice versa, industries often cannot buy patents or collaborate with universities because the latter are frequently too slow to draw up collaboration contracts, or their technological developments are still in very early stages (Heredia Pérez et al., 2018; Marotta et al., 2007).

Consequently, UIC activity in emerging economies is relatively low (Fischer et al., 2019b; Teixeira, 2014; Teixeira and Mota, 2012), and this has also made its scientific study challenging (Fischer et al., 2020). Consequently, the relevant scientific literature reporting on UIC in emerging countries is still a work in progress. However, minimal empirical evidence and some scientific studies do reveal frugal innovations, open innovation, joint innovation labs, co-creation, and other outcomes through which universities in emerging economies actively collaborate with industry (Bjerregaard, 2009; De Silva et al., 2021a; Fischer et al., 2020; Perkmann and Walsh, 2007a; Zavale and Langa, 2018). In contrast to the advanced economies, UICs that occur in emerging countries seem to be driven by non-commercial purposes that often have positive consequences for society (Arza and Carattoli, 2016; D'Este and Perkmann, 2011; Guerrero et al., 2018; Perkmann et al., 2021; Rinaldi et al., 2018). However, the scientific study of such UICs with social impact in emerging and developed economies is still embryonic (see Table 1).

---Insert Table 1 here ---

Yet, knowledge and technology transfer between two such heterogeneous actors is not always easy to carry out, and this difficulty has resulted in research focused on different angles. For instance, the literature on UIC is generous regarding the structural determinants of UIC success at both institutional and individual levels (Carayannis et al., 2017). For example, at institutional level it is already established that the private or public nature of collaborative innovation projects determines their success or failure (Bozeman et al., 2013; Zhao et al., 2018), that licenses and inventions in universities and their degree of maturity determine the difficulty of their transfer to other stakeholders (Gulbrandsen and Thune, 2017). Likewise, counterfactual mechanisms, administrative practices, political, social, contextual, and individual matters are factors that

facilitate or impede UIC (Bruneel et al., 2010; Jones-Evans, 1998). It is said that such factors can impede or facilitate UIC activities since they depend to a large extent on the individuals involved in such activities (Cunningham and Menter, 2020).

Zooming in on the individual level, research into UIC in developed countries suggests that the difference in individuals' motivations to engage in UIC activities depends on whether such individuals belong to academia or industry (Perkmann et al., 2021). Motivations common to both include the need to respond to institutional policies, financial gain, human capital development, the search for efficiency, the stability provided by R&D contracts, the improvement of institutional image, intentions to buy or sell a research result, personal contacts, and previous experience (Cunningham and Menter, 2020; Perkmann et al., 2021; Rubens et al., 2017). On the other hand, within the divergent motivations for both parties, the need for legitimacy that universities have in society, social pressure, the battle of academics to achieve recognition and good reputation, and the contribution to the regional or national economy stand out (Breznitz et al., 2008). In general, UIC activities have been governed by outcomes that generate economic benefits for the parties involved.

With regards to the UIC activities in emerging economies at the individual level, scholars make mention of UIC activities that are not driven by economic interests but rather by social challenges (De Silva et al., 2021a; Fischer et al., 2020; Rinaldi et al., 2018). However, the scientific literature has not yet progressed to explaining the existence of such social-related outcomes from UIC activities (Ankrah and AL-Tabbaa, 2015; De Silva et al., 2021b; Perkmann et al., 2021; Zavale and Langa, 2018). Ankran (2015) suggests that institutional needs explain social benefits from

UICs, i.e., universities seek to serve the community and enhance their prestige, while the industry looks to improve its reputation through socially responsible business. Other scholars have centered research at the micro-level in order to explain the different forms of UIC.

Individual micro-processes – understood as the variables that measure phenomena related to the first unit of observation for a particular scenario (Balven et al., 2018; Cunningham and Menter, 2020; Snijders and Bosker, 2012) – have been used to undertake micro-level research for UIC (Villani et al., 2017). For instance, the unusual characteristics of the researchers' intention to patent, commercialize, and address relationships with industry are well documented (Markman et al., 2008; Perkmann et al., 2021; Wright, 2014). However, there is a distinct lack of theoretical development to understand how such socially impactful UIC activities emerge at the individual level (Cunningham and Menter, 2020; De Silva et al., 2021a; Fischer et al., 2020). Therefore, we argue that some micro-processes may be the critical drivers determining UIC's emergence with social impact in emerging economies.

2.2 UIC with social impact

Some scholars note that UIC can also pursue purposes of social value creation (Carl, 2020; De Silva et al., 2021a; Fischer et al., 2020; Guerrero et al., 2017; Guerrero and Urbano, 2017; Rinaldi et al., 2018). For example, at the micro-level, Carl (2019) links the field of technological innovation with that of social innovation and argues that researchers can be transformative agents capable of promoting a paradigm shift from the technological to the social (Carl, 2020). Etzkowitz (2017) argues that academic leadership can transform the faculty's culture into more socially

inclusive. Indeed, the universities' missions can evolve beyond teaching and research to being oriented on societal problem-solving (Etzkowitz and Zhou, 2017).

The relevant literature on UIC also reports that universities are finding other mechanisms to fulfill their mission towards society (Fischer et al., 2020; Song et al., 2020). To do so, universities connect with other actors in their ecosystem to complement their knowledge and resources in order to achieve a common goal that need not involve the transfer of technology or the creation of economic value (Klofsten et al., 2019; Rinaldi et al., 2018; Rubens et al., 2017). Through co-creation mechanisms and without intellectual property in the form of patents, universities can connect with industry to generate sustainable development and social impact (De Silva et al., 2021a; De Silva and Wright, 2019; Rinaldi et al., 2018). Carayannis et al. (2019), on the other hand, suggest that universities adapt and connect intelligently with industry depending on the domain and intellectual capital they possess (Calza et al., 2019). Certainly, some macro-level conditions influence the type of collaboration and the type of UIC outcomes. However, UIC's approach that seeks social impact seems to be driven mainly by individual-level decisions and, therefore, cannot be fully understood without examining the associated micro-processes.

The individual motivations to promote UIC have been debated throughout the literature. Some authors suggest that the main motives for engaging in UIC activities are those related to monetary gain (Mahdad et al., 2020, 2018), while others see collaborations driven by non-financial interests. For example, Göktepe-Hulten (2009) found that academics are more interested in increasing their reputation than in receiving some financial return from collaboration with industry (Göktepe-Hulten and Mahagaonkar, 2010). Bercovitz (2008) discusses different types of academic

legitimacy at the end of the process of collaboration with industry (Bercovitz and Feldman, 2008), while Perkmann et al. (2019) argue that some academics undertake collaborations with third parties just because it can make a difference to society (Perkmann et al., 2021). Still, the individual micro-processes involved in UIC with social impact in emerging economies are yet to be uncovered.

While a macro-processes approach allows the study of institutional characteristics, in this paper, we follow Snijders and Bosker's (2012) definition of micro-process variables, as used by Balven and Siegel (2018), which comprise those micro-processes that measure phenomena related to the first unit of observation for a particular scenario (Snijders and Bosker, 2012) – in our case, that of UIC with social impact. Within the types of micro-processes contained in UIC, three types stand out: (i) at the individual level, i.e., contained within the individual (intra-individual) defined as the cognitive or affective phenomena that can influence the behavior towards UIC; (ii) at the relational level, viz. coming from other subjects involved in UIC that influence the behavior of others or vice versa; and (iii) at the organizational level, which have to do with the practices, channels, policies that influence the behavior towards UIC. Figure 1 summarizes the rationale behind our literature review.

---Insert Figure 1 here ---

As discussed earlier in this paper, the characteristics of the emerging economic context affect the traditional forms, mechanisms, and consequences of UIC reported in the literature compared to those in developed economies. For this reason, in the next section, we make two propositions that answer our research question and fill the knowledge gap.

2.2.1. Lack of a supportive environment in emerging economies (LATAM universities)

Antecedents

Expectations from family, friends, coworkers, and significant others influence and drive human behavior (Ajzen, 2005; Basu and Virick, 2008; Guzman-Alfonso and Guzman-Cuevas, 2012; Iakovleva and Kolvereid, 2009; Roncancio et al., 2020). Consequently, social expectations and the influence of the environmental elements, political and institutional support are closely related to the subjective norm (Liñán et al., 2011). In the case of LATAM universities, such organizations are predominantly teaching-oriented, and policies to support UIC are at a relatively early stage of development (Calderón-Hernández et al., 2020; Naranjo-Valencia and Calderón-Hernández, 2015). In general, academics and industry in this region are not expected to engage in joint UIC activities due to the lack of incentives, policies, and resources. Thus, the social norm that might positively influence UIC engagement is not promoted in the institutional setting and therefore requires other more subjective motivations. Given that UIC in emerging economies occurs (Chaves et al., 2012; Teixeira and Mota, 2012; Zavale and Langa, 2018) and is not always expected to have a formal framework (Perkmann and Walsh, 2007b; Zavale and Langa, 2018), informal or ad-hoc interactions are expected. Therefore, we formulate the following proposition:

***Proposition 1:** Despite a general lack of a favorable ecosystem (public policies, university support, or industry incentives), UIC does occur in emerging economies (e.g., LATAM countries), which indicates a low level of the subjective norm for such activities.*

2.2.2. The outcomes of UIC in emerging economies

As argued above, the relevant scientific literature on UIC is well documented, particularly in developed economic contexts (Perkmann et al., 2021). In such scenarios, where innovation systems are mature, R&D investment is relatively high, and universities motivate researchers to transfer technology and connect with industry, thereby accelerating patent production (Guerrero and Urbano, 2017; Jones-Evans, 1998). That, in turn, attracts the attention of industry, which may either buy the patents, collaborate in joint projects to create economic value, or contract the university for a particular development (Mahdad et al., 2020). Generally, such collaborations are guided by the notion of creating exclusively economic value for the parties involved (Guimón, 2013; Perkmann et al., 2021).

In the LATAM context, however, innovation systems are immature, and university interactions with industry mainly comprise consulting and training, but there is less joint R&D, IP, or spin-off generation (Arocena and Sutz, 2001; Dalmarco et al., 2018; Fischer et al., 2020, 2019a). It is common in emerging countries to find that market failures drive government priorities towards solving social problems (Crespi and Dutrénit, 2014). In LATAM countries, governments prioritize solving persistent social issues in their political agendas, thereby generating a national dynamic that incentivizes the search for solutions (Rubens et al., 2017). This call influences the direction of the academic and industrial agenda. Therefore, we propose the following:

Proposition 2: *Outcomes of university-industry collaborations in emerging economies (e.g., LATAM countries) will be predominantly driven by industry and academics' social orientations toward solving problems.*

3. Methodology

The need to fill the knowledge gap and the arguments made in the previous sections of this paper demands a qualitative type of research (Yin, 2018). We have conducted an exploratory study among individuals working at universities, start-ups, incubators, banks, industry, social enterprises, and government, whereby we made sure that each respondent has taken part in UIC activities whose outcomes have an existing social impact on Bolivia and Colombia. In order to reduce possible bias, we have examined the same types of organizations in either empirical context (Eisenhardt, 1989). In each case, our level of analysis was the type of organization, and the unit of analysis was the people already involved or interested in collaborating with industry or university to generate social impact.

