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University Business Incubator Model: The Synergy of Theory and Practice

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Abbreviations

UBI	University Business Incubator
SJR	Scimago Journal & Country Rank
ULSM	University-Level Support Mechanisms
LCSM	Local-Context Support Mechanisms
STEM	Science, Technology, Engineering, and Mathematics
GloCal	Global and Local
POC	Proof-of-Concept
RBSO	Research-Based Spin-Offs
CPI	Corporate, Private Incubators
IPI	Independent Private Incubators
BIC	Business Innovation Centers
NVCI	New Value Creation Intention
MVP	Minimum Vital Product
R&D	Research and Development
TT	Technology Transfer
VRIN	Valuable, Rare, Inimitable Non-Substitutable
COVID	Coronavirus Disease
IP	Intellectual Property
B2B	Business to Business
IPO	Input – Process – Outcomes

Glossary

Third mission	Representation of the economic and social mission of the university and its contribution to communities and territories
Entrepreneurial ecosystem	An ecosystem that allows for the fast flow of talent, information, and resources helps entrepreneurs quickly find what they need at each stage of growth.
Journal Citation Report	Resource for impact factor data.
Scimago Journal & Country Rank	The measure of the scientific influence of scholarly journals that accounts for both the number of citations received by a journal and the importance or prestige of the journals where the citations come from.
Nvivo software	Qualitative Data Analysis Software for Researchers
Crash-testing	An event aimed at “stress testing” the market strategies, business models, distribution, roadmaps, etc., of technology startups.
Spin-off	A subsidiary of a parent company that has been sold off creating a new company
Triple Helix model	An articulation between three social actors—the university, the private sector, and the government—with the aim of generating regional development around innovation.

Abstract

Business incubators play a significant role in developing an entrepreneurial ecosystem by supporting attempts of new ideas to become sustainable business units. A growing body of evidence suggests University Business Incubators are one type of such organization and, in the lens of the "third mission" of high education, contribute to the growing qualitative employment rate and quantity of innovative start-ups. Previous research has indicated potential associations between UBIs and organizational studies investigating models of running innovation-supporting businesses. However, the historiography of UBIs largely ignores the role of exploring these organizations from business model perspectives that could contribute to the incubation theory and provide practitioners with more insights in this field.

This thesis seeks to understand and explore the trends in the UBI literature on the research agenda and develop the model of UBIs from the BMC and the Input - Process - Output perspectives. This manuscript includes a systematic literature review and case studies. This systematic literature review is based on the papers from the most credible sources of the Scopus and Web of Science databases. Regarding case studies, interviews of representatives from leading UBIs formed the basis and shed light on some aspects of the incubations process from their business model perspective.

The thesis concludes that the research agenda of the UBI is developing, and the interest of management scholars is increasing. Thematic analysis of the literature formed the main topics around which the inquiry is going, and based on these topics, the corresponding conceptual framework is proposed. The framework prompted an idea to develop the UBI model using data from interviews mentioned earlier. Therefore, other results are the UBI models and recommendations to researchers and practitioners that are first, to our knowledge, proposed in such a manner, and the author believes that it contributes to the incubation theory.

INTRODUCTION

The University Business Incubator (UBI) is a unique part of an innovation ecosystem that provides various support services to university-related start-ups, mainly in the embryonic stage. They play a significant role in educating, launching, and promoting entrepreneurs at universities. However, as universities expand their mission objectives and industry's expectations of academia are changing, UBIs are again looking for what might be a sustainable start-up incubation model.

UBIs & Entrepreneurship

It is challenging to overestimate the value of entrepreneurs and their input into society as they constantly strive to improve our lives and sustain their financial stability by doing this. Such a lifestyle is related to many risks because new ideas proposed by entrepreneurs often face market issues like product-market fit and customer competition. Therefore, UBI is one of the tools that aim to reduce these risks and support entrepreneurship, improve needed skills, and develop an entrepreneurial ecosystem.

Innovation starts with ideas, and the root of them usually is the entrepreneurial mindset engaged with market needs and applying new approaches to the problem-solving process. It is a rhetorical question if people are born with an entrepreneurial

mindset as a talent or if it is a skill that can be acquired. Moreover, cultural aspects are also involved in this debate; for instance, in some nations, it is acceptable to have several fails before becoming a successful entrepreneur. While in other nations, people believe that opportunity to become an entrepreneur is given only once, and a person should not take a second try after the first fall. Therefore, UBIs are there to develop an entrepreneurial culture for nurturing open mindsets ready to innovate (Gallant et al., 2010). However, mindset is a starting point of the way that is called entrepreneurial lifestyle.

Entrepreneurial skills

A brilliant idea does not guarantee success, as a journey from lab to market is incredibly challenging. Starting a new firm, especially with an innovative product, is related to obstacles entrepreneurs must deal with. For instance, the challenges could be the market is unprepared for the proposed new product, manufacturing process setting, and budgeting. Hence, to overcome these challenges, future entrepreneurs are required to develop specific skills that could be acquired through incubation programs while studying at university.

UBIs provide a range of services to develop entrepreneurial skills. Educational workshops, mentoring sessions, and meetings with experts are examples of such services available for start-ups. These services are complimentary for university students as an additional opportunity to imply knowledge and be more prepared for the

job market. However, academics are also welcome to participate in these programs.

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Studies of UBIs show the importance of having a clear view of how the incubation process is organized. A significant number of papers from the resource-based view (RBV) perspective in this area highlight the attention of scholars to the understanding of the tangible and intangible assets available within an incubation program. Data from several studies suggest that the focus moved from infrastructure to more intangible services during the last decades. In the beginning, incubators as a phenomenon had a role in saving the military manufacturing infrastructure left after the Second World War by attracting entrepreneurs to re-directing production from the military to the peacetime market. Although the infrastructure is still necessary, recent research shows that services like networking are moving to the leading positions by degrees.

To date, there has been little agreement on how to structure the workflow of UBIs and their business model. Due to the heterogeneity of their mother organization based on which they are situated, there is considerable debate if UBIs have to be non-profit or earn a budget by themselves. Should they have to be open for everyone interested or have to support only students and academics of the university they work in? These and many other questions raise the value and demonstrate the importance of research in the UBIs business model.

Surprisingly, UBI's business model is seldom studied, and it is unclear what is the product of their activities, who the customers are, how they communicate to the market, and how their back-office structures this list of issues, which can be continued longer. In addition, no research has been found that applied Business Model Canvas (BMC) for UBIs to attempt to add clarity to previously listed issues. At least this is weird, as many UBIs apply the BMC method in the education process of start-ups that need to improve entrepreneurial skills.

The BMC is also very convenient for many reasons in investigating the business model of any organization, not for UBIs only. It covers almost all aspects of the business processes that start-up owners should pay attention to. Moreover, the BMC can briefly illustrate all business plan chapters on one page only. These advantages are invaluable for today's information age reality when the competition for people's attention knows no boundaries.

However, BMC is not ideal and has some limitations in assessing a business model for startups and UBIs. The main issue is the static nature of the business model due to focusing most on value-proposition, distribution, and budgeting. As entrepreneurship is a dynamic process, startups need to know which steps should be taken in a particular development period. Moreover, organizing business processes is one of the main factors of transformation from startup to sustainable enterprise. Therefore, the input-process-output (IPO) model can help distinguish the tasks and steps that should be taken in a required period both for a startup and for UBI, like any other organization.

CHAPTER 1

University Business Incubators: Systematic Literature Review and Research Agenda

ABSTRACT

University Business Incubators (UBI) - being one of the main actors in the entrepreneurial ecosystem - play a significant role in the start-up supporting process. A growing body of evidence suggests the new knowledge generated in universities positively influences innovations by promoting ideas to the market. The historiography of the UBI model largely neglects the role of balance between science, social impact, and business objectives. The principal objectives of this article are to investigate the trends in UBI research and develop a research agenda related to the phenomena. A combined qualitative (descriptive analysis) and quantitative (thematic analysis) methodological approach is used to answer the research questions. This study identified the distribution of the publications by year, the methods applied, and the journals that published the articles about UBI. The principal findings of this research are the generated eight themes that formed the basis of the proposed conceptual framework. The results can contribute to a better understanding of how UBI managers can balance the objectives of supporting start-ups, social impact, and working for the sake of science.

Keywords: Business Incubator, Entrepreneurship, Literature Review, Entrepreneurial Ecosystem, Resources.

INTRODUCTION

The role of entrepreneurship is a core element in growth for most countries regardless of their differences in economic development levels, and incubators support entrepreneurial initiatives, thereby contributing as the drivers of the process. (Carayannis & Von Zedtwitz, 2005; A. C. Cooper, 1985c; Charlene L. Nicholls-Nixon et al., 2021). Incubators - as startups supporting organizations - need a clear view of their sustainable business model (Tang et al., 2021a). Depending on their objectives and strategies, they could be classified into different archetypes (McCarthy et al., 2018). Starting from the 1980s, the incubators for almost four decades have attracted scholars' attention (Hackett & Dilts, 2004) that, allowed them to develop theories, including incubation models based on several factors, such as services provided and the parent organization of the incubator, that might influence the incubator policies (Grimaldi & Grandi, 2005).