3.1. Research setting

The phenomenon of UIC has been studied from different perspectives and theoretical streams, mostly in developed countries where it is not common for universities and industries to establish joint initiatives to solve a social challenge. This is partly because the critical mass of patents pushes such activities in said contexts towards economic value creation. Additionally, the low number of market failures and limited social problems create an environment in which organizations can invest in joint university-industry science, technology, and innovation development. However, in emerging economies, market failures have created an environment in which there are fundamental social challenges (Fischer et al., 2019b). Besides, universities do not have the resources necessary for economic value creation or sophisticated R&D development, and therefore university-industry collaborations obey other norms not only impacted by the context but by the individuals involved.

Bolivia and Colombia provide fertile empirical scenarios to study individuals involved in university-industry joint activities. In both contexts, resources to support research and knowledge transfer are limited, and socio-economic conditions are governed by market failures, social challenges, and a lack of infrastructure for world-class R&D development. To be specific, in Bolivia and Colombia, the allocation of goods and services is not Pareto efficient, which often results in wealth accumulating in the hands of a few individuals, leaving a large number in poverty or with unsatisfactory primary living conditions (Marotta et al., 2007; Vega-Jurado et al., 2008). Since governments in such countries must put the welfare of society at the top of their agendas, investment in R&D lags behind, which slows down the innovative impact of universities (Calderón-Hernández et al., 2020). Despite the above, joint university-industry activities do occur in both countries and are publicly recognized as resulting in the solution of a societal challenge (Chen, 2014; Fischer et al., 2020).

In Bolivia's particular case, 15 universities are grouped into what is known as the executive committee of Bolivian universities, which brings together the majority of their students. Private universities in Bolivia are self-financed based on student fees, but both private and public universities lack resources and capacities for research and knowledge transfer (Vega-Jurado et al., 2008) and, therefore, for UICs. Moreover, universities are immersed in a politically unstable ecosystem, where social inequalities result from the institutional gaps endemic to emerging economies. Given such circumstances, joint university-industry activities in Bolivia are predominantly oriented towards solving social problems and addressing primary needs for the survival of individuals and communities (Gaiger et al., 2019; Vega-Jurado et al., 2008).

In Colombia, by contrast, there are 292 higher education organizations, of which 37.6% are public. Only 85 universities in this country offer post-graduate programs. Private universities are mostly teaching universities. Public universities have been conducting scientific research for over 70 years, so although the dynamics of invention patents and scientific publications are increasing every year, it is still incipient. In Colombia, the commercialization of research results began to be promoted from the Spin-off law introduced between 2016 and 2017, but its proper regulation is still under discussion in the Colombian Senate, so the number of spin-offs is still low (Calderón-Hernández et al., 2020). A higher rate of necessity-driven entrepreneurial activity with a lower innovative orientation characterizes Colombia (Sutz, 2000; Bosma et al., 2021).

Therefore, the Colombian context is complementary to that of Bolivia, and both constitute fertile ground for studying joint university-industry activities. Based on the above, both universities and industry operate in complex contexts characterized by organizational divergences highly influenced by the environment in which they operate and where social problems appear to be the bridge that connects the logic of academia with the logic of industry, the latter being traditionally focused on the market (Calderón-Hernández et al., 2020; Guerrero et al., 2018; Olavarrieta and Villena, 2014). The most important activities of UIC in such contexts are commonly collaborative projects of not very sophisticated research, consulting activities, joint university-industry laboratories funded by industry that seek the generation of social innovations based on technology, university hackathons funded by industry, agreements where industry finances community service learning activities, co-creation scenarios promoted by the university and financed by the industry for the solution of social problems, and intersectoral working groups promoted by the government to connect the university with industry for social purposes and open innovation for sustainability.

3.2. Case selection

Given that this research focuses on the micro-processes perspective, we have chosen individuals who are formally and informally involved in the joint university-industry operations as mentioned above. Moreover, the sample selection for the qualitative study was prepared with the support of colleagues from local universities in both countries as a measure of internal validity (Yin, 2018). The subjects of interest included junior and senior professors, university staff, entrepreneurs and industry members, representatives of public organizations, incubators, financial organizations, technical and professional education organizations, and voluntary associations in both countries. Subjects were picked after carefully considering their role and responsibilities related to entrepreneurship and UIC programs and activities. Other actors in the local ecosystem were selected based on their contacts and cooperation and their support for local innovation development.

This variety of subjects is useful for understanding the micro-processes associated with joint university-industry activities in Bolivia and Colombia. Likewise, the selection of subjects in these regional contexts and relatively similar organizations reduce the potential problems of contextual biases given that UIC varies across regions and depends on the quality of the universities (Minguillo and Thelwall, 2015; Munari et al., 2017; Villani et al., 2017). Table 2 summarizes the key characteristics of the selected organizations and the subjects in our sample.

--- Insert Table 2 here ---

3.3. Data collection

In this study, we have followed Lincoln and Guba (1986) in terms of purposive sampling guidelines in order to elicit different views and experiences from a diverse group of participants and thus generate diversity in the empirical evidence (Guba, 1981; Lincoln and Guba, 1986). Among them, we first focused on individuals that were more knowledgeable about our research topic, i.e., subjects directly involved in joint university-industry activities (Corley and Gioia, 2004; Gioia et al., 2013).

Next, we used the semi-structured interview technique to facilitate the exploration of the uninvestigated social phenomenon and other related structural issues (Alvesson and Kärreman, 2011). The data collection process was based on 33 semi-structured interviews, 8 focus group discussions, and 6 participant observations conducted in Bolivia between December 2017 and April 2019 and in Colombia in September 2019. The interviews focused on exploring the role of universities in their local ecosystems, industry support for social entrepreneurship and alleviating social challenges, joint university-industry interactions and activities, challenges and catalysts of such joint UI operations, and motivations for addressing UI relationships with social goals. The interview protocols for both academics and non-academics were discussed with nine senior local experts from both countries to ensure the study's construct validity (Yin, 2018) (see Appendix 1). Before each interview, participants were informed about the purpose of the study and assured that their responses would be anonymous. They were allowed to ask questions before and during the interviews (Brink, 1993). This tactic ensured the quality of their responses by enhancing trust between researchers and respondents. The duration of the interviews averaged 51 minutes, ranging

from 19 to 56 minutes. The focus groups involved between 3 and 12 people and had an average duration of 106 minutes, varying between 60 and 240 minutes.

Interviews and focus group discussions were recorded and transcribed to increase the study's reliability as well as overcome any researcher bias in the interpretation of the data and, additionally, as an audit measure (Brink, 1993). To gain an in-depth understanding of the context and reduce researcher bias, we used methodological triangulation (Golfashani, 2003) by using as sources our primary data (i.e., data collected *in situ*) with our participant observations and secondary data (Corbin and Strauss, 1998). We kept the same unit of analysis for the methodological triangulation as was done for the semi-structured interviews in order to maintain controlled results, the holistic focus, and the stable dynamic reality (Duffy, 1987). Table 3 presents a summary of the participant observations.

--- Insert Table 3 here ---

3.4. Data analysis

The analysis of the data obtained was qualitative, and we followed the approach of Strauss and Corbin (1998) and also referred to others already located within the relevant scientific literature in management, in particular in the domain of UIC (Corbin and Strauss, 1998; Corley and Gioia, 2004; Eisenhardt, 1989; Gioia et al., 2013; Villani et al., 2017). We classified the interviews and documents inductively, using open, axial, and selective coding. With Atlas IT 9.0 as a tool, we proceeded first with open coding, i.e., first-order codes that represented the first ideas for classifying the data obtained in the field. Then we moved towards the interconnection of the codes through second-order coding to finally arrive at the theoretical codes representing the global

dimensions used to propose a general framework or model (Charmaz, 2006; Villani et al., 2017; Willig et al., 2017). Table 4 presents our data structure, which includes first/second-order codes and a sample of illustrative data for the most representative. The above procedure was repeated until data saturation was reached and when it was observed that code refinement was no longer productive.

---- Insert Table 4 here----

During first-order coding, the information obtained within the different university-industry joint activities was classified in a general way, following Strauss and Corbin (1998). Second-order coding identified patterns, sequences, and meanings where the logic consisted of assigning the same code to those that shared similar characteristics. Finally, when first-order codes could no longer be assigned to the data, more general themes leading to second-order codes continued to emerge, and codes were grouped into these general themes. At the end of the on-site data collection, we repeated the steps described above for all our research subjects (Corbin and Strauss, 1998).

4. FINDINGS

4.1. Lack of a supportive environment.

Antecedents

Following our methodological triangulation, policies and incentives that promote technology transfer and UICs were found to be still underdeveloped in Bolivia and Colombia. In emerging economies, universities receive political and financial support to promote UIC (Llopis et al., 2018). Moreover, establishing joint university-industry laboratories is common, while the value created

is expected to be distributed among all parties (Guerrero et al., 2019). In our empirical setting, our data collected in situ findings are in line with our methodological triangulation information.

Despite the lack of government support for industry members, as demonstrated above, entrepreneurial activity does exist. It means that entrepreneurship emerges although the absence of favorable social norms. A professor in entrepreneurship mentions that social businesses have been developed by social entrepreneurs, despite the lack of government support. However, in the Bolivian and Colombian contexts, this economic branch could be further stimulated, as demonstrated by the following quote from a student entrepreneur:

“Government does not support entrepreneurs just like in Chile. They give like an amount of money to do programs or to distribute to entrepreneurs. Bolivia is the opposite. Instead of money, the government increase the taxes or something like that” (interviewee FGI, Bolivia)

In the particular case of Bolivia, the lack of technological progress that the country has experienced in recent years is also evidenced in other indicators, such as persistently low levels of labor productivity (Muriel, 2016) and low spending on R&D in the country (World Bank, 2020), compared to other regions. The results presented above show that Bolivian and Colombian universities find a not very encouraging context for UIC. Nevertheless, Bolivian and Colombian universities have engaged in joint activities with industry, even without financial or political support.

4.2. The outcomes of UIC in emerging economies

4.2.1 The nature of university-industry collaborations in Bolivia and Colombia

In LATAM universities, UIC that occurs is usually motivated by consulting and teaching activities, as discussed in this paper's previous sections. In the particular case of Colombia, our

methodological triangulation shows that innovation dynamics are relatively new and, therefore, those that involve the presence of industry for the generation of new joint developments are equally recent development (González-Gélvez and Jaime, 2013). Universities are subject to an ecosystem that is in its infancy in terms of state policies that promote innovation and joint UIC (Betancur Monsalve and Garay Herazo, 2015). For example, only in 2017 was a law processed in the Colombian Congress that allows academics to create companies with their research results. Before that, the volume of joint invention patents between universities and industry, although growing since 2005, had not significantly increased since it went from 6 patents applications in 2005 to 64 in 2013 (Calderón-Hernández et al., 2020; Salazar and Valderrama, 2013). So, even without a legal platform, universities were already looking to industry. A case in point is a public university that was contacted by a ceramics business to develop a coating, from which the first spin-off officially emerged, but for lack of regulation, it did not perform in the market as expected (Betancur Monsalve and Garay Herazo, 2015). To date, Colombia has no more than 50 officially registered spin-offs, yet collaborations with industry often occur in other ways (Betancur Monsalve and Garay Herazo, 2015; Calderón-Hernández et al., 2020; Salazar and Valderrama, 2013).

In line with the above, universities have a long history of collaborating with industry to achieve other joint goals, such as those related to social impact through entrepreneurship:

“In almost 50 years of history, many agreements have been developed with private and public companies in favor of the development of social initiatives that later have ended up being created as businesses related to that type of thing, such as PISOTON or the subject of scholarships, but also has ended up supporting social entrepreneurs in some way” (interviewee PI, Colombia).

In this regard, Machicado (2019) analyzes the evolution of the innovation index, using information from the Global Competitiveness Index (GCI), and finds that, in Bolivia, the index improved during 2010-2014 but fell from 2015, ranking 135th out of 137 countries in 2017, with a worse position than it had in 2008. According to the author, in the period of rebound, the availability of scientists and engineers and the collaboration between industry and universities in R&D stand out. Additionally, due to the lack of capabilities and resources for universities located in emerging countries like LATAM, academics motivated by an environment rich in social problems connect with their contacts in the industry to carry out their entrepreneurial goals (Randy Burd, 2013), as well as the respective dissemination of knowledge in society, the third mission of universities (Cinar, 2019). To show evidence of the above, the rector of one of the universities in Bolivia mentions the importance of connecting with industry to promote entrepreneurship and social impact:

“Our university proposes inclusion connected to the environment to get out of dependence on oil income. Therefore, we can influence the development of the industry with academic programs, with institutional management, that we can generate better development conditions and impact the region. For that, one of the mechanisms with which we are convinced that we can do it is through the transversal axis of entrepreneurship” (Panel of Rectors from Bolivia and Colombia).

Our methodological triangulation found that although it is common in LATAM universities to find UICs (De Fuentes and Dutrénit, 2012), they often do not lead to the results obtained in a developed context (e.g., patents, creation of spin-off companies) and therefore do not involve complex formal collaboration contracts (Calderón-Hernández et al., 2020). Consequently, in Bolivia and Colombia, most UICs are triggered not only by business opportunities but also informally by societal issues (Calderón-Hernández et al., 2020; Naranjo-Valencia and Calderón-Hernández,

2015; Salazar and Valderrama, 2013; Vega-Jurado et al., 2008). Therefore, it is common to find the university engaged in civic matters (Gonzalez-Perez, 2010):

“As a university [name of the university], we have a marked social vocation, where we understand that knowledge and technological development must always walk towards innovation ultimately for the benefit of all stakeholders of society, in that sense, we have two laboratories, one is where we develop a business, and the other is a social innovation center where we dedicate ourselves to general social innovation processes. Industrial partners fund both laboratories.” (Interviewee P4, Colombia).

4.2.2. Drivers of LATAM university-industry collaboration

In terms of motivation, we found that university staff and industry representatives possess a similar set of motives that drive them to participate in joint university-industry social laboratories. We have classified these into seven dimensions: the importance of entrepreneurship support mechanisms, family influence and culture, pro-social behaviors, deontic justice, social identity, championing social welfare, and entrepreneurial culture.

Universities influence individuals' career choices through established business courses (Muofhe and Du Toit, 2011). Our findings reveal that just as in developed contexts, universities additionally have other mechanisms to support entrepreneurship, as shown by one of the students who attended a research seedbed and now has his own company, and by another who attended university entrepreneurship courses as well as the training provided by the incubator:

“Through the incubator program, I have been able to train in different aspects that I was unaware of (marketing, legal, financial, administrative, etc.). This has allowed me to write a complete business plan with which I can present my project to the bank and other possible allies, and in this way, I am ready to start” (interviewee P7, Bolivia)

“So, this, if there are many universities doing talks almost all year-round regarding volunteering, regarding social marketing and regarding how to be effective through digital tools, how to collect funds, I think that these are like the issues posed by the university, the academy and well and well it has been constant”
(interviewee P30, Colombia)

Universities in Bolivia and Colombia are also promoting entrepreneurship by creating entrepreneurship units that offer business training to university staff and create events to promote entrepreneurial thinking, workshops, and fairs. Likewise, Montoya et al. (2009) found that students can also create new ventures in the university context and be promoted by third parties. According to our methodological triangulations, such a model does not exist in developed countries, where universities often deal directly with incubators and accelerators (Good et al., 2019), while in the case of Bolivia and Colombia, incubators are separate entities that work hand in hand with seedbeds, and the afore mentioned entrepreneurship units.

Culture (Wennberg et al., 2013) and family influence (Urban, 2013) are some of the elements that foster entrepreneurial behaviors. Our findings coincide with those described in our methodological triangulation, especially those related to family influence in terms of support (Criaco et al., 2017), as can be seen in the following quote:

“To talk about an entrepreneurial culture is to talk about behavior or customs that make people entrepreneurial. Families are very supportive of entrepreneurship because many of these are inherited (food, crafts, etc.) and this encourages the entrepreneurial spirit to be developed from within the home”
(interviewee P3, Bolivia)

The above suggests that some members of academia and industry can self-identify as socially responsible entrepreneurs (Meek et al., 2010), from which follows an important micro-process

already used in the literature of UIC and technology transfer, viz. social identity (Balven et al., 2018), which occurs when an individual identifies as belonging to a group (Zou et al., 2019), as can be seen in the following quote:

“Since I come from a family in which my father developed his own business, I think I also have that entrepreneurial blood. It allows me to continue thriving in my enterprise as well as fighting for solving societal problems, I am a social entrepreneur” (interviewee P3, Bolivia)

Similarly, one critical element that impacts individuals' behavior towards executing an entrepreneurial process that facilitates UIC is championing social welfare (Balven et al., 2018; Neves and Brito, 2020). This means that when someone supports or defends a cause in a workgroup, they motivate others to action (Rasmussen et al., 2011). Since such a process occurs relationally, we consider it a micro-process (Balven et al., 2018). Thus, as can be seen from the following quote, an interviewee from the industry mentions that a member of the marketing team motivates him to approach university-industry relationships to create social and welfare impact:

“I have one colleague from marketing, who is always telling us that we have to engage with other actors in order to improve our societal impact, he is a defender of societal causes, and that motivates me” (interviewee P12, Bolivia)

In the same vein, a process at the individual level could be identified and recognized as deontic justice, understood as an academic's desire to see their knowledge or research used in a way that provides benefits to society (Balven et al., 2018). Evidence of the above can be noted in the following quote from an academic involved in a joint university-industry social innovation lab:

“There is nothing more rewarding than seeing my research translated into the solution of a real problem in my country, well at least we are working hard towards achieving that goal” (interviewee P29, Colombia)

From our methodological triangulation, it was clear that some of the respondents attach relevant importance to providing welfare to others and have, in this way, a pro-social behavior (Douglas and Prentice, 2019; Douglas et al., 2020). Given that in Bolivia and Colombia, the socioeconomic context includes vulnerable communities in conditions of extreme poverty, there is evidence that some university entrepreneurs act in favor of helping others (Bacq and Alt, 2018), as the following university entrepreneurs made clear:

“From the foundation, we have the domain of social entrepreneurship as a seed that will help us build sustainable communities. Within the foundation’s strategic framework, entrepreneurship is transversal to all our programs” (interviewee P30, Colombia)

“I have to solve my people’s problems, what do I mean by that? To provide solutions to the problem that the producers have. I think I can do that. That is the biggest goal I have” (interviewee P8, Bolivia)

One industry representative stands out regarding the industry’s pro-social orientation and participation in collaborations with universities. He is interested in learning about social innovation to increase the social impact of the company:

“I am very interested in social innovation and new methodologies to increase the impact my company, for me it’s very important this thing; and at my company, we believe a lot in the mentoring given at universities within partnerships. We are a result of such mentoring” (interviewee P9, Bolivia)

Another industry representative has also identified the lack of adequate regulation in universities as an opportunity to establish links in favor of entrepreneurship with positive impact:

“Depending on the universities, of course, but on average is really hard. And they have a lot of problems in terms of intellectual property, regulations, and in terms of research. So that is why we want to create programs for sensibilization. We design programs for entrepreneurs that innovate, incubate, and at the end will create a product that makes an impact, this kind of makes a summary.” (Interviewee P10, Bolivia)

Entrepreneurial culture is also considered a key element influencing entrepreneurial activity (Ao and Liu, 2014). An institution's entrepreneurial culture can foster entrepreneurial activity in its staff members (Bienkowska et al., 2016) as well as in its students, as expressed by the following respondent:

“The university is doing this because it is not creating a culture of students graduating and going to organizations to be one more employee; but the university is inspiring and forming us to set up our own company or realize the craziest dreams we have, without having a fear of failure” (interviewee P11, Bolivia)

Joint activities between university and industry that are not based on technology transfer nor driven by the creation of economic value but are rather oriented to solving a social problem rely heavily on the motivations and individual characteristics of the actors involved. Depending on these characteristics and on the channel used by universities and industry to carry out joint activities, different micro-processes can facilitate social impact, as we propose in Fig. 2.

--- Insert Figure 2 here ---

5. Discussion and concluding remarks

The purpose of this exploratory research was to understand how entrepreneurial universities effectively enhance social impact in emerging economies (Fischer et al., 2020), answering other calls from the scientific literature (Fischer et al., 2020; Wright, 2018). To do so, we have uncovered and explained the individual micro-processes involved in joint university-industry activities (UIC). We can put forward two relevant conclusions based on the data collected in Bolivia and Colombia.

Our first conclusion is related to our finding that university-industry joint undertakings that generate social impact in emerging economies occur in a context of low subjective norms. Previous studies report that institutional and cultural support and social acceptance influence the subjective norm towards a particular behavior (Maresch et al., 2016; Miranda et al., 2017). Consequently, individuals feel motivated to engage in spin-off creation, technology transfer, or collaboration activities at universities and industries (Fischer et al., 2020; Liñán et al., 2011; Nabi and Liñán, 2011). Our study also shows different results since, in the LATAM context, the absence of stimuli for a subjective norm that favors UICs with social impact did not preclude such joint collaboration. Some studies mention prior experience and intellectual property as precursors of UICs (Ankrah and AL-Tabbaa, 2015; Llopis et al., 2018; Perkmann et al., 2021). Our results differ since individuals who engage in UICs in LATAM seek to complement their innovative capabilities and positively impact society. Such findings align with Johnston (2016), who argues that UICs occur motivated by complementing rather than overlapping capabilities and knowledge (Johnston and Huggins, 2016). In this way, our results are aligned with recent empirical studies that argue that multiple actors seek to complement their capabilities to solve a societal problem (Ibáñez et al., 2021). A possible explanation for why such individuals engage in UICs for social impact in contexts of a low subjective norm can be found in the micro-processes involved. Therefore, our study contributes to the academic debate on UICs by extending the literature by providing evidence from emerging contexts. We also argue that it is not always intellectual property or prior experience that determines UICs' existence. Instead, their existence and impact on society in emerging economies are driven by the individuals' characteristics.