Universities are one such parent organization for incubators. The "third mission" context, which highlights the place of universities in local economic growth, involves the universities in the entrepreneurship-supporting process, and they set up incubators on the campus (Charlene L. Nicholls-Nixon et al., 2021). Therefore, these incubators are in the specific group called University Business Incubators (UBIs), which are mainly non-for-profit organizations (von Zedtwitz, 2003) with the objectives to commercialize the science results (Phan et al., 2005) and developing students' career views to be able to compete in the global job market (Mayorga, 2019b). Such proximity to science is advantageous because the new knowledge produced is a significant element of innovation promotion. However, it might also cause a problem as focusing

on pulling scientific results to the market is challenging for incubator managers. There is a risk of underestimating the company with a high potential to grow in the global market yet having a lower level of scientific sophistication in the product (Grandi & Grimaldi, 2004a). The UBI's uniqueness implies the disagreement of their primary objectives and courses the debates on whether they should first serve the community, work for the sake of science, or generate revenue.

Extensive research has shown that the incubation process is a part of an entrepreneurial ecosystem that links the stakeholders to collaborate and support new firms in their embryonic stage. The incubators as an organization are presented from different perspectives, and their business model is segmented by various features that allow subdividing them into groups according to inherent characteristics. Several attempts have been made to expand the existing knowledge of incubation based on the systematic literature review approach (Good et al., 2019a; Guerrero et al., 2021; Hausberg & Korreck, 2020; Kötting, 2020). To our knowledge, the first systematic literature review dedicated specifically to university-based incubators was written by (M. McAdam et al., 2006b), which proposes an overview of the research agendas related to the phenomena. The most recent literature review paper was written by (Bodolica & Spraggon, 2021), who focus mainly on incubating innovations within the developing countries context. All listed articles provide reliable information and are full of theoretical insights that could be applied in practice. However, there is little information on research trends in UBI and a lack of consensus on how they can keep the balance between science, social impact, and business processes.

Thus, this paper has two key aims. Firstly, this review explored the existing literature on UBI to find the patterns and describe the research trends. Secondly, this study tries to find a new method of organizing the UBI in the balance between science and business. The questions that drive the research

are: 1. how is the number of articles distributed across the period? 2. What research methodologies are used? 3. Which journals publish the articles? 4. What are the key themes related to the topic?

Data for this study were collected using a data extraction form for systematic literature review and presented in descriptive and thematic analysis. The critical contribution of this research is the conceptual framework of positioning the UBI within the entrepreneurial ecosystem.

The following section of this paper explains the methods and steps applied to answer the questions raised by this research. Then, descriptive analyses present the results of research trends. The main theme overview and conceptual framework proposition are in the discussion section. Finally, the conclusion sums up the main points of the article.

RESEARCH METHODOLOGY

Systematic literature search

According to the definition proposed by Green et al. (2008), "A systematic review attempts to collate all empirical evidence that fits pre-specified eligibility criteria to answer a specific research question." The literature review aims twofold: first, they assess the existing body of knowledge (Guerrero et al., 2021), revealing trends, patterns, themes, and issues (Seuring & Müller, 2008). Second, they create the conceptual framework (Kötting, 2020), thereby contributing to the literature (Good et al., 2019b). In the systematic literature review generally, authors employ scientific articles only and leave the grey literature and book chapters out of scope, yet that is acceptable due to the number of papers analyzed and the peer-review process supply the quality at the required level (Pittaway & Cope, 2007). Considering the illustration of quantitative data and descriptive analysis provides the

qualitative data presented in thematic analysis, the methodology is mixed. The reviewed articles Fig.1 were included passing the standardized flow diagram process (Moher et al., 2009) that, consists of the following four steps:

Baseline.

Following the research aim and identifying the relevant publications, the Scopus and Web of Science databases were applied. These two databases—with a significant number of scientific publications—provide the most detailed information about the peer-reviewed literature required to assess the quality of the articles and minimize research bias (Foss & Saebi, 2017; Walker, 2010). In terms of the quality of the search items, the keywords "university," "business," and "incubator" were included in the title, abstract, and keywords for the Business, Management, and Accounting subject area (González-Pereira et al., 2010). Search "presets" are next: English language, peer-reviewed journals articles published until November 2021 as the search was conducted in that period. This search provides 394 papers. After the detected duplicates were deleted, the 294 articles were identified.

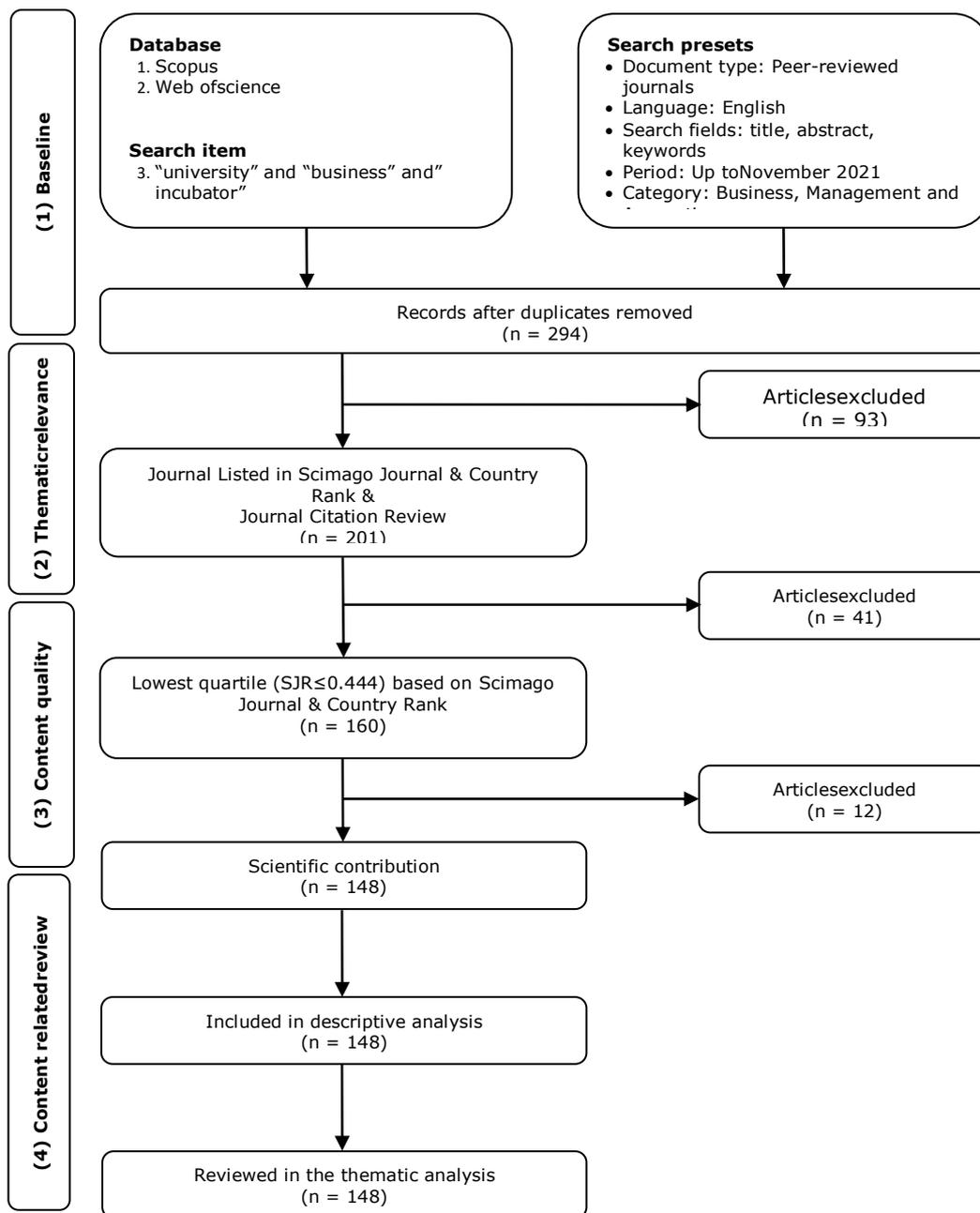


Figure 1 Diagram flow

Thematic relevance.

For the second step, the sources of the identified articles were run under cross-checking process. The journals of the sample needed to be listed in both "Important technical indexes" (Mesa-Gresa et al., 2018), such as the Journal Citation Report and the Scimago Journal & Country Rank. This

restriction advanced the search by increasing the confidence in the relevance of the publications - as being listed in the Journal Citation Report as well as in the Scimago Journal & Country Rank - should be regarded as a criterion of sufficient relevance to the journal (Kötting, 2020). As a result, 93 articles were excluded from the scope, so for the next step, 201 articles were relocated.

Content quality.

For the third step, each journal was screened through the Scimago Journal & Country Rank, namely their position in SCImago Journal Rank Indicator. This indicator is assumed to adequately assess the correlation between the citation and the actual contribution to the science. The needle enables estimating the prestige or influence of a scientific journal based on the largest specialized dataset. It was determined to consider the journals with the minimum level of ($SJR \leq 0,444$) at the instant of the search. Consequently, the article from the journals with an index lower than the checkpoint was excluded. Citation is one of the indicators of the scientific contribution in a research field (Kötting, 2020), so $n=12$ articles were excluded as they were not cited before conducting this literature search.

Content-related review.

For the final step, in place to evade neglecting any necessary details, all publications $n=148$ were included in the descriptive and thematic analysis. The rigor of the research process is supplied by the data extraction form of essential information from the reviewed articles, which permits to avoid subjective bias and applied in current the analysis (Tranfield et al., 2003). The Nvivo software was used for the data extraction process. The data for descriptive analysis were coded through

full article screening, and line-by-line coding of abstracts (Pittaway & Cope, 2007) generated the themes to provide a conceptual framework.

RESULTS

Descriptive analysis

By year.