Our first conclusion is related to our LATAM research settings (Bolivia and Colombia). Our study shows that there are five micro-processes (pro-social behavior, entrepreneurship culture, social identity, championing social welfare, and deontic justice) in both academics and industry members, which explain not only their involvement in joint UICs activities but also the nature of their impact on society despite the low subjective norm. Our results report that such micro-processes may act as drivers for UICs in emerging economies. The above runs counter to the studies of Galid (2015) and Soendergaard (2015). They argue that economic incentives, recognition, networking, access to resources, industry problem-solving, research application (Ahamed Galib et al., 2015), organizational incentives, attitude towards collaboration, and intentions for participation (Soendergaard et al., 2015) are the main drivers promoting joint UIC activities (Mahdad et al., 2020, 2018; Perkmann et al., 2021). Regarding the consequences of UIC joint activities, our study found that such joint undertakings in emerging contexts occur mostly informally and aim to solve a social problem. In this regard, our results are aligned with previous studies that found that partnerships without pre-conceived commercial agendas deliver the most sustainable outputs (Ehrismann and Patel, 2015). Indeed, our study found that UIC joint ventures seeking social impact in emerging economies use open innovation, co-creation, and community service-learning channels that often converge in frugal innovations and social entrepreneurship. This is in line with other studies that report that joint university-private sector knowledge generation and dissemination activities are useful for frugal innovations in emerging economies (Fischer et al., 2020).

This study also has several limitations that provide opportunities for future research. First, although our study was conducted in only two emerging economies, the rich data obtained from in-depth interviews with different UIC actors prompted us to make two propositions that we have

generalized to refer to all emerging or developing economies. Nevertheless, further research is required to confirm our findings in other emerging economies, not only on the Latin-American continent but also on other continents where countries have fragile innovation systems and supportive contexts where UIC joint activities emerge.

Second, although we could conduct interviews with industry personnel involved in UICs, our study was also limited by the lack of availability for interviews. Consequently, our results draw conclusions based on data that mostly, but not exclusively, come from members of the universities participating in UIC. Therefore, further semi-structured interviews are required with industry members collaborating with UIC in developing economies to refine our findings.

Third, in terms of the individual micro-processes involved in UIC with social impact, we proposed a general framework in Figure 2. However, such a model is based only on the results of our qualitative study, and therefore causality, moderation, or association between the variables explaining the existence of social impact via UIC joint undertakings in emerging economies cannot be deduced. A more advanced quantitative approach to this investigation could be considered. Interestingly, support for UICs, innovation, and social impact in developed economies is different from that in developing economies (Cinar, 2019; Guerrero et al., 2019). Therefore, another avenue of research would be to measure and then compare the levels of the subjective norm across developed and developing economies to investigate the role that individual micro-processes play in creating social impact via UIC joint undertakings. Indeed, given that most of the micro-processes are similar between the university and industry members involved in UICs, future studies may work on theory development to shed light on the extent to which similar individual

micro-processes contribute to organizational proximity, which consequently facilitates UIC joint undertakings (Johnston and Huggins, 2016).

Finally, this study could also be extended to measure the efficiency of UIC outcomes in creating social impact. For example, by introducing a moderating effect of individual micro-processes on innovation, community service learning, and co-creation, as mentioned in Figure 2. This would help to understand how stimulating a particular individual micro-process in a university, or an industry determines the type of outcome generated, particularly in fragile innovation systems, typical of emerging economies.

References

- Abreu, M., Grinevich, V., 2013. The nature of academic entrepreneurship in the UK: Widening the focus on entrepreneurial activities. *Res. Policy* 42, 408–422. <https://doi.org/10.1016/j.respol.2012.10.005>
- Aguinis, H., Villamor, I., Lazzarini, S.G., Vassolo, R.S., Amorós, J.E., Allen, D.G., 2020. Conducting Management Research in Latin America: Why and What’s in It for You? *J. Manage.* XX No. X, 1–22. <https://doi.org/10.1177/0149206320901581>
- Ahamed Galib, M., Nahar Munny, K., Khudaykulov, A., 2015. Enhancing university –industry collaboration: What are the drivers of academic researchers’ involvement in industry? *Int. J. Innov. Econ. Dev.* 1, 36–46. <https://doi.org/10.18775/ijied.1849-7551-7020.2015.11.2004>
- Ajzen, I., 2005. *Attitudes, Personality and Behavior*, Second. ed. Open University Press, New York.
- Alvesson, M., Kärreman, D., 2011. *Qualitative Research and Theory Development, Mystery as Method*. SAGE Publications Ltd, London.

- Ankrah, S., AL-Tabbaa, O., 2015. Universities-industry collaboration: A systematic review. *Scand. J. Manag.* 31, 387–408. <https://doi.org/10.1016/j.scaman.2015.02.003>
- Ao, J., Liu, Z., 2014. What impact entrepreneurial intention? Cultural, environmental, and educational factors. *J. Manag. Anal.* 1, 224–239. <https://doi.org/10.1080/23270012.2014.994232>
- Arocena, R., Sutz, J., 2001. Changing knowledge production and Latin American universities. *Res. Policy* 30, 1221–1234. [https://doi.org/10.1016/S0048-7333\(00\)00143-8](https://doi.org/10.1016/S0048-7333(00)00143-8)
- Arza, V., Carattoli, M., 2016. Personal ties in university-industry linkages: a case-study from Argentina. *J. Technol. Transf.* 42, 1–27. <https://doi.org/10.1007/s10961-016-9544-x>
- Bacq, S., Alt, E., 2018. Feeling capable and valued : A prosocial perspective on the link between empathy and social entrepreneurial intentions. *J. Bus. Ventur.* 33, 333–350. <https://doi.org/10.1016/j.jbusvent.2018.01.004>
- Baier-Fuentes, H., Guerrero, M., Amorós, J.E., 2021. Does triple helix collaboration matter for the early internationalisation of technology-based firms in emerging Economies? *Technol. Forecast. Soc. Change* 163, 120439. <https://doi.org/10.1016/j.techfore.2020.120439>
- Balven, R., Fenters, V., Siegel, D.S., Waldman, D., 2018. Academic Entrepreneurship: The Roles of Identity, Motivation, Championing, Education, Work-Life Balance, and Organizational Justice. *Acad. Manag. Perspect.* 32, 21–42. <https://doi.org/10.5465/amp.2016.0127>
- Basu, A., Virick, M., 2008. Assessing entrepreneurial intentions amongst students: a comparative study. *12th Annu. Meet. Natl. Coll.* 79–86.
- Bercovitz, J., Feldman, M., 2008. Academic Entrepreneurs: Organizational Change at the Individual Level. *Organ. Sci.* 19, 69–89. <https://doi.org/10.1287/orsc.1070.0295>
- Betancur Monsalve, M.C., Garay Herazo, K.J., 2015. En la Senda de una Hoja de ruta de Spin-Off

Universitarias en Colombia, Ruta N.

- Bienkowska, D., Klofsten, M., Rasmussen, E., 2016. PhD students in the entrepreneurial University -Perceived Support for Academic Entrepreneurship. *Eur. J. Educ.*
- Bjerregaard, T., 2009. Universities-industry collaboration strategies: a micro-level perspective. *Eur. J. Innov. Manag.* 12, 161–176. <https://doi.org/10.1108/14601060910953951>
- Bosma, N., Hill, S., Ionescu-Somers, A., Kelley, D., Guerrero, M., Schott, T. 2021. Global Entrepreneurship Monitor 2020/2021 Global Report. Global Entrepreneurship Research Association: London, UK.
- Bozeman, B., Fay, D., Slade, C.P., 2013. Research collaboration in universities and academic entrepreneurship: the-state-of-the-art. *J. Technol. Transf.* 38, 1–67. <https://doi.org/10.1007/s10961-012-9281-8>
- Breznitz, S.M., O’Shea, R.P., Allen, T.J., 2008. University commercialization strategies in the development of regional bioclusters. *J. Prod. Innov. Manag.* 25, 129–142. <https://doi.org/10.1111/j.1540-5885.2008.00290.x>
- Brink, H.I.L., 1993. Validity and reliability in qualitative research. *Curationis* 16, 35–38. <https://doi.org/10.4102/curationis.v16i2.1396>
- Bruneel, J., D’Este, P., Salter, A., 2010. Investigating the factors that diminish the barriers to university-industry collaboration. *Res. Policy* 39, 858–868. <https://doi.org/10.1016/j.respol.2010.03.006>
- Calderón-Hernández, G., Jiménez-Zapata, Y.A., Serna-Gomez, H.M., 2020. Barriers to University Spin-Off Creation in an Emerging Context: An Institutional Theory of Organizations Approach. *Minerva* 58, 625–650. <https://doi.org/10.1007/s11024-020-09407-4>
- Calza, F., Carayannis, E.G., Panetti, E., Parmentola, A., 2019. The Role of University in the Smart

- Specialization Strategy: Exploring How University–Industry Interactions Change in Different Technological Domains. *IEEE Trans. Eng. Manag. PP*, 1–9.
<https://doi.org/10.1109/tem.2019.2950514>
- Carayannis, E.G., Goletsis, Y., Grigoroudis, E., 2017. Composite innovation metrics: MCDA and the Quadruple Innovation Helix framework. *Technol. Forecast. Soc. Change*.
<https://doi.org/10.1016/j.techfore.2017.03.008>
- Carl, J., 2020. From technological to social innovation – the changing role of principal investigators within entrepreneurial ecosystems. *J. Manag. Dev.* 39, 739–752.
<https://doi.org/10.1108/JMD-09-2019-0406>
- Centobelli, P., Cerchione, R., Esposito, E., Shashi, 2019. Exploration and exploitation in the development of more entrepreneurial universities: A twisting learning path model of ambidexterity. *Technol. Forecast. Soc. Change* 141, 172–194.
<https://doi.org/10.1016/j.techfore.2018.10.014>
- Charmaz, K., 2006. *Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis*, Second. ed, Sage Publications. Sage Publications, London.
- Chaves, C.V., Carvalho, S.S.M., Silva, L.A., Teixeira, T.C., Bernardes, P., 2012. The point of view of firms in Minas Gerais about the contribution of universities and research institutes to R&D activities. *Res. Policy* 41, 1683–1695.
<https://doi.org/10.1016/j.respol.2012.07.008>
- Chen, S.-H., 2014. The Confluence of Academia and Industry: A Case Study of the Taiwanese Biopharmaceutical Innovation System. *Rev. Policy Res.* 31, 408–429.
<https://doi.org/10.1111/ropr.12089>
- Cinar, R., 2019. Delving into social entrepreneurship in universities: is it legitimate yet? *Reg. Stud.*

- Reg. Sci. 6, 217–232. <https://doi.org/10.1080/21681376.2019.1583602>
- Clarysse, B., Wright, M., Van de Velde, E., 2011. Entrepreneurial Origin, Technological Knowledge, and the Growth of Spin-Off Companies. *J. Manag. Stud.* 48, 1420–1442. <https://doi.org/10.1111/j.1467-6486.2010.00991.x>
- Corbin, J., Strauss, A., 1998. *Basics of Qualitative Research: Techniques and procedures for developing grounded theory*, Third. ed. SAGE Publications Ltd, London.
- Corley, K.G., Gioia, D.A., 2004. Identity ambiguity and change in the wake of a corporate spin-off. *Adm. Sci. Q.* 49, 173–208. <https://doi.org/10.2307/4131471>
- Crespi, G., Dutrénit, G., 2014. *Science, Technology and Innovation Policies for Development, Science, Technology and Innovation Policies for Development: The Latin American Experience*. Springer International Publishing, Cham. <https://doi.org/10.1007/978-3-319-04108-7>
- Criaco, G., Sieger, P., Wennberg, K., Chirico, F., Minola, T., 2017. Parents’ performance in entrepreneurship as a “double-edged sword” for the intergenerational transmission of entrepreneurship. *Small Bus. Econ.* 1–24. <https://doi.org/10.1007/s11187-017-9854-x>
- Cunningham, J.A., Menter, M., 2020. Micro-level academic entrepreneurship: a research agenda. *J. Manag. Dev.* 39, 581–598. <https://doi.org/10.1108/JMD-04-2020-0129>
- D’Este, P., Guy, F., Iammarino, S., 2013. Shaping the formation of university-industry research collaborations: what type of proximity does really matter? *J. Econ. Geogr.* 13, 537–558. <https://doi.org/10.1093/jeg/lbs010>
- D’Este, P., Perkmann, M., 2011. Why do academics engage with industry? The entrepreneurial university and individual motivations. *J. Technol. Transf.* 36, 316–339. <https://doi.org/10.1007/s10961-010-9153-z>