In order to demonstrate the tendency in the research field of University Business Incubators and provide evidence of growing attention of academia to the phenomenon (Ali et al., 2018; Perkmann et al., 2013).

Fig.2 shows that the number of articles increases steadily despite the considerable fluctuation between the designated period, which can be divided into three primary periods. First, the period up to 2001 when the number did not grow beyond the two articles in scientific journals per year. In 1996, 1997, and 1999 wherein some years - of this period - did not have any publication.

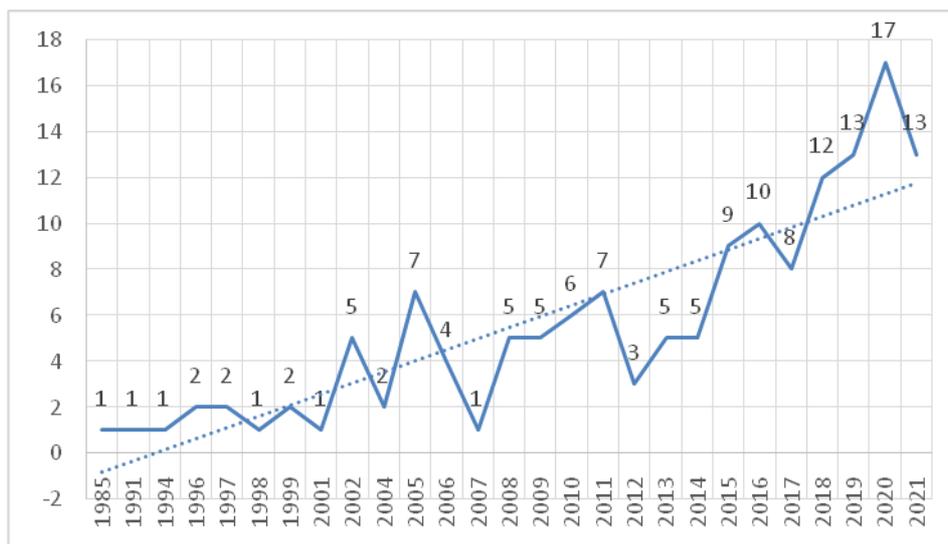


Figure 2 Distribution of publications per year across the period studied.

The next decade has seen a sharp growth up to $n = 5$ articles in 2002 and two "picks" in 2005 and 2011 with $n=7$ articles per each of these years, yet in 2003 and 2007 the numbers descent to $n=0$ and $n=1$ respectively. Finally, starting from 2012, the dramatic growth takes place from $n=3$ in 2002 up to $n=17$ articles in 2020. Each year the growth is stable apart in 2017, when the number falls from $n=10$ to $n=8$, but then it continues to grow by $n=10$ in 2016 and beyond.

By methodology.

It is common practice when a systematic literature review produces the analysis of articles that cover a range of methodologies (Ashby et al., 2012).

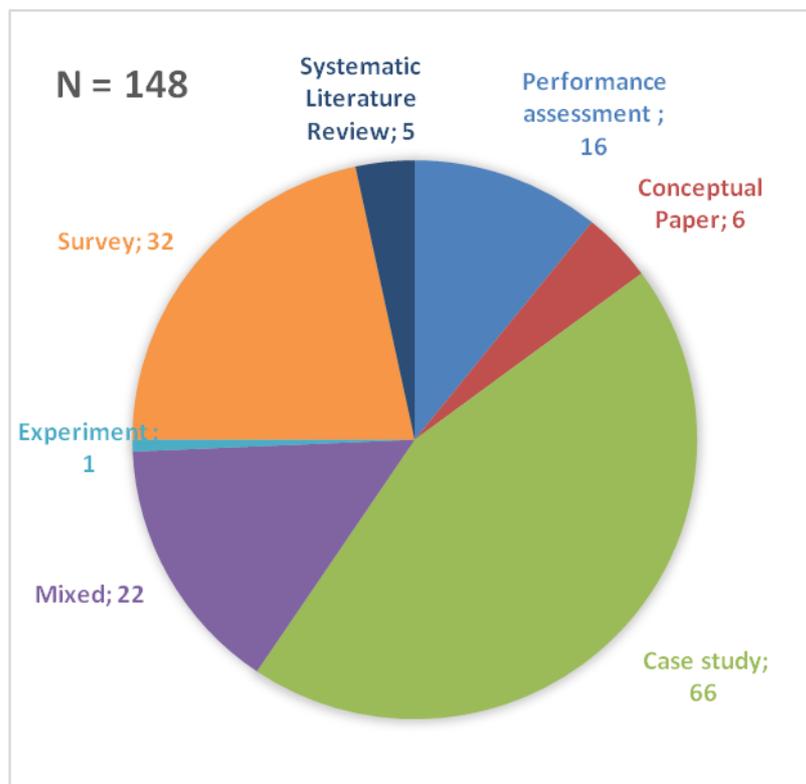


Figure 3 Methodology applied.

Hence, the provision of the results presented in Fig. 3 illustrates the methods applied by the authors of the articles from the bibliography of current research (Seuring & Müller, 2008). According to (Guerrero et al., 2014), a case study is a reasonable approach to exploring a relatively new phenomenon. Consequently, as University Business Incubator is a relatively new phenomenon, the majority of the methods used by the researchers are case studies followed by surveys. Both methods, in sum, acquire almost 3/4 of the articles that were studied. The next methodologies are mixed n=22; performance assessment n= 16; and conceptual papers n=6. Moreover, it should be highlighted that systematic literature review as an approach represented on a comparably low-level n=5 and almost close to the list leaving this position for experiment n=1.

By journal.

The analysis - of the journal's Table. I. where articles were published - is led by two journals (*Journal of Technology Transfer* and *Technovation*). They demonstrate a stable focus on the topic of University Business Incubators as the articles from these journals written in the field cover all three decades observed in this review. The *Industry and Higher Education* is also steady in the numbers of publications in each decade of the given period and share the third place in the list with *Technological Forecasting and Social Change* which shows the dynamic of growth only in the last decade.

Next, the International Journal of Entrepreneurial Behavior and Research with the International Entrepreneurship And Management Journal likewise show the activity in the second half of the period, whereas following four journals (namely Journal Of Small Business Management, Research Policy, Journal Of Business Venturing, and R And D Management) published the articles in the first two decades.

Table 1. Reviewed journals.

N	Journal title	SJR	Articles published
1	Journal Of Technology Transfer	1.768	27
2	Technovation	2.3	19
4	Technological Forecasting And Social Change	2.226	9
3	Industry And Higher Education	0.444	9
5	International Journal of Entrepreneurial Behaviour and Research	1.241	6
6	International Entrepreneurship And Management Journal	1.338	5
9	Journal Of Business Venturing	7.107	4
8	Research Policy	3.666	4
7	Journal Of Small Business Management	1.683	4
10	R And D Management	1.253	4

DISCUSSION

Regional development.

The contribution of the University business incubators to the regions as a topic arises in the reviewed articles. The university is a core of sustainable (Lamine et al., 2018) regional economic development (Hayter, 2016; Lalkaka, 2002; Phillips, 2002; Ratinho & Henriques, 2010) and triggers positive effects (Jones & Parry, 2011). They support spin-offs and provide resources to transfer the research-based idea to the real market and create innovative enterprises. Moreover, it is confirmed that many highly innovative firms further an environment where co-located organizations generate new products even without being part of the university (Díez-Vial & Montoro-Sánchez, 2016). A better understanding of these

processes and well-established coordination of the stakeholders could influence even the national industrial systems (Venturini & Verbano, 2017).

Although the programs for entrepreneurs' attraction launched by particular region administrations are pretty promising, the issue of the entrepreneurs' mobility at the startup stage has a long history. The corporation that opens the branch is usually seen as a job supplier mechanism. UBIs, on the other hand, can fill this role as an alternative to such an approach to the job market and innovation development (A. C. Cooper, 1985a). (Markusen & Oden, 1996) are also concerned about the effectiveness of the public funds' expenditure as state labs are inferior in the number of spin-offs launched compared to universities and research-intensive businesses. The reason for this might be an enormous number of stakeholders and public interests 'involvement, which is challenging to manage in the new firm creation process.

Government is a significant link in bridging the universities with the industry in recruiting the talents who are concentrated in the universities. Hence, responsible university departments organize the activities in partnership with the student community and government representatives (Cadorin et al., 2021). However, the fact that - universities create knowledge and science is one of the main focuses - should also be in the scope of the collaboration activities of the public-private initiatives of innovation advancement (Guadix et al., 2016)(Gorączkowska, 2020). Updates the local authorities by proposing new recommendations on how incubators could level up the innovation of their graduate enterprises.

(Fini et al., 2011b) have analyzed if there is a competition or collaboration between University-Level Support Mechanisms (ULSMs) and Local-Context Support Mechanisms (LCSMs) in stimulating the formation of new academic spin-offs. The data were used for this purpose from the 404 self-driven companies grown in the 64 Italian Science, Technology, Engineering, and

Mathematics universities (STEM universities). Results demonstrate that the local support mechanisms could positively or negatively affect the correlation between these two support mechanisms and the University spin-offs margin. This case is one of many other analyses binding to a specific region, and further, several examples are presented.

In this research, under a region is implied a variety of geographical units that could be as part of Europe (Carayannis & Von Zedtwitz, 2005) and as a separate city (Jones & Parry, 2011; Voisey et al., 2013b). Focusing on the pilot projects of central and Eastern Europe (Carayannis & Von Zedtwitz, 2005) presents the model that observes the best practices of different types of incubation based on the significant scope of geography that includes global practices and local knowledge. They advocate that the proposed model of global and local (gloCal) incubators network can spread the necessary knowledge required for innovation fostering among the participants independently of the entrepreneurs' scale and vanish the socio-cultural, political, etc., barriers. This is supposed to support keeping the balance between venture capitalists' interests and regional economic growth.

The smaller research scopes include only two countries (Spain and Ireland) by comparing two entrepreneurial universities as incubators that, through the "crash-testing" and supporting ideas, implement new projects and contribute to the local social and economic initiatives. The research was done by (Guerrero et al., 2014). It was motivated by the lack of a comparative analysis of the incubation process in the regions with relatively similar backgrounds and real-time conditions. Findings provide the guideline for the universities on the way to becoming entrepreneurial. Countries as separate cases are also observed as regions in incubation literature. For instance, Wales was identified twice in the reviewed first article stating the benefits of the pre-incubation process in job creation and local economic growth (Voisey et al., 2013b). The second

article presents insights into critical areas of the technology-oriented startup's support (Jones & Parry, 2011). With the purpose to illustrate the value of innovation spaces in universities as a knowledge-rich environment in supporting an entrepreneurial approach to new product creation, the case study of South African academic startups was explored through the lens of innovation, entrepreneurship, and technology transfer theoretical overview. As a result, the patterns across the research-based enterprises were identified that are common to innovative entrepreneurs and should contribute to regional ecosystems (Kruger & Steyn, 2020).

Science & Business.

Apart from education and research activities, the universities have a social responsibility to positively impact the surrounding environment with the economic and cultural direction. This responsibility is called the 'third mission' and is supported with funds provided by the government (Warren et al., 2009). Research organizations' suppliers of the new knowledge-based firms generated from intellectual property developed within the universities are assumed to be effective ways of commercialization (Davenport et al., 2002). One of the mechanisms for commercialization is a public scholarship provided for those academics and scientists planning to foster high-tech firms. The support aims to strengthen the initial stage of the new venture creation (Reitan, 1997). The initial phase requires the foundation as scholars are not much aware of commerce, and incubators serve them as a tool to overcome three main barriers: First, the traditional view of a rewarding research system that is different from commercialization; Second, recognition of the existed market demand to their knowledge; Third, engagement of the individuals and organizations with market knowledge into the research results (O'Gorman et al., 2008). Therefore, the issue of science and

industry collaboration is investigated in the reviewed articles where the phenomenon is observed from various angles and proposed diverse solutions. Commercialization is a risky process due to uncertain expectations from the return of investment, so University Business incubators introduce events such as the Proof-of-Concept (POC) that attempt to reduce the risks (Mcadam et al., 2010; Virtanen & Laukkanen, 2002).

The gap between academia and industry encourages (Festel, 2013) to analyze the technology transfer approach through three types of new venture creation when the technology transfers from the university, between the corporations, and within them (namely academic spin-offs, corporate spin-outs, and internal start-ups). (Berbegal-Mirabent et al., 2015) analyze three types of spin-offs supporting strategies: the university's technology transfer support office, a license agreement, and equity sharing with an incubator. The results demonstrate the absence of the dominant approach, and the authors recommend applying several combinations to achieve success for an academic spin-off. However, (Markman et al., 2005) found that new venture creation under the licensing-for-equity strategy overcomes sponsored research licensing strategy. The licensing-for-cash approach is most commonly less correlated with new firm creation. In the recent articles, in order to highlight the link between academia and industry, the commercialization process results call research-based spin-offs (RBSO) (Venturini & Verbano, 2017; Verbano et al., 2020).

Performance assessment

University business incubators operate within the scope of the hosting universities' 'third mission' and mainly do not pursue gaining profit as much as possible. However, like any other organization, UBIs mean by themselves business-related concepts to realize the significance of the work being done.

Consequently, the incubation process study and result measurement are some of the topics researched by scholars (Fukugawa, 2018; M'Chirgui et al., 2018; Mian, 1996a). Before measuring the results and comparing the incubators with the firms as an analogy, it should be a clear view of whom they operate. In other words, who is a *customer* of incubation? Should the state organization allocating funds be treated as a customer or incubatees whose income does not correlate with services? The discussion suggests that customers could be many actors who benefit from the collaboration with the incubators, or there are no customers, depending on the context (Aaboen, 2009).

Next 'attribute' of the organization that influences the performance is a manager who deals with the customers. For instance, the single case study of the incubator at Dublin university as a client (Ahmad & Ingle, 2011) proposes considering the high-tech firm tenant firm. They study customer relation management stages within the incubator. Findings show that the incubator sufficiency depends on the human relationship between manager and clients as well as among clients themselves that occurs during the co-production. Another research about the management as a driver of incubation is done by (Redondo & Camarero, 2017). Based on the institutional logic, they aim to compare academically with the commercial approach in organizing the educational and supporting practice. Results show that managers with entrepreneurial backgrounds are more involved in personal support and encourage tenant firms to engage in networking activities. In contrast, managers lacking entrepreneurial experience weaken in such areas. Moreover, it is suggested that this trend between manager profile and running activities does not significantly relate to the university sponsor typology if it is state or private (Mian, 1994).

This article looked at the *resources* in a particular theme, so a short notice demonstrates the connection between the

performance and the resources available during incubation. For example, the different resources are used to assist new firms with the high-tech component (M'Chirgui et al., 2018). The environment should be seen as an external resource that impacts the incubator's ability (Fukugawa, 2018). According to intangible resources, the case study proposed by (Kevill et al., 2020) is unique storytelling that illustrates the step-by-step process of incubation and the role of the incubator in setting the entrepreneurial mindset for female entrepreneurs.

Recent articles focus on the performance suggest benchmarking as a ranking of the services or incubators to identify the leading unit in similar items. Some representations of such research are ranking the several aspects that increase the results of strategic management (Kiani Mavi et al., 2019) that should be in focus in parallel with the daily routine (Baraldi & Ingemansson Havenvid, 2016). The results propose some practical advice that supposes to contribute to practitioners in decision making (Wann et al., 2017)

Social impact

The incubation idea is not limited to high technology development only and has a broader understanding of their zone of responsibility. The business and social effects are indeed occupying the leading positions in the list of purposes of the incubation models that have the potential to spread around the world (Etzkowitz et al., 2005). Social capital as a theme of the incubation was neglected earlier (Redondo & Camarero, 2019); with the intense focus on business success, the incubatees usually do not pay much attention to the social input of the incubator. Yet, results show that proactive incubator managers contribute to collective social capital, creating conditions to develop individual social capital. Moreover, (Sansone et al., 2020) consider the social incubator as a separate phenomenon among 'incubators family' and

defined them as an incubator with the majority of startups focused on the social impact. They do not look inferior to other incubators in terms of effects on economic indicators.

Human capital and demography - in the context of socioeconomic characteristics—also affect the incubation process within the local innovation ecosystem (Del Bosco et al., 2021). Therefore, the personalities with the tacit knowledge (Davenport et al., 2002) and the corresponding competencies are at the same level of importance as the physical infrastructure, policy, and environment. Hence, the personalities with the related competencies are at the same level of importance as the physical infrastructure, policy, and overall atmosphere. In other words, the talents as universities' job outcomes play a significant role in collaboration with companies and should be supported by incubator managers through the link of stakeholders (Cadorin et al., 2021; Fukugawa, 2018).

Women encounter specific barriers common for any entrepreneur, yet some might be gender-specific, including socio-cultural peculiarity. Incubators are entrepreneurship-supporting institutes that should help overcome such kinds of barriers. However, the research done in the Irish campus incubator revealed an imbalance, and women business owners' representation among tenant firms is insufficiently high (Treanor & Henry, 2010). However, the entrepreneurship education program launched in the United Arab Emirates demonstrates the growing interest to become an entrepreneur among listeners, including female students done this program (Sowmya et al., 2010). Gender inequality and entrepreneurship inquiries in incubation literature could be expanded and contribute to the field.

The following social issue is that universities are in charge and are employed, and incubators are also involved. The employees are worried about the level of student preparedness for the workforce. The universities provide theoretical

knowledge through classes and practical works like case studies within incubator activities - in close link with the actual companies (Mian, 1996a) - are supposed to prepare the students for a career after study (Mayorga, 2019a). However, the balance of the mission is an essential part of social enterprises like UBIs. The case of (I-BUS) - a student-driven incubator in one Brazilian private university, illustrates that attempts to cover the niches as much as possible without following the primary mission may lead to failure (Ometto et al., 2019). One alternative to making a student's career choice is developing an entrepreneurial mindset (Guerrero et al., 2020; Lee-Ross, 2015).

Incubation model

Entrepreneurship supporting organizations develop regional economics and positively affect the social and cultural aspects of the local community. These benefits are acceptable reasons for such organizations to be seen as an object for investment from the government's point of view. Therefore, they should respond to the basic requirements for funds attraction and be assessable to provide a replicable model (Guadix et al., 2016) capable of providing a sustainable increase in the number of new innovative companies (Roig-Tierno et al., 2015). A clear view of such a business model of linking research and market to create innovation-oriented firms helps policymakers incorporate university outcomes (Baglieri et al., 2018).

However, the incubation model is not static, and workflow approaches might change and transform the model accordingly. The research on the incubators is usually done within a short period, so the request for an inquiry into the models' lifecycle evolution is made by (Charlene L. Nicholls-Nixon et al., 2021). The holistic case study of the one leading Canadian incubator supplies the entrepreneurship field with

insights that approve the dynamic of the university business incubators. Moreover, other research from Greece supports this idea, showing that the incubators shifted their model from university-based to private ownership, and venture capital gradually replaced public funds (Sofouli & Vonortas, 2007).