- Dalmarco, G., Hulsink, W., Blois, G. V., 2018. Creating entrepreneurial universities in an emerging economy: Evidence from Brazil. *Technol. Forecast. Soc. Change* 135, 99–111. <https://doi.org/10.1016/j.techfore.2018.04.015>
- de-Oliveira, F., Rodil-Marzábal, Ó., 2019. Structural characteristics and organizational determinants as obstacles to innovation in small developing countries. *Technol. Forecast. Soc. Change* 140, 306–314. <https://doi.org/10.1016/j.techfore.2018.12.021>
- De Fuentes, C., Dutrénit, G., 2012. Best channels of academia-industry interaction for long-term benefit. *Res. Policy* 41, 1666–1682. <https://doi.org/10.1016/j.respol.2012.03.026>
- De Silva, M., Gokhberg, L., Meissner, D., Russo, M., 2021a. Addressing societal challenges through the simultaneous generation of social and business values: A conceptual framework for science-based co-creation. *Technovation* 104, 102268. <https://doi.org/10.1016/j.technovation.2021.102268>
- De Silva, M., Rossi, F., Yip, N.K.T., Rosli, A., 2021b. Does affective evaluation matter for the success of university-industry collaborations? A sentiment analysis of university-industry collaborative project reports. *Technol. Forecast. Soc. Change* 163, 120473. <https://doi.org/10.1016/j.techfore.2020.120473>
- De Silva, M., Wright, M., 2019. Entrepreneurial co-creation: societal impact through open innovation. *R&D Manag.* 49, 318–342. <https://doi.org/10.1111/radm.12362>
- Douglas, E., Prentice, C., 2019. Innovation and profit motivations for social entrepreneurship: A fuzzy-set analysis. *J. Bus. Res.* 99, 69–79. <https://doi.org/10.1016/j.jbusres.2019.02.031>
- Douglas, E.J., Shepherd, D.A., Prentice, C., 2020. Using fuzzy-set qualitative comparative analysis for a finer-grained understanding of entrepreneurship. *J. Bus. Ventur.* 35, 105970. <https://doi.org/10.1016/j.jbusvent.2019.105970>

- Duffy, M.E., 1987. Methodological Triangulation: A vehicle for merging Quantitative and Qualitative Research Methods. *J. Nurs. Scholarsh.* 130–133.
- Ehrismann, D., Patel, D., 2015. University – Industry collaborations: models, drivers and cultures. *Swiss Med. Wkly.* 145, 1–6. <https://doi.org/10.4414/smw.2015.14086>
- Eisenhardt, K.M., 1989. Building Theories from Case Study Research. *Acad. Manag. Rev.* 14, 532. <https://doi.org/10.2307/258557>
- Etzkowitz, H., 2017. Innovation Lodestar: The entrepreneurial university in a stellar knowledge firmament. *Technol. Forecast. Soc. Change* 123, 122–129. <https://doi.org/10.1016/j.techfore.2016.04.026>
- Etzkowitz, H., Smith, H.L., Henry, C., Poulouvasilis, A., 2010. Gender, Science and Innovation, in: Elgar (Ed.), . Elgar O, pp. 1–14.
- Etzkowitz, H., Zhou, C., 2017. *The Triple Helix: University–Industry–Government Innovation and Entrepreneurship*, Second. ed. Taylor & Francis, New York.
- Filippetti, A., Savona, M., 2017. University–industry linkages and academic engagements: individual behaviours and firms’ barriers. Introduction to the special section. *J. Technol. Transf.* 42, 1–11. <https://doi.org/10.1007/s10961-017-9576-x>
- Fischer, B., Guerrero, M., Guimón, J., Schaeffer, P.R., 2020. Knowledge transfer for frugal innovation: where do entrepreneurial universities stand? *J. Knowl. Manag.* 25, 360–379. <https://doi.org/10.1108/JKM-01-2020-0040>
- Fischer, B.B., Moraes, G.H.S.M. de, Schaeffer, P.R., 2019a. Universities’ institutional settings and academic entrepreneurship: Notes from a developing country. *Technol. Forecast. Soc. Change* 147, 243–252. <https://doi.org/10.1016/j.techfore.2019.07.009>
- Fischer, B.B., Schaeffer, P.R., Vonortas, N.S., 2019b. Evolution of university-industry

- collaboration in Brazil from a technology upgrading perspective. *Technol. Forecast. Soc. Change* 145, 330–340. <https://doi.org/10.1016/j.techfore.2018.05.001>
- Fischer, B.B., Schaeffer, P.R., Vonortas, N.S., Queiroz, S., 2018. Quality comes first: university-industry collaboration as a source of academic entrepreneurship in a developing country. *J. Technol. Transf.* 43, 263–284. <https://doi.org/10.1007/s10961-017-9568-x>
- Fuster, E., Padilla-Meléndez, A., Lockett, N., Del-Águila-Obra, A.R., 2019. The emerging role of university spin-off companies in developing regional entrepreneurial university ecosystems: The case of Andalusia. *Technol. Forecast. Soc. Change* 141, 219–231. <https://doi.org/10.1016/j.techfore.2018.10.020>
- Gaiger, L., Nyssens, M., Wanderley, F., 2019. *Social Enterprise in Latin America, Social Enterprise in Latin America*. Routledge, New York : Routledge, 2019. | Series: Routledge studies in social enterprise & social innovation. <https://doi.org/10.4324/9780429055164>
- Gioia, D.A., Corley, K.G., Hamilton, A.L., 2013. Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. *Organ. Res. Methods* 16, 15–31. <https://doi.org/10.1177/1094428112452151>
- Göktepe-Hulten, D., Mahagaonkar, P., 2010. Inventing and patenting activities of scientists: In the expectation of money or reputation? *J. Technol. Transf.* 35, 401–423. <https://doi.org/10.1007/s10961-009-9126-2>
- Golfashani, N., 2003. *Understanding Reliability and Validity in Qualitative Research, The Qualitative Report*.
- González-Gélvez, D.M., Jaime, A., 2013. El patentamiento Universitario en Colombia. *J. Technol. Manag. Innov.* 8, 233–345. <https://doi.org/10.4067/s0718-27242013000300050>
- Gonzalez-Perez, M.-A., 2010. The civically engaged university model in Colombia. *Int. J.*

- Technol. Manag. Sustain. Dev. 9, 161–173. <https://doi.org/10.1386/tmsd.9.3.161>
- Good, M., Knockaert, M., Soppe, B., Wright, M., 2019. The technology transfer ecosystem in academia. An organizational design perspective. *Technovation* 82–83, 35–50. <https://doi.org/10.1016/j.technovation.2018.06.009>
- Guerrero, M., Herrera, F., Urbano, D., 2019. Strategic knowledge management within subsidised entrepreneurial university-industry partnerships. *Manag. Decis.* 57, 3280–3300. <https://doi.org/10.1108/MD-10-2018-1126>
- Guerrero, M., Urbano, D., 2017. The impact of Triple Helix agents on entrepreneurial innovations' performance: An inside look at enterprises located in an emerging economy. *Technol. Forecast. Soc. Change* 119, 294–309. <https://doi.org/10.1016/j.techfore.2016.06.015>
- Guerrero, M., Urbano, D., 2012. The development of an entrepreneurial university. *J. Technol. Transf.* 37, 43–74. <https://doi.org/10.1007/s10961-010-9171-x>
- Guerrero, M., Urbano, D., Cunningham, J.A., Gajón, E., 2018. Determinants of Graduates' Start-Ups Creation across a Multi-Campus Entrepreneurial University: The Case of Monterrey Institute of Technology and Higher Education. *J. Small Bus. Manag.* 56, 150–178. <https://doi.org/10.1111/jsbm.12366>
- Guerrero, M., Urbano, D., Herrera, F., 2017. Innovation practices in emerging economies: Do university partnerships matter? *J. Technol. Transf.* 44, 615–646. <https://doi.org/10.1007/s10961-017-9578-8>
- Guimón, J., 2013. Promoting University - Industry Collaboration in Developing Countries, The Innovation Policy Platform - Policy Brief.
- Gulbrandsen, M., Thune, T., 2017. The effects of non-academic work experience on external interaction and research performance. *J. Technol. Transf.* 42, 795–813.

<https://doi.org/10.1007/s10961-017-9556-1>

Guzman-Alfonso, C., Guzman-Cuevas, J., 2012. Entrepreneurial Intention Models as Applied to Latin America. *J. Organ. Chang. Manag.* 25, 721–735.

<https://doi.org/10.1108/09534811211254608>

Heredia Pérez, J.A., Kunc, M.H., Durst, S., Flores, A., Geldes, C., 2018. Impact of competition from unregistered firms on R&D investment by industrial sectors in emerging economies.

Technol. Forecast. Soc. Change 133, 179–189.

<https://doi.org/10.1016/j.techfore.2018.03.028>

Iakovleva, T., Kolvereid, L., 2009. An integrated model of entrepreneurial intentions. *Int. J. Bus. Glob.* 3, 66. <https://doi.org/10.1504/IJBG.2009.021632>

Ibáñez, M.J., Guerrero, M., Yáñez-Valdés, C., Barros-Celume, S., 2021. Digital social entrepreneurship: the N-Helix response to stakeholders' COVID-19 needs. *J. Technol. Transf.*

<https://doi.org/10.1007/s10961-021-09855-4>

Johnston, A., Huggins, R., 2016. Drivers of University–Industry Links: The Case of Knowledge-Intensive Business Service Firms in Rural Locations. *Reg. Stud.* 50, 1330–1345.

<https://doi.org/10.1080/00343404.2015.1009028>

Jones-Evans, D., 1998. Universities, Technology Transfer and Spin-off Activities – Academic Entrepreneurship in Different European Regions, Targeted Socio-Economic Research Project No 1042. University of Glamorgan.

Jones, S.E., Coates, N., 2020. A micro-level view on knowledge co-creation through university-industry collaboration in a multi-national corporation. *J. Manag. Dev.* 39, 723–738.