The incubation model as a pipeline from idea to the market has a broader meaning than nursing future entrepreneurs in 'greenhouse' conditions before they become self-sufficient organizations. Before being accepted to the incubation, at the pre-incubation stage, future entrepreneurs could be recommended to pass through some processes to prove the minimum viability of the idea. This stage demonstrates the relevance to the overall results. It receives positive feedback from the incubation program graduates that successfully operate in the market and contribute by job creation in an area of economic underperformance (Voisey et al., 2013a). Moreover, post-incubation monitoring of the graduates' performance is a good practice for assessing if the collaboration between incubator and entrepreneurs were beneficial and evaluating the scope of influence of the incubators and university programs (Lasrado et al., 2016).

Reviewed literature does not provide scholarly agreement about the definition of the incubation model and the number of types. For instance, (Grandi & Grimaldi, 2004a; Grimaldi & Grandi, 2005) distinguishes four categories, namely: corporate, private incubators (CPIs), independent private incubators (IPIs), business innovation centers (BICs), and university business incubators (UBIs). These five incubation types could be considered in the context of two models that assist the incubators in spotting they are strategically positioning based on the relevance to one of two models. Supporting the idea of the quantity of four types of incubation models (Barbero et al., 2014), propose them other classification. In order to see the relationship between the incubator classification and the innovation produced, researchers name the following

archetypes: basic research, university, economic development, and private incubator. Partly similar to enumerated categories (Carayannis & Von Zedtwitz, 2005) use five types, and two types not mentioned earlier are regional and virtual. Additionally, in the literature, other models are presented that deserve attention: sector-specialized business incubator (Schwartz & Hornych, 2008); three-stage model (Davenport et al., 2002); Co-incubation spin-off-strategy (Cooke et al., 2006).

Incubation & Innovation

The core idea of the startup is to create a sustainable business model based on emerging technology by using an entrepreneurial approach (Emami & Dimov, 2017; Kohler, 2016). This fact drives the regions to compete for innovations and motivates them to invest in this sphere. This fact causes regions to compete for innovations and encourages them to invest in this sphere. Mainly, fostering incubators in hyperlocal areas, most effort is intended to serve the surrounding community, positively supporting the creation of new enterprises lying on less tested technologies that bring innovations to the industry (Donegan & Lowe, 2020). Hence, the corporations are equivalently involved in supporting startups as a source of external innovation and, as a rule, have business units responsible for the developing innovation environment (Kohler, 2016). This environment built by states and corporations increases entrepreneurs' trust in the success of new value creation intention (NVCI) as experienced entrepreneurs would promote the product novelty on a higher level (Emami & Dimov, 2017).

Universities administrate the innovation centers within the campus (A. C. Cooper, 1985c) that ought to commercialize the knowledge generated within the walls of high educational institutions (Bodolica & Spraggon, 2021). The authors propose

the conceptual paper of their view on setting the innovation hub and suggest applying their guidelines in universities in regions with transitional and emerging markets as they believe in driving the power of the entrepreneurial mindset in fostering the diffusion of innovation.

Commercialization is connected to opportunities with higher risks due to low recognition on the market and the demand for already well-known products. Competing in such conditions requires specific effort, skills, and circumstances. To evaluate the startup's potential in the early stage, the mechanisms such as minimum vital product (MVP) development and the proof of concept (POC) were presented in the reviewed literature. Firstly, time can play a crucial role, and the innovation supporting centers focusing on the (MVP) development should expand the view to the whole startup team. Consequently, within the available resources, the centers in order to save time and launch a new venture quicker, contribute to the survival rate by filling the gap in lack of entrepreneurial experience (Stayton & Mangematin, 2016). Secondly, to deliver the value of embryonic technology, the principal investigator leading the team can apply for the (PoC) process (Mcadam et al., 2010).

Concepts such as Technology Transfer (TT) process and Research and Development (R&D) activities highlight the importance of the presence of the innovating component in the new emerging firms incubated in the universities. Technology transfer - the idea of delivering the 'lab born' new technologies into the market that is likewise associated to fourth industrial revolution (Kruger & Steyn, 2020) - operates under certain licensing strategies (Markman et al., 2005) within the eponymous ecosystem (Good et al., 2019b), within organizational policy and available resources (Moray & Clarysse, 2005). Comparative analysis done in the research of the R&D activities in different entrepreneurship supporting organizations reveals that technology incubators produce a

more significant number but novelty on a pretty similar level of innovation with the non-incubated firms. In contrast, academic incubators increase the chances of promoting the invention on a global scale. The correlation between incubation environment and number of innovation was determined by (Cravo & Marques, 2019), and it noticed that the startup's R&D results of are mainly in the field of parent organization.

Entrepreneurial ecosystem

The incubation is not an isolated process, and occasionally the new product development is influenced by the external environment. The institutional theory employed in incubation process research supports the view that external pressure stimulates startups to adapt to the incubation location, external shareholders, and primary consumers' requests (Davidsson et al., 2006). To overcome this issue, the environment is mainly called an Entrepreneurial Ecosystem based on different mechanisms that create favorable conditions for increasing the survival rate of the startups. To promote employment and product growth (Breznitz & Zhang, 2019), the ecosystem is diversified (Lamine et al., 2018) and directed to motivate innovation through collaboration both inside the incubator (Di Fatta et al., 2018) and outside with the external stakeholders (Etzkowitz et al., 2005).

The entrepreneurial ecosystem usually operates at the expense of the region stakeholders' collaboration: university, government, and industry. In other words, such collaboration is the definition of the Triple Helix approach that is proposed as the platform for the skills brokers to operate locally and globally within the internet-based service (Lalkaka, 2002; Papagiannidis et al., 2009). Moreover, the university-driven ecosystem - Triple Helix model stimulates innovation (Wonglimpiyarat, 2016) and startup early internationalization (Baier-Fuentes et al., 2021) that requires deeper integration of

the incubator's internal and external stakeholders (Allahar & Sookram, 2019). However, it should be considered that the entrepreneurial ecosystem is not always related to the global or regional context and could be developed even within the one university (Hayter, 2016; Prokop, 2021a).

Resources and services

The catalog of the resources available during the incubation and ranking of each resource's importance in the start-up supporting pathway attracts researchers' attention (Fernández Fernández et al., 2015; Lasrado et al., 2016; Löfsten, 2015; Zedtwitz & Grimaldi, 2006). Moreover, given the limit of allocated resources (Culkin, 2013), the incubator managers - to be more productive (Warren et al., 2009) - can prioritize the services they provide in the new venture support and innovation development business model. However, the effective use of incubator resources increases during the high tech firms' advancement and willingness to be independent of the "nurturing" organization (M. McAdam & McAdam, 2008). Hence, to explore this part of the university business incubation field, scholars usually apply a resource-based approach to analyze the situation and supply the practitioners with insights. Hence, to explore this part of the university business incubation field, scholars usually apply a resource-based approach to analyze the situation and supply the practitioners with insights. Conditional resources can be divided into two types: tangible and intangible, material and immaterial (Venturini & Verbano, 2017), or intellectual and material (C. E. Cooper et al., 2012), which is the same.

The tangible assets include funds, advantages from pooling resources, and sharing resources (K. F. Chan & Lau, 2005) such as university space (Markusen & Oden, 1996), labs, and equipment (Grimaldi & Grandi, 2001; Mian, 1996b). Additionally, the funds take a special place among tangible

resources as incubation is the process of supporting ventures in the early stage when the future is promising and uncertain at the same time (R. McAdam et al., 2009). Preparation for investment obtain is one of the services provided by the incubator managers looking for available capital sources and acting as a connector between the start-up and the funds' holders (M. McAdam & Marlow, 2011). The funds' providers could be both public and private (Pierrakis & Saridakis, 2019) that support the start-ups with non-refundable capitals such as subsidies (K. F. Chan & Lau, 2005) and grants that are usually allocated by states (Jones & Parry, 2011), on the other hand, with an attempt to diversify the risks (Carayannis & Von Zedtwitz, 2005). In expectation of returns, the private (Croce et al., 2014) budgets are provided by Seed funds (Munari et al., 2015) and venture capitalists (Pierrakis & Saridakis, 2019).

The business incubators' intangible services list is provided below: knowledge, education, skills, image, consulting, mentoring, and networking. Entrepreneurial *education* should be a global trend (Sowmya et al., 2010), for instance, the Italian case demonstrates the positive effect of developing an entrepreneurial mindset among students with different majors and backgrounds supporting interdisciplinary student collaboration, and this helps them to see the issues from different perspectives and search for the optimal solution (Secundo et al., 2020). Moreover, the knowledge - especially scientific and technological developed inside the university (Grimaldi & Grandi, 2001) - as an intangible asset is also a valuable service for new ventures. Acquiring knowledge before they become skill (Markusen & Oden, 1996; Zobnina et al., 2019) is a long-term process that requires an appropriate period of relationship with the university (Díez-Vial & Montoro-Sánchez, 2016).

The *image* (K. F. Chan & Lau, 2005; Grimaldi & Grandi, 2001) and brand (Salvador, 2011) of the university might add the trust level to the affiliated start-up, yet could be also

treated as a disadvantage due to the relationship of practitioners to the theory (M. McAdam & Marlow, 2008) that sometimes does not respond to the "real-world challenges". However, the university is a good platform for start-ups in organizing useful activities such as *networking* and mentoring (Warren et al., 2009) that aid in the development of the innovation ecosystem through a high level of stakeholders involvement (Miller et al., 2011) who initiating, orchestrating and partaking in start-up supporting process (Liu, 2020). The networking relationship - formal and informal (Rothschild & Darr, 2005) - could be both internal - among incubated firms (Öberg et al., 2020) and external (Soetanto & Jack, 2013), for instance, experts *consulting* (K. F. Chan & Lau, 2005; Jones & Parry, 2011) to increase the chances to succeed (Rubin et al., 2015a).