<https://doi.org/10.1108/JMD-08-2019-0365>

Kafouros, M., Love, J.H., Ganotakis, P., Konara, P., 2020. Experience in R&D collaborations,

- innovative performance and the moderating effect of different dimensions of absorptive capacity. *Technol. Forecast. Soc. Change* 150, 119757. <https://doi.org/10.1016/j.techfore.2019.119757>
- Klofsten, M., Fayolle, A., Guerrero, M., Mian, S., Urbano, D., Wright, M., 2019. The entrepreneurial university as driver for economic growth and social change - Key strategic challenges. *Technol. Forecast. Soc. Change* 141, 149–158. <https://doi.org/10.1016/j.techfore.2018.12.004>
- Liñán, F., Urbano, D., Guerrero, M., 2011. Regional variations in entrepreneurial cognitions: Start-up intentions of university students in Spain. *Entrep. Reg. Dev.* 23, 187–215. <https://doi.org/10.1080/08985620903233929>
- Link, A.N., Siegel, D.S., Wright, M., 2015. *The Chicago Handbook of University Technology Transfer and Academic Entrepreneurship*. University of Chicago Press. <https://doi.org/10.7208/chicago/9780226178486.001.0001>
- Llopis, O., Sánchez-Barrioluengo, M., Olmos-Peñuela, J., Castro-Martínez, E., 2018. Scientists' engagement in knowledge transfer and exchange: individual factors, variety of mechanisms and users. *Sci. Public Policy* 1–14. <https://doi.org/10.1093/scipol/scy020>
- Mahdad, M., Bogers, M., Piccaluga, A., Minin, A. Di, 2018. Chapter 7 Exploring the Organization of University–Industry Joint Laboratories: A Leadership Perspective. pp. 141–173. <https://doi.org/10.1108/978-1-78769-431-620181007>
- Mahdad, M., Minh, T.T., Bogers, M.L.A.M., Piccaluga, A., 2020. Joint university–industry laboratories through the lens of proximity dimensions: moving beyond geographical proximity. *Int. J. Innov. Sci.* 12, 433–456. <https://doi.org/10.1108/IJIS-10-2019-0096>
- Maietta, O.W., 2015. Determinants of university–firm R&D collaboration and its impact on

- innovation: A perspective from a low-tech industry. *Res. Policy* 44, 1341–1359.
<https://doi.org/10.1016/j.respol.2015.03.006>
- Maresch, D., Harms, R., Kailer, N., Wimmer-Wurm, B., 2016. The impact of entrepreneurship education on the entrepreneurial intention of students in science and engineering versus business studies university programs. *Technol. Forecast. Soc. Change* 104, 172–179.
<https://doi.org/10.1016/j.techfore.2015.11.006>
- Markman, G.D., Siegel, D.S., Wright, M., 2008. Research and Technology Commercialization. *J. Manag. Stud.* 45, 1401–1423. <https://doi.org/10.1111/j.1467-6486.2008.00803.x>
- Marotta, D., Mark, M., Blom, A., Thorn, K., 2007. Human Capital and University-Industry Linkages' Role in Fostering Firm Innovation: An Empirical Study of Chile and Colombia. *SSRN Electron. J.* <https://doi.org/10.2139/ssrn.1862248>
- Meek, W.R., Pacheco, D.F., York, J.G., 2010. The impact of social norms on entrepreneurial action: Evidence from the environmental entrepreneurship context. *J. Bus. Ventur.* 25, 493–509. <https://doi.org/10.1016/j.jbusvent.2009.09.007>
- Meissner, D., Shmatko, N., 2017. “ Keep open ”: the potential of gatekeepers for the aligning universities to the new Knowledge Triangle. *Technol. Forecast. Soc. Chang.* 123, 191–198.
<https://doi.org/10.1016/j.techfore.2016.03.012>
- Meng, D., Li, X., Rong, K., 2019. Industry-to-university knowledge transfer in ecosystem-based academic entrepreneurship: Case study of automotive dynamics & control group in Tsinghua University. *Technol. Forecast. Soc. Change* 141, 249–262.
<https://doi.org/10.1016/j.techfore.2018.10.005>
- Minguillo, D., Thelwall, M., 2015. Research excellence and university-industry collaboration in UK science parks. *Res. Eval.* 24, 181–196. <https://doi.org/10.1093/reseval/rvu032>

- Miranda, F.J., Chamorro-Mera, A., Rubio, S., 2017. Academic entrepreneurship in Spanish universities: An analysis of the determinants of entrepreneurial intention. *Eur. Res. Manag. Bus. Econ.* 23, 113–122. <https://doi.org/10.1016/j.iedeen.2017.01.001>
- Montoya Martínez, E., 2009. La creación de Spin-offs de base académica - investigativa por iniciativa de los estudiantes: el caso de la Universidad Nacional de Colombia sede Medellín. Universidad Nacional de Colombia.
- Munari, F., Rasmussen, E., Toschi, L., Villani, E., 2016. Determinants of the university technology transfer policy-mix: a cross-national analysis of gap-funding instruments. *J. Technol. Transf.* 41, 1377–1405. <https://doi.org/10.1007/s10961-015-9448-1>
- Munari, F., Sobrero, M., Toschi, L., 2017. Financing technology transfer: assessment of university-oriented proof-of-concept programmes. *Technol. Anal. Strateg. Manag.* 29, 233–246. <https://doi.org/10.1080/09537325.2016.1241874>
- Muofhe, N.J., Du Toit, W.F., 2011. Entrepreneurial education's and entrepreneurial role models' influence on career choice. *SA J. Hum. Resour. Manag.* 9, 1–15. <https://doi.org/10.4102/sajhrm.v9i1.345>
- Nabi, G., Liñán, F., 2011. Graduate entrepreneurship in the developing world: intentions, education and development. *J. Educ. + Train.* 53, 325–334. <https://doi.org/10.1108/004009111111147668>
- Naranjo-Valencia, J.C., Calderón-Hernández, G., 2015. Construyendo una cultura de innovación. Una propuesta de transformación cultural. *Estud. Gerenciales* 31, 223–236. <https://doi.org/10.1016/j.estger.2014.12.005>
- Neves, S., Brito, C., 2020. Academic entrepreneurship intentions : a systematic literature review 39, 645–704. <https://doi.org/10.1108/JMD-11-2019-0451>

- Olavarrieta, S., Villena, M.G., 2014. Innovation and business research in Latin America: An overview. *J. Bus. Res.* 67, 489–497. <https://doi.org/10.1016/j.jbusres.2013.11.005>
- Perkmann, M., Fini, R., Ross, J.M., Salter, A., Silvestri, C., Tartari, V., 2015. Accounting for universities' impact: Using augmented data to measure academic engagement and commercialization by academic scientists. *Res. Eval.* 24, 380–391. <https://doi.org/10.1093/reseval/rvv020>
- Perkmann, M., Salandra, R., Tartari, V., McKelvey, M., Hughes, A., 2021. Academic engagement: A review of the literature 2011-2019. *Res. Policy* 50, 104114. <https://doi.org/10.1016/j.respol.2020.104114>
- Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A., Sobrero, M., 2013. Academic engagement and commercialisation: A review of the literature on university–industry relations. *Res. Policy* 42, 423–442. <https://doi.org/10.1016/j.respol.2012.09.007>
- Perkmann, M., Walsh, K., 2007a. University-industry relationships and open innovation: Towards a research agenda. *Int. J. Manag. Rev.* 9, 259–280. <https://doi.org/10.1111/j.1468-2370.2007.00225.x>
- Perkmann, M., Walsh, K., 2007b. University–industry relationships and open innovation: Towards a research agenda. *Int. J. Manag. Rev.* 9, 259–280. <https://doi.org/10.1111/j.1468-2370.2007.00225.x>
- Randy Burd, M.M.M., 2013. Impact Over Revenue: Toward a Social Entrepreneurship Model for University Technology Transfer. *J. Entrep. Organ. Manag.* 02, 1–7. <https://doi.org/10.4172/2169-026x.1000104>

- Rasmussen, E., Mosey, S., Wright, M., 2011. The Evolution of Entrepreneurial Competencies : A Longitudinal Study of University Spin-Off Einar Rasmussen , Simon Mosey and Mike Wright. <https://doi.org/10.1111/j.1467-6486.2010.00995.x>
- Rinaldi, C., Cavicchi, A., Spigarelli, F., Lacchè, L., Rubens, A., 2018. Universities and smart specialisation strategy. *Int. J. Sustain. High. Educ.* 19, 67–84. <https://doi.org/10.1108/IJSHE-04-2016-0070>
- Roncancio, J.J., Dentchev, N.A., Diaz Gonzalez, A., Crispeels, T., 2020. The Role of the Subjective Norm in Explaining the Performance of Entrepreneurial Universities. *Acad. Manag. Proc.* 2020, 17693. <https://doi.org/10.5465/AMBPP.2020.17693abstract>
- Roud, V., Vlasova, V., 2020. Strategies of industry-science cooperation in the Russian manufacturing sector. *J. Technol. Transf.* 45, 870–907. <https://doi.org/10.1007/s10961-018-9703-3>
- Rubens, A., Spigarelli, F., Cavicchi, A., Rinaldi, C., 2017. Universities’ third mission and the entrepreneurial university and the challenges they bring to higher education institutions. *J. Enterprising Communities People Places Glob. Econ.* 11, 354–372. <https://doi.org/10.1108/JEC-01-2017-0006>
- Salazar, M. del P.R., Valderrama, M.G., 2013. La Alianza Universidad-Empresa-Estado: una estrategia para promover innovación. *Rev. EAN* 112. <https://doi.org/10.21158/01208160.n68.2010.500>
- Sánchez-Barrioluengo, M., Benneworth, P., 2019. Is the entrepreneurial university also regionally engaged? Analysing the influence of university’s structural configuration on third mission performance. *Technol. Forecast. Soc. Change* 141, 206–218. <https://doi.org/10.1016/j.techfore.2018.10.017>

- Schartinger, D., Rammer, C., Fischer, M.M., Fröhlich, J., 2002. Knowledge interactions between universities and industry in Austria: Sectorial patterns and determinants. *Res. Policy* 31, 303–328. [https://doi.org/0048-7333/02/\\$](https://doi.org/0048-7333/02/$)
- Snijders, T., Bosker, R., 2012. *Multilevel Analysis: An introduction to basic and advanced multilevel modeling*, 2nd ed. Sage, London.
- Soendergaard, H.A., Bergenholtz, C., Juhl, H.J., 2015. *University-Industry Collaboration : Drivers and Barriers for going Online*.
- Soetanto, D., van Geenhuizen, M., 2019. Life after incubation: The impact of entrepreneurial universities on the long-term performance of their spin-offs. *Technol. Forecast. Soc. Change* 141, 263–276. <https://doi.org/10.1016/j.techfore.2018.10.021>
- Song, Yanwu, Zhang, J., Song, Yingkang, Fan, X., Zhu, Y., Zhang, C., 2020. Can industry-university-research collaborative innovation efficiency reduce carbon emissions? *Technol. Forecast. Soc. Change* 157, 120094. <https://doi.org/10.1016/j.techfore.2020.120094>
- Suh, Y., Woo, C., Koh, J., Jeon, J., 2019. Analysing the satisfaction of university–industry cooperation efforts based on the Kano model: A Korean case. *Technol. Forecast. Soc. Change* 148, 119740. <https://doi.org/10.1016/j.techfore.2019.119740>
- Sutz, J., 2000. The university–industry–government relations in Latin America. *Res. Policy* 29, 279–290. [https://doi.org/10.1016/S0048-7333\(99\)00066-9](https://doi.org/10.1016/S0048-7333(99)00066-9)
- Teixeira, A.A.C., 2014. Evolution, roots and influence of the literature on national systems of innovation: A bibliometric account. *Cambridge J. Econ.* 38, 181–214. <https://doi.org/10.1093/cje/bet022>
- Teixeira, A.A.C., Mota, L., 2012. A bibliometric portrait of the evolution, scientific roots and influence of the literature on university-industry links. *Scientometrics* 93, 719–743.

<https://doi.org/10.1007/s11192-012-0823-5>

- Urban, B., 2013. Influence of the Institutional Environment on Entrepreneurial Intentions in an Emerging Economy. *Int. J. Entrep. Innov.* 14, 179–191. <https://doi.org/10.5367/ijei.2013.0122>
- Vega-Jurado, J., Fernández-de-Lucio, I., Huanca, R., 2008. University–industry relations in Bolivia: implications for university transformations in Latin America. *High. Educ.* 56, 205–220. <https://doi.org/10.1007/s10734-007-9098-9>
- Villani, E., Rasmussen, E., Grimaldi, R., 2017. How intermediary organizations facilitate university–industry technology transfer: A proximity approach. *Technol. Forecast. Soc. Change* 114, 86–102. <https://doi.org/10.1016/j.techfore.2016.06.004>
- Wennberg, K., Pathak, S., Autio, E., 2013. How culture moulds the effects of self-efficacy and fear of failure on entrepreneurship. *Entrep. Reg. Dev.* 25, 756–780. <https://doi.org/10.1080/08985626.2013.862975>
- Willig, C., Rogers, W.S., Terry, G., Hayfield, N., Clarke, V., Braun, V., 2017. Thematic Analysis, in: *The SAGE Handbook of Qualitative Research in Psychology*. SAGE Publications Ltd, 1 Oliver’s Yard, 55 City Road London EC1Y 1SP, pp. 17–36. <https://doi.org/10.4135/9781526405555.n2>
- Wit-de Vries, E. de, Dolfsma, W.A., van der Windt, H.J., Gerkema, M.P., 2019. Knowledge transfer in university–industry research partnerships: a review. *J. Technol. Transf.* 44, 1236–1255. <https://doi.org/10.1007/s10961-018-9660-x>
- Wright, M., 2018. Academic entrepreneurship: the permanent evolution? *Manag. Organ. Hist.* 13, 88–93. <https://doi.org/10.1080/17449359.2018.1530845>
- Wright, M., 2014. Academic entrepreneurship, technology transfer and society: where next? *J.*

Technol. Transf. 39, 322–334. <https://doi.org/10.1007/s10961-012-9286-3>

- Yigitcanlar, T., Sabatini-Marques, J., Da-Costa, E.M., Kamruzzaman, M., Ioppolo, G., 2019. Stimulating technological innovation through incentives: Perceptions of Australian and Brazilian firms. *Technol. Forecast. Soc. Change* 146, 403–412. <https://doi.org/10.1016/j.techfore.2017.05.039>
- Yin, R.K., 2018. *Case study research and applications: Design and methods*, Sixth. ed. Sage Publications, California.
- Zavale, N.C., Langa, P.V., 2018. University-industry linkages' literature on Sub-Saharan Africa: systematic literature review and bibliometric account. *Scientometrics* 116, 1–49. <https://doi.org/10.1007/s11192-018-2760-4>
- Zhao, Z., Anders, B., Cai, J., 2018. Promoting academic engagement: university context and individual characteristics. *J. Technol. Transf.* 45, 1–34. <https://doi.org/10.1007/s10961-018-9680-6>
- Zou, B., Guo, J., Guo, F., Shi, Y., Li, Y., 2019. Who am I? The influence of social identification on academic entrepreneurs' role conflict. *Int. Entrep. Manag. J.* 15, 363–384. <https://doi.org/10.1007/s11365-017-0492-1>

Appendix 1

Interview protocol A –Enterprises and Industry

Organization profile

1. Can you describe the mission of your organization? (Association, NGO, Government, Training, Financing, Education, Other?)
2. Describe your organization: legal status, years of operation, founders, capital, top management, board of directors (if applicable), and other relevant information about the organization's management.

Relationship with Entrepreneurship and Entrepreneurial Ecosystem

3. Is there a culture for Entrepreneurship in (city)? What is the most relevant activity for entrepreneurs in (city)?
4. What is your relationship with Entrepreneurship / Entrepreneurs in your city?
5. The policy environment for (Socially vulnerable) entrepreneurs:
 - What is the role of the government in supporting entrepreneurship: programs, needs, or constraints?
 - What is your perception of the policy environment: ease to create new businesses, taxes, incentives, regulations, grants, other programs?
 - Are there any other organizations influencing the organization's environment?
6. What are the principal obstacles in the local market for your organization?
7. Do you think there is sufficient and qualified human capital to stimulate entrepreneurship/support entrepreneurs? If not, what type of profiles are missing?
8. Infrastructure: What is your perception (Electricity, Telecommunications – internet-, water, gas, and transport).
9. Can you please describe the Business Environment for your organization? (Competitors, supply chain, informal competition, and other relevant aspects.)
10. Support:
 - a) what type of support is available to Entrepreneurs in the city? (networking, training, mentorship, coaching, legal, funding)
 - b) Who provides this support?
11. What do you consider is further needed to stimulate entrepreneurship in this city?
12. What are the relevant entrepreneurs / entrepreneurial organizations in this city?

Interview protocol B –Entrepreneurs

Background information

Tell me about yourself (studies, family situation - kids, married, siblings, profession). Can you describe your day-to-day routine?

Business Models of the (social) Entrepreneur – how does it work?

1. What product/service is being provided?
2. To whom?
3. How many customers have been served?
4. Where are you providing your products/services?
5. What are the major costs of your activity (materials, labor, etc.)?
6. How is your activity funded?
7. Do you consider yourself an entrepreneur?
8. Is there an entrepreneurial culture in (city name)?
9. What are the main problems of your business activity?

10. What type of support do you need as an entrepreneur (financials, networking, legal, coaching, etc.)?
11. What organizations or people in [name of the country] can support entrepreneurs like yourself?
12. Are you part of a network or a group? Can you describe how that's working?

Interview Protocol C – For University Staff

1. Please describe how your work is related to social entrepreneurship
2. What types of resources do social entrepreneurs mostly need, according to your observations?
3. What are the main actors within the ecosystem supporting social entrepreneurs that can provide the resources as mentioned above?
4. In your opinion, what type of resources mentioned above can universities provide in their support to social entrepreneurs?
5. What are the most relevant activities your university is currently developing to support social entrepreneurs?
6. What is the role of internal stakeholders (students, faculty, and staff) to support social entrepreneurs?
7. How does your university engage a broader network of external stakeholders to support social entrepreneurs?
8. How can the local ecosystem of stakeholders expand in order to improve the support of social entrepreneurs?
9. What are the limitations for universities to mobilize resources needed by social entrepreneurs?

Table 1**Selected articles on UIC, and UIC with social impact**

Author(s)	Unit of study	Aspects of UIC analyzed	Disciplinary orientation	Key results
Bruneel et al. (2010)	Research projects of universities with businesses	Obstacles to collaborations between universities and industry	Business economics	Prior experience and trust can reduce the barriers to collaboration between university and industry
D'Este and Perkmann (2011)	Academics involved in UIC	Motivations of academics to engage with industry	Business economics	Academics engage with industry to further their research results. Motivations of academics depend on the UIC channel
D'Este et al. (2013)	Collaborative research grants between universities and business firms	Types of proximity between university and industry	Business economics, Management	Geographical distance makes University-Industry collaboration more likely to happen and prior joint experience in UI partnerships.
Maietta (2015)	University-Firm collaboration in low-tech industry	University -Firm R&D collaboration with partners at different universities	Business economics	University-firm R&D collaboration impacts innovation processes, and it is influenced by the geographical proximity between universities and firms
Ankrah and AL-Tabbaa (2015)	Existing literature on U-I partnerships 1990-2014	Motivations, outcomes, forms, and formation process on UIC	Management	A conceptual framework for UIC from an integrative perspective
Wit-de Vries et al. (2019)	Existing literature on U-I partnerships 2002-2016	Identifies practices between U-I that can facilitate knowledge transfer for research partnerships	Engineering and business	Knowledge differences and differences in goals resulting from different institutional cultures are important barriers to KT. Trust, communication, the use of intermediaries, and experience are found as facilitators for knowledge transfer that help to resolve the identified barriers
De Silva et al. (2021a)	Societal Impact via Co-creation	Simultaneous generation of social and business value across several actors	Management and business economics	Science-based co-creation is discussed from a policy perspective.
Guerrero et al. (2019)	University-Industry Partnerships	Collaborative/opportunistic behaviors within UI partnerships	Management	Universities with entrepreneurial behavior exhibit collaborative-opportunistic behavior, and it increases the management costs of collaboration
Fischer et al. (2019b)	Universities and their linkages to industry	Universities embeddedness in innovation system in an emerging economy, patenting activity, and linkages to industry	Economics, management, business economics	The evolution of university-industry collaboration in Brazil has co-evolved along with the national policies on innovation. Academia plays an important role in contributing to value chains and technology upgrading
Fischer et al. (2020)	Leading university in an emerging economy	Frugal innovation arising from University-Industry relationships	Business economics, Management	Internal capabilities of universities can foster frugal innovations and connect them to markets and stakeholders
Schartinger et al. (2002)	Knowledge interactions between universities and industry in Austria: Sectoral patterns and determinants	The intensity of knowledge interactions does not follow a clear pattern. Low interactions in humanities and social sciences were found.	Technology, economics, environmental sciences	Other areas are different that direct cooperation between universities and industries should be studied. As it seems, there are more UIC channels and, therefore, more different outcomes.
Roud and Vlasova (2020)	Strategies of industry-science cooperation in the Russian manufacturing sector	The paper discusses the relevance of traditional hypotheses on the relationship	Economics of innovation	Public support can be tailored to promote networking with R&D organizations and universities and for non-R&D cooperative activities

		between industry and science to developing countries		
Rinaldi et al. (2018)	Universities and smart specialization strategy: From third mission to sustainable development co-creation	Analyses the emerging role of social sciences and humanities universities in contemporary society via fourth-mission activities	Business, economics, and law	Universities can play different and broader roles which could support regions in designing and implementing smart specialization strategy
Perkmann and Walsh (2007a)	University-industry relationships and open innovation: Towards a research agenda	Explores the diffusion and characteristics of collaborative relationships between universities and industry	Management	The paper presents a research agenda on the role of open innovation for University-Industry relationships
Mahdad et al. (2020)	Joint university-industry laboratories through the lens of proximity dimensions: moving beyond geographical proximity	The paper studies proximity dimensions as a result of geographically proximate university and industry joint laboratories	Business management	Cognitive proximity at the interface level could systematically influence collaborative innovation within university-industry laboratories.