Short summary

Based on the overview of the generated themes, the following definition is proposed: UBIs are directed to contribute to regional development and bring social impact by supporting early-stage start-ups. The UBI model connects to resources and provides services for innovative start-ups that attempt to commercialize scientific research.

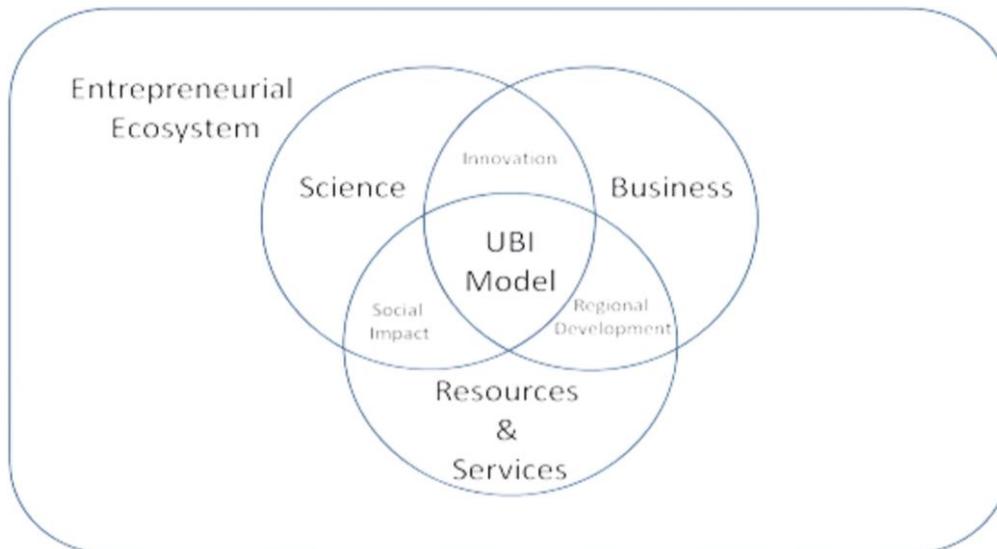


Figure 4 Conceptual framework of UBI.

CONCLUSION

The aim of the present research is twofold: first, to provide an overview of the trends in the literature related to the University Business Incubators (Fig. 1-3, and Table I); second, to examine the evolution of the research agenda in the last three decades and generate main themes related to the field (Fig. 4.)

The descriptive analysis proposes the following results: first, it confirms the trend of growing academic interest in the phenomena; second, it demonstrates the proportions of the methods applied in the reviewed literature; third, it proposes the ranking of the journals by a number of published articles. The study's strength is thematic analysis, presented in the discussion section; by open coding method, eight themes were generated and synthesized their main ideas into blocks.

Recommendations for further research

The findings of this review provide insights for the researchers interested in the incubation field and suggest some direction for future research:

- The study should be repeated using empirical evidence from the practitioners of UBI management.
- What is now needed is a cross-national study involving developing countries to find opportunities for innovation development there.
- Researchers are proposed to apply the study approach used in the current article to define the research agenda of other start-up supporting tools.
- A further study could assess the viability of the developed conceptual model in practical cases.
- The experiment as a method is underused only (n=1) among (n=148) screened. Hence, methodological contribution to the UBI literature can be made by using the experiment as the research method.

Practitioners are also the audience of management research (Tranfield et al., 2003). They could benefit from this review as an important practical implication is this concentration of information proposed in the thematic analysis could be insightful for the university business incubation process. The current study is limited by the number of articles as the search protocol created for this review set specific requirements that were helpful for the data extraction process.

CHAPTER 2

University Business Incubator Model: The Business Model Canvas Approach

Abstract

There is a recognised need for supporting innovative ideas through different tools that help start-ups check if their products are valuable in the market. University Business Incubators (UBIs) are one tool that strives to provide all necessary services to new firms to increase their survival possibilities. There has recently been renewed interest in UBIs from an organisational behaviour point of view, so scholars explore how UBIs structure workflow to have a sustainable business model before implementing them in start-ups. A growing body of evidence suggests it is still an open question. The historiography of UBIs largely ignored the necessity of having a business model that could apply to many universities that would like to launch an incubator. This study explored whether the Business Model Canvas (BMC) can be used for UBIs. The research is based on ten case studies. Interviews with experts in the field provided qualitative data to see the patterns and how the nine blocks of BMC help construct a business model for UBIs. This study identified that BMC could help increase understanding of how UBIs are organised and what practitioners should pay attention to in their start-up support processes.

Introduction

It is becoming an international trend to establish sustainable entrepreneurial ecosystems as an attribute of regional economic growth, where innovative ideas are becoming start-ups that have the potential to scale up to the global market (Carayannis & Von Zedtwitz, 2005; Kruger & Steyn, 2020; Tang et al., 2021b). Business incubators are one of the key components of an entrepreneurial ecosystem due to the connecting role of stakeholders and the provision of greenhouse conditions for their incubated new ventures. For the last decades, researchers have shown an increased interest in organisational management issues in incubators, the archetypes of which can be segmented based on different features (Aaboen, 2009; von Zedtwitz, 2003; Woolley & MacGregor, 2021). Furthermore, special attention has been paid to UBIs as one of the unique segments of incubators that mainly deal with students and scholars (Lee & Osteryoung, 2004a; Nicholls-Nixon et al., 2021; Somsuk & Laosirihongthong, 2014; Wann et al., 2017).

The main challenge many researchers face is the heterogeneous nature of the UBI models, which does not allow for a standardised approach to management that applies to most such organisations. For instance, the realities in Israel show that corporations are the main investors in the entrepreneurial ecosystem, whereas, in Australia, the government is the dominant sponsor of innovation (Rubin et al., 2015a). The literature also raises questions about other aspects of the business model, such as customers (Aaboen, 2009), value creation (Mian, 1996a), and the resources of UBIs (M'Chirgui et al., 2018).

Customers pay for the values or services they receive (Teece, 2010), yet in some UBI, the start-ups, who receive access to the services and resources, do not spend their own budget as they receive them for free (Sjölundh & Wahlbin,

2008) within incubation programs. Aaboen (2009) suggests that for incubators, the customers can be universities, investors, or policymakers. However, such an assumption is quite questionable because universities are mainly parent companies for UBIs (von Zedtwitz, 2003) and treat them as customers, which, in classical understanding, is slightly complicated. Investors and policymakers are also difficult to classify as customers, as incubators strive to connect start-ups with investors by organising events and providing office (McAdam & Marlow, 2011) space for meetings and usually do not charge them.

The debate continues about the best strategies for the management of UBIs. A significant number of articles attempt to establish the UBI model and explore it from different perspectives (Grandi & Grimaldi, 2004b; McAdam et al., 2006a; Mian, 1997a; Nicholls-Nixon et al., 2021; Redondo & Camarero, 2019; von Zedtwitz, 2003). However, among reviewed research papers about the UBI model, the BMC approach, proposed by Osterwalder and Pigneur (2010) as one of the common and convenient methods to put the main organisational points in nine blocks, is mentioned only once (Carayannis et al., 2017). Hence, this statement allows for the assumption that the nature of the UBI business model remains unclear from the BMC's perspective.

This study seeks to obtain data that will help address these research gaps. The specific objective of this study was to explore whether it is possible to apply the BMC approach to UBIs. The research questions in this study focused on how UBIs are organised within their start-up support process. Data for this study were collected using a semi-structured interview questionnaire. Ten leading UBIs from the list of international university rankings and the UBI-Global benchmarking report kindly agreed to participate in the current research. The study offers some important insights into the business incubation literature, as understanding the link between the UBI and BMC

approaches will help practitioners see the main points of the start-up support process in one paper.

The remaining part of the paper proceeds as follows: the literature review section gives a background for both the business model and UBI; next, the methodology section describes the steps taken to conduct this research; then, the results section provides the view of the experts in the UBI field; in the discussion section, the connection between theory and practice is demonstrated; and finally, in the conclusion section, the summary of the paper is presented.

Literature review

Business model

Several systematic reviews on the business model have been undertaken (Foss & Saebi, 2017; Massa et al., 2017; Teece, 2010; Wirtz et al., 2016), where authors highlight the importance of the topic on a global level both for practitioners and management scholars. Within the value creation and value capture theories, the business model strategy focuses not only on the supply side but also considers the demand side (Massa et al., 2017).

The value proposition is one of the most mentioned in the literature that tells of its core role in the business model (Bohnsack et al., 2014; Geissdoerfer et al., 2018; Zott et al., 2011). The value of business models has three dimensions: creation, capture, and offer. Value creation is part of a company's process that responds to the availability of the product in the volume and time needed. This allows for being ready for value capture, meaning communicating with customers to exchange the product for capital. Hence, understanding the market demand for a particular product or service creates a value offer (Müller et al., 2018). Before a

created value reaches the customer and creates profit for a company (Teece, 2010), it requires certain resources (Barney, 2001). According to recent trends, the business model is becoming more eco-friendly (Bocken et al., 2014) and open to e-commerce opportunities (Amit & Zott, 2001).