Table 2

Interviews and Profile’s Respondents Overview

BOLIVIA			COLOMBIA			
Data collection	Domain	Participants	Data collection	Domain	Participants	
Interviews (17)	University	Junior Professor (Management) (P1) Junior Professor (Management) (P2) Junior Professor (Management) (P3) Senior Professor (Business School) (P4)	Interviews (16)	University	Coordination of university incubator (P18) Director Entrepreneurship Center (P19) Director of Social Engagement (P20) International Projects Coordinator (P21) International Students Coordinator (P22) Internationalization advisor (P23) Senior Professor (Architecture) (P24) Senior Professor (Architecture) (P25) Students Entrepreneur (P26) Coordinator of mentorship program (P27)	
	Technical institutions	Academic Director (P5) Vocational Trainer (P6)			Social Enterprise	Director (P28) Director (P29)
	Startup	Entrepreneur (P7) Entrepreneur (P8) Entrepreneur (P9) Entrepreneur (P10) Entrepreneur (P11)			Non-Profit Organizations	Coordinator of community projects (P30) Manager (P31)
	Retail	Entrepreneur (P12)			Government (Major Office)	Coordinator of Entrepreneurship (P32)
	Non-Profit Organizations	Director (P13) Manager (P14)			Chamber of Commerce	Director of innovation (P33)
	Incubator	Director (P15) Director (P16)				
	Bank	Director (P17)				
Focus Groups (4)	Entrepreneurs Students and graduates	4 Participants (FG1)	Focus Groups (4)	University Outreach and entrepreneurship	3 Participants (FG5)	
	Government officials	4 Participants (FG2)		University Student’s entrepreneurs and junior professors	7 Participants (FG6)	
	Incubator Coordinators and trainers	10 Participants (FG3)		University Voluntary program team	3 Participants (FG7)	
	NGO Management team	3 Participants (FG4)		University Student’s entrepreneurs in topics related to peacekeeping	12 Participants (FG8)	

Table 3
Observations, Domain, and Participants

BOLIVIA (4 Observations)		COLOMBIA (4 Observations)	
Domain	Participants	Domain	Participants
Entrepreneurship Fair "Yo Emprendo"	Social Entrepreneurs UCB team Local incubator team VUB <i>October 23, 2018</i>	Lecture and meetings with university officials	Meetings with university officials (12) Presentation to students (+200 students) <i>March 15 and 16, 2018</i>
VUB Student Mobility Brussels, Belgium to Tarija, Bolivia	VUB Master Theses students (9) VUB Ph.D. Students (2) UCB Professors (4) Team Incubator Tarija (7) Team CAP program (4) Local Entrepreneurs Tarija (36) Local students Tarija (60) <i>Dec 3 to 10, 2018</i>	Entrepreneurship and Voluntarism University Fair	70 + Entrepreneurs and student organizations participating in the Fair <i>Nov 11, 2018</i>
Round table discussion University-Industry cooperation in support of Entrepreneurship	Academics (4) Team incubator Tarija (6) Entrepreneurs (4) Team CAP (2) <i>April 16, 2019</i>	Meetings with a university official and coaching to local entrepreneurs	Meeting with university officials (2) Coaching students' entrepreneurs and other project leaders (20+) <i>Sept 8, 2019</i>
Institutional visit to Bolivia - Development cooperation project with CEUB (Inter-University association)	17 local academics (5 cities) to discuss topics on Entrepreneurship (Cluster 3) VUB professors VUB Delegation of Authorities <i>April 7 to 12, 2019</i>	Social Entrepreneurship Summit	The panel of Rectors: Universidad del Norte Universidad Católica Boliviana - Sede Tarija Universidad del Magdalena Social Entrepreneurship Fair: 20 + Entrepreneurs <i>Sept 12 and 13, 2019</i>

Table 4

Coding structure (UIC: First-order code) and illustrative data

Antecedents (Low subjective norm)			
Group	Second-order code	Third-order code	Illustrative data
Lack of supportive environment	Governmental	LSE-Gov	<i>"We see that, at the level of the universities, the government of the day implements its own priorities and sometimes stops the progress and programs that have been working in favor of entrepreneurship. Every four years we have to change our agenda, and that hinders, does not support the development of a university that can have a sustainable policy to support entrepreneurship."</i>
	Social Recognition	LSE-SoR	<i>"Craftsmen and their work, it is very undervalued. In other countries and cultures, this is more valued and promoted at the country level. It attracts tourism, generates local jobs, and strengthens itself as an economic activity. Here, it is the opposite."</i>
Consequences (outcomes driven by individuals' orientation to solve social problems)			
Illustrative Channels of UIC with social impact	Community service learning	Ch-CSL	<i>"Our university proposes inclusion connected to the environment to get out of dependence on oil income. Therefore, we can influence the development of the industry with academic programs, with institutional management, that we can generate better development conditions and impact the region."</i>
	Open Innovation	Ch-OpI	<i>"Now universities are making alliances with the private sector to seek for market research and the outcomes are publicly available."</i>
	Social Innovation Labs	Ch-SIL	<i>"As a university [name of the university], we have a marked social vocation, where we understand that knowledge and technological development must always walk towards innovation ultimately for the benefit of all stakeholders of society, in that sense, we have two laboratories, one is where we develop a business and the other is a social innovation center where we dedicate ourselves to general social innovation processes. Industrial partners fund both laboratories."</i>
Mechanisms facilitating UIC with social Impact	Entrepreneurship courses	Mec-EntC	<i>"Through the incubator program, I have been able to train in different aspects that I was unaware of (marketing, legal, financial, administrative, etc.). This has allowed me to write a complete business plan with which I can present my project to the bank and other possible allies, and in this way, I am ready to start."</i>
	Entrepreneurship Units and Incubators	Mec-EnU	<i>"What I have learned in the incubator is an excellent thing. Every day we work to create more awareness about the importance of entrepreneurship for our country, Bolivia, and we need to promote it even more with the universities and other networks that exist."</i>
Individual Micro-processes	Entrepreneurship culture	Micro-EnC	<i>"Families are very supportive of entrepreneurship because many of these are inherited (food, crafts, etc.) and this encourages the entrepreneurial spirit to be developed from within the home."</i>
	Social Identity	Micro-SI	<i>"Since I come from a family in which my father developed his own business, I think I also have that entrepreneurial blood. It allows me to continue thriving in my enterprise as well as fighting for solving societal problems, I am a social entrepreneur."</i>
	Championing Social Welfare	Micro-CSW	<i>"I have one colleague from marketing, who is always telling us that we have to engage with other actors in order to improve our societal impact, he is a defender of societal causes, and that motivates me."</i>
	Deontic Justice	Micro-DJ	<i>"There is nothing more rewarding than seeing my research translated into the solution of a real problem in my country, well at least we are working hard towards achieving that goal."</i>
	Pro-social Behaviour	Micro-PB	<i>"I have to solve my people's problems, what do I mean by that? To provide solutions to the problem that the producers have. I think I can do that. That is the biggest goal I have."</i>

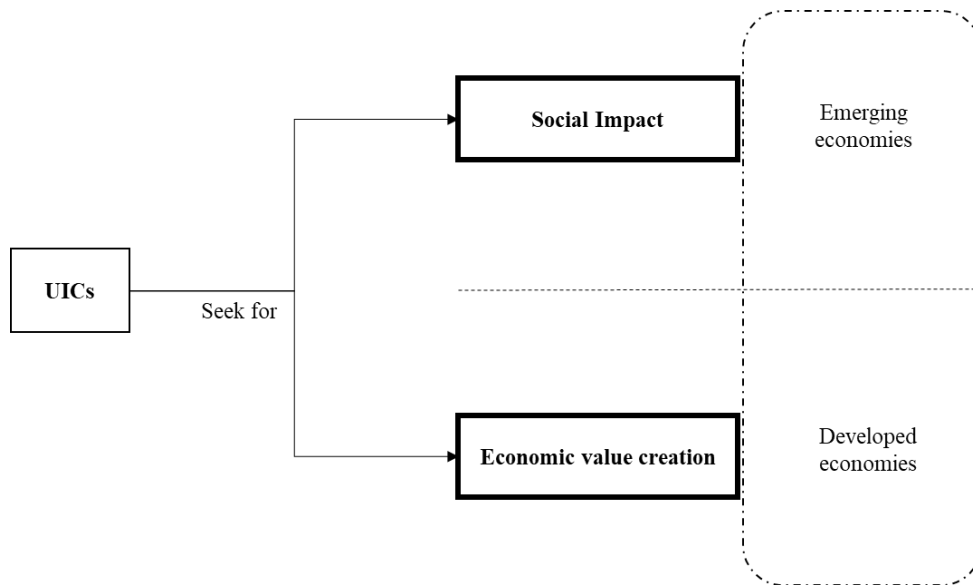


Fig. 1. Research model

Source: Author

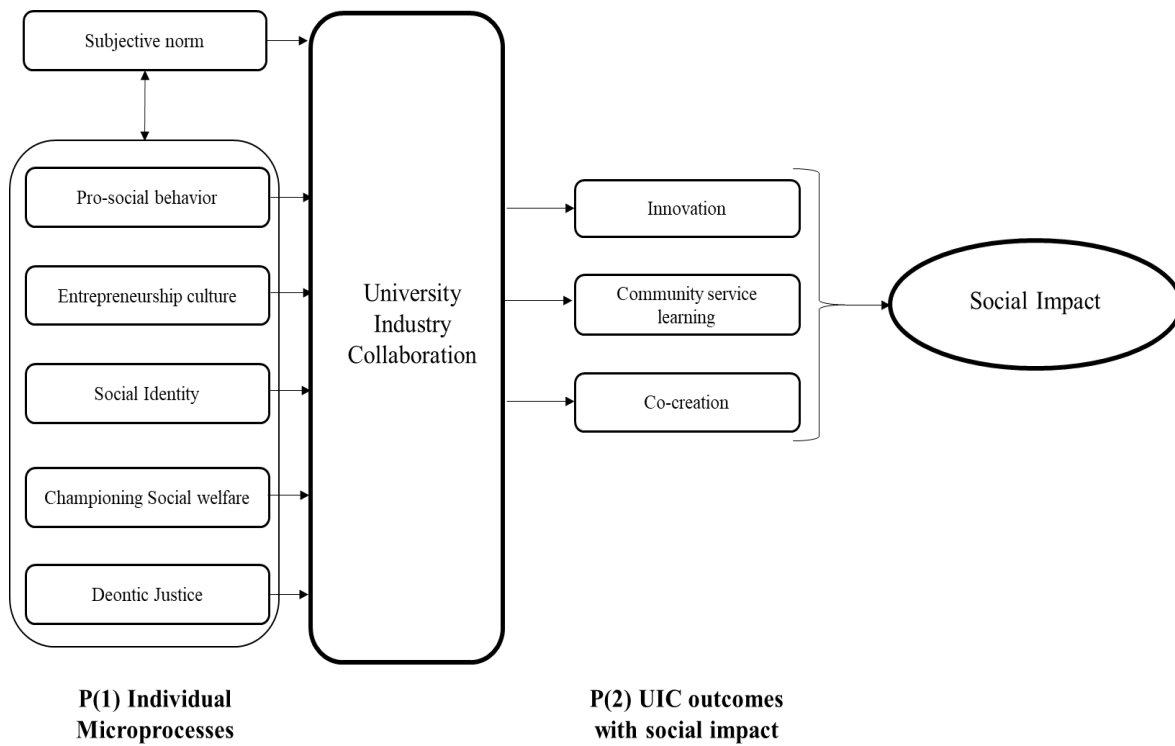


Fig. 2. General framework

Source: Author