A clear view of who is (or are) the customer(s) of the company is another main part of the business model. In other words, companies need to know for whom they create values (Baden-Fuller & Haefliger, 2013). In this path, marketing theories propose a business model to segment the customers (Foss & Saebi, 2017), creating an interface (Boons & Lüdeke-Freund, 2013) for each group according to their specific needs and willingness to purchase the product. However, a direct company-customer relationship is unnecessary, and some companies can delegate sales to their partner companies within an entrepreneurial ecosystem (Adner, 2017; Bocken et al., 2014).

The next components of the business model are resources that involve maintaining the workflow of the companies in an optimal rhythm. The resources might be expressed as tangible assets, including infrastructure, tools and equipment, intellectual property, etc. However, in the last decades, the importance of intangible assets such as networking, personal brand, knowledge, and skills has grown in marketing (Vargo & Lusch, 2014) as well as from the perspective of business models (Teece, 2018). Furthermore, the quality and quantity of both tangible and intangible resources influence the competitiveness of companies. The companies are more competitive as their resources are valuable, rare, inimitable, non-substitutable (VRIN) (Barney, 1991), or organised (VRIO) (Barney & Wright, 1998).

One of the most recognised business models mentioned by scholars and applied by practitioners is the BMC proposed by Osterwalder and Pigneur (2010), as it is based on nine blocks and provides a convenient view of the listed elements of

a business model: value, customers, and resources. For instance, Joyce and Paquin used it to create the sustainability-oriented business model innovation, and current research is also applying the BMC approach to define the business model of UBIs.

University business incubator

The essential part of the innovation ecosystem (Nicholls-Nixon et al., 2020)—UBIs—is the driver that is designed to support entrepreneurial activities to help ideas, especially new technology-oriented ones, become companies (Mian, 1997b; Wonglimpiyarat, 2016). The analogy of UBIs with firms shows that their customers have several segments, yet depending on the point of view, it is also possible to state that among UBI's stakeholders, no one could be called a customer (Aaboen, 2009). This is because the values created by UBI for the resident companies are social and business networks (Cooper et al., 2012), which are difficult to measure and hence almost impossible to charge for.

Table 2. UBI definitions

Author (Year)	Sample	Title	Source	Findings
Hisrich & Smilor (1988)	9 UBIs	The University and Business Incubation: Technology Transfer through Entrepreneurial Development	The Journal of Technology Transfer	Within technology transfer, the UBIs link linking talent, technology, capital, and knowledge.
Mian (1997a)	National study of 30 UTBI facilities	Assessing and Managing the University Technology Business Incubator: An Integrative Framework	Journal of Business Venturing	UBIs' performance assessment model is based on three variables: Performance Outcomes, Management Policies and their effectiveness, Services and their Value-Added.
Zedtwitz (2003)	41 incubation and R&D managers	Classification and management of incubators: aligning strategic objectives and competitive scope for new business facilitation	Entrepreneurship and Innovation Management	UBI model is more viable when their parent universities prioritise commercialisation.
Grimaldi & Grandi (2005)	8 incubators	Business incubators and new venture creation: An assessment of incubating models	Technovation	UBI is a start-up supporting organisation that provides a mix of tangible and intangible services.
Zedtwitz & Grimaldi (2006)	10 Italian incubators	Are Service Profiles Incubator-Specific? Results from an Empirical Investigation in Italy	Journal of Technology Transfer	The effect of incubators' strategic objectives on a managerial focus
McAdam et al. (2006)	n/a	Business Processes and Networks in University Incubators: A Review and Research Agendas	Technology Analysis & Strategic Management	Linear Model of Technological Innovation shows the technology transfer activities in a UBI.
Guerrero et al. (2014)	4 entrepreneurial universities	Entrepreneurial universities in two European regions: A case study comparison	Journal of Technology Transfer	Entrepreneurial university as a whole is a model for the natural incubation of social and economic initiatives.
Tang et al. (2021)	5 Technology Business Incubators	Exploring technology business incubators and their business incubation models: Case studies from China	Journal of Technology Transfer	TBIs business models match their strategies.

UBIs search for opportunities to innovate their tenant companies within R&D activities due to the link with the universities, and research shows that product innovation is the most demanded service among companies compared to, for instance, marketing innovation or process innovation (Cravo & Marques, 2019). However, the typology of the innovations is connected to the incubator archetype they originate from, as the inner content of the incubator influences the external results of the work (Barbero et al., 2014). Moreover, incubators, as the driver of the innovation infrastructure, are more common in countries with developed industries and are seldom seen in developing countries due to the high risk and cost of innovation implementation (Carayannis & Von Zedtwitz, 2005).

Methodology

Research design

This research aims to describe how the UBI model is organised and explain why it has changed in the last three decades. The data is based mainly on the views of experts in the field. Therefore, the case study approach applied in this research resonates with the definition proposed by Yin (2003), p. 1:

'In general, case studies are the preferred strategy when "how" or "why" questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context'.

Many researchers have utilised the case study in their inquiry into the university business incubator model. However, the case study as a qualitative research approach is often criticised for its potential researcher bias risk. Hence, to

minimise the data analysis process, we strive to apply the features of the methodology that enhance grounded theory development (Gioia et al., 2013).

Sampling

The expert's recruitment for this research could be divided into three rounds. Moreover, UBI representatives from different regions are presented to avoid country bias. The first round is based on the UBI Global World Benchmark report (Meyer, 2020), and some of the leading organisations, according to this report, are present in the research sample. Next, due to the research focus on university-related incubators, the QS university internationalisation and research ranking (Aguillo et al., 2010) is the second way to identify and recruit the experts. Although the rankings are suitable tools to identify the leading organisations in a field, we believe that UBIs with successful practices could exist outside of any rankings and still have great results. Hence, to make the sample more representative, the third run was completed by the random incubators with prominent results. The UBI experts were contacted between May and November 2021, when the working realities had undergone a dramatic change due to COVID-19, and it was challenging to reach them, resulting in a low response rate. Hence, the sample size is 10 interviews, which is adequate for qualitative research (Dworkin, 2012).

Data collection and analysis

Qualitative data were collected using a semi-structured questionnaire. All participants were sent an invitation letter to participate and give an interview about their incubation practice. After accepting the invitation, if required, the potential interviewees were introduced to the questionnaire to prepare for the interview.

The questionnaire contains four main parts: the idea attraction activities for the incubation; the incubation process pipeline; the post-incubation monitoring; and the overall questions concerning the respondent and the represented organisation.

For data triangulation purposes (Yin, 2009), the information about the interviewed incubators was complimented by the data available from various sources (e.g., websites and news reports). Each interview was conducted virtually on the Zoom platform. The interviews were recorded only with the respondent's permission to address any ethical concerns. After that, they were coded using a line-by-line approach. The codes were integrated into themes that allowed for the development of meaningful theory related to the UBI model (Williams & Moser, 2019).

Results

The semi-structured questionnaire was structured around three main bars (idea-attraction, incubation process, and post-incubation relations), and the flexible order of the questions allowed respondents to share their views on the incubation process that covers all nine blocks of the BMC.

Value proposition

Most of the respondents mentioned their incubators' aims (Table 1) in the introduction section (8 out of 10), and the other two respondents, in place of aim, mentioned their model and target group. The aims are mainly focused on the ideas supporting and ecosystem contribution. One interviewee mentioned the importance of making successful and happy companies that are growing from the ideas, and other interviewees added that the ideas should come from academia and have a potential for sustainable growth within solving the

social challenges. Interviewees highlighted the role of the incubator in the ecosystem enlargement process, starting from the faculty and going up to the regional level. The synthesis of interviewees' quotes also brought us to the statement that developing an entrepreneurial mindset by transforming ideas into companies, including the community of peer-to-peer learning environments, provides support to increase the start-ups' survival rate and target international markets. The negotiation positions of the incubators could be separately mentioned as the value proposition for new start-ups without a portfolio or background.

Customer segment

Although, as a rule, it is not the start-ups but companies and universities that are the source of the incubators' revenue. However, it was decided to place them in the 'customer segment' graph, as incubators' services tend to be start-up-centred. Additionally, the start-ups must meet several requirements before being accepted into the incubation program. First, the idea should be at the initial stage, according to Interviewee No. 2: '...tech companies start working with them in a very, very early phase'. Second, unique or research-based ideas are preferable, as the expert mentioned: '...one was already an idea or even an IP patent or something like that' (Interviewee No. 3). Third, the potential for scale is another requirement: 'and a scalable business idea' (Interviewee No. 2).

Customer relationship

It takes time before the ideas become companies within the incubation program. The interviews show there is no fixed duration of the program that could last starting from six weeks and, depending on the companies' maturation level, up to five

years: '...to solve that needs only six months to be developed. But other project needs maybe five years to be developed' (Interviewee No. 3).

Channels

The communication between the start-up and incubator runs in virtual and real-life modes and includes three main periods, already mentioned earlier. The real-life channels of communication may include activities such as contests, pre-admission interviews, and round shows. Although the number of online communications is now overlapping the 'in-present' channels, incubator managers attempt to use as many communication channels as possible: 'I would say we are using a 360-degree approach in terms of channels. And yes, what we don't do, actually, maybe, let's focus on what we are not doing is anything with print or anything with. It's a traditional media like radio, TV' (Interviewee No. 9).

Table 3. Interview content analysis

N	Aims	Content
Incubator 1	<p><i>Reference 1:</i> We aim at either [the University] or the process of transforming an idea into a successful corporation, which is managed by two organisations.</p> <p><i>Reference 2:</i> We do a stronger support job because the goal of [our incubator] is to make the start-up successful and make the company happy...</p>	<ul style="list-style-type: none"> – idea into a company; – make a start-up successful; – make the company happy.
Incubator 2	<p>...with the purpose of supporting companies, always tech companies, into becoming sustainable growth companies that solve societal challenges that we face throughout the world.</p>	<ul style="list-style-type: none"> – supporting companies; – tech companies; – sustainable growth; solving social challenges; – global view.
Incubator 3	<p>[The incubator] is a pre-incubator in the Faculty of Science, which aims to support and stress entrepreneurship activities and nurture the faculty.</p>	<ul style="list-style-type: none"> – entrepreneurship activities; – nurtures the faculty.
Incubator 4	<p><i>Reference 1:</i> The main target of our company is to enlarge the ecosystem around university...</p> <p><i>Reference 2:</i> Extended ecosystem is our main goal for the University.</p>	<ul style="list-style-type: none"> – ecosystem around university; – enlarge (extend) the ecosystem.
Incubator 5	<p>The foundation was set up six years ago with the dimension of supporting technology start-ups, especially those that are coming from academia. To enable commercialisation of R&D results.</p>	<ul style="list-style-type: none"> – support technology start-ups; – especially from academia – enable commercialisation – R&D results.

Incubator 6	Our mission is to provide high-level entrepreneurship education to start-ups from all industries and in different stages of development so that they can take their ideas or early-stage ventures and bring them to fruition.	<ul style="list-style-type: none"> - mission; - entrepreneurial education; - all industries; - different stage companies;
Incubator 7	And our model is that we provide high-intensity support services such as mentoring, coaching, and training workshops to selected companies; we only focus on high-tech and scientific businesses. And you stay with us for as long as they need our support, and then [you] graduate. (Model)	<ul style="list-style-type: none"> - intensity and support services; - mentoring; - coaching; - training; - workshops; - high-tech and scientific business; - they graduate.
Incubator 8	We focus on start-ups in deep tech, which I would say are, you know, technology-oriented, usually in technologies around data, like machine learning, and so on. (Target group)	<ul style="list-style-type: none"> - deep tech; - technology oriented; - data technologies; - machine learning.
Incubator 9	Our main vision or goal is to develop the entrepreneurial ecosystem here.	<ul style="list-style-type: none"> - region development; - entrepreneurial ecosystem development.
Incubator 10	He was a person with a significant industrial background who had come to believe in his history with very large companies, including being head of engineering for Ford Motor Company. He had come to believe that the key to innovation is not big companies but entrepreneurs.	<ul style="list-style-type: none"> - industrial background; - very large companies; - key for innovation; - big companies vs entrepreneurs.

Revenue streams

UBIs contribute to society by developing the entrepreneurial ecosystem and creating value-added products by commercialising technology and research results. Therefore, it is often that the regional governments are involved in the process as one of the main beneficiaries and provide support by allocating grants or launching joint projects with investing companies, for instance, venture capitalists: '...the fund itself is actually a public-private fund, meaning that part of the fund comes from the government' (Interviewee No. 4). Moreover, the universities usually additionally provide grants and cover the operational costs of the incubators. However, the model of charging the start-ups is still relevant, and incubators, to cover their expenses, charge membership fees or share the risks and equity of the start-ups.

Key partners

The practical part of entrepreneurship in incubators implies a tight connection between the university and Industry. Therefore, industry experts are involved in the incubation programs. Local authorities interested in developing an entrepreneurial ecosystem provide available instruments to support start-ups, such as infrastructure or grants. Other sources of the needed budgets are private investors. Despite the UBIs having the same customer segment, instead of competing, they prefer to collaborate and sometimes even join and create partnerships: '...the whole partnership [is better] than just one incubator, and it's more attractive to investors. So, we do this as one big conference together as a group' (Interviewee No. 7).

Key activities

The activities within the incubators start with idea attraction through different events and application admissions. Next, the applicants, before being accepted for incubation, should demonstrate the potential to grow and the uniqueness of the idea. After being accepted, they get the opportunity to develop entrepreneurial knowledge and skills, meet experts from different fields, participate in workshops, etc. The main purposes of such activities are to assist the applicant in the decision-making process of setting up the company and putting their ideas on the market. However, the decision to become a company should be taken rationally: '...Is that something that you [we] actually need to think about? Maybe it is easier to sell the IP itself to other companies? So [so] we try to be as fair as possible on that part' (Interviewee No. 4).

Key resources

The key resources for incubation supply could be tangible as well as intangible. The tangible resources include funds, university infrastructure, laboratories, office and co-working space, and tools for prototyping. As experts mentioned: 'We have a machinery park that is actually realising the prototypes' (Interviewee No. 9) and '...we named the innovation garage...' (Interviewee No. 1). The intangible resources include knowledge, networking, university image, and software.

Cost structure

The cost structure consists of the operational workflow; some incubators provide non-refundable seed funds for start-ups and are shareholders in start-up costs.

6. Key partners	7. Key activities	1. Value proposition	3. Customer relationship	2. Customer segment
experts governmental organisations incubators partnership industry investor network university idea source	buffet activities business plan education funnel process prototype stakeholders' involvement Technology Transfer Track	incubator aim entrepreneurship mindset global market innovation ecosystem negotiate region research commercialisation proof of concept survival rate	pre-incubator checkpoint MVP programme duration post incubation	B2B idea stage innovative idea RBSO scalable idea start-up areas
	8. Key resources Tangible infrastructure Intangible services Software Investment		4. Channels Real-life events Virtual communication tools	
9. Cost structure		5. Revenue streams		
buy equipment corporate tax advantages risk money		branch within companies company buys start-ups equity share grant investment membership fees operational funds		

Figure 5 UBI from the BMC approach

Discussion

Several studies explore the business model of UBIs, proposing an assessment and management framework (Mian, 1997a), comparing them with other forms of incubation (Grimaldi & Grandi, 2005), and admitting that incubation is a constantly developing process (Nicholls-Nixon et al., 2021). This study aimed to explore the model of UBIs and, based on empirical evidence, propose a view from the business BMC approach. The current study found that the policies of UBIs are embedded in the surrounding realities and may differ depending on the country of location (Rubin et al., 2015b).

However, the general patterns also exist and allow the building of a conceptual framework for the UBIs model.

Value proposition

What is curious about this result is that the representatives, right at the start of interviews, used to mention the goals of the UBIs that are directed mostly towards social contribution rather than profit creation, which is in line with the previous study (von Zedtwitz, 2003). The contribution lies in regional development (Lamine et al., 2018) through promoting innovations (McCarthy et al., 2018), including public R&D expenses (Fini et al., 2011a). However, regional belonging does not mean focusing on local markets but rather the other way around, by thinking globally and applying an entrepreneurial mindset (Allahar & Sookram, 2019; Secundo et al., 2020; Sowmya et al., 2010), targeting consumers on an international level (Baier-Fuentes et al., 2021; O'Gorman et al., 2008).

Customer segment

Being on the embryonic level for a start-up is one of the requirements to be accepted for incubation; in other words, to be incubated at the beginning, the new venture should be in the initial stage (Fukugawa, 2018; Mcadam et al., 2010). The additional requirement is that the idea be innovative (Del Bosco et al., 2021; Di Fatta et al., 2018; Soetanto & Jack, 2013), research-based (Venturini & Verbano, 2017; Verbano et al., 2020), and come from academia to start a company (Croce et al., 2014). Scalable companies that can demonstrate sustainable growth in the future are mainly accepted for incubation (Kiran & Bose, 2020).

Customer relationship

According to the literature, an incubation program (from idea to first sale) may last up to 1 year (Marvel & Droege, 2010) or a slightly longer 18 months. However, the experts in this study state that the program duration is not fixed and that it is up to start-up owners to decide when they are ready for kick-off, which can take from a few weeks (Stayton & Mangematin, 2016) up to 5 years (Chan & Lau, 2005). A possible explanation for this might be that research-based spin-offs include the expectation of the results of the experiments, which takes a lot of time.

Key partners and activities

Interview results show that UBI's partners consist of three main groups: experts, investors, and future partners. The academy staff or students that are the main customers of incubation are usually research-focused and less aware of market realities, and experts from the industry are there to fill this gap through (Baraldi & Havenvid, 2016; Kiani Mavi et al., 2019; O'Gorman et al., 2008; Somsuk & Laosirihongthong, 2014) different activities such as mentorship (McGee et al., 2021), coaching (Redondo & Camarero, 2017), and expert panel events (Patton et al., 2009). Another group of partners are investors, who expect the value-added of implementing innovation but face the high risk of involvement in supporting start-ups. Hence, local authorities interested in regional economic growth are ready to share the risks by allocating grants (Woolley & MacGregor, 2021) to new ventures or funds to venture capitalists by applying public-private partnership mechanisms (Pierrakis & Saridakis, 2019). Finally, companies live in a commercial environment where it is difficult to survive without a business relationship with partners, so the incubated

firms establish business ties (Breznitz et al., 2018) using the opportunities to collaborate with UBI's partners or peer start-ups (Kevill et al., 2020).

Key resources

Resources used within the incubation programme as a theme for research are often met in the papers where scholars mainly apply a resource-based view (Barney, 1991; M'Chirgui et al., 2018; Venturini & Verbano, 2017) and divide them into two main groups: tangible and intangible (Grimaldi & Grandi, 2005; Soetanto & Jack, 2013).

Cost structure and revenue streams

Although the UBIs are non-profit organisations, the operational costs, infrastructure maintenance, and experts' attraction require a budget. Hence, they practice different approaches to establishing sustainable financial models. The main customers of UBIs are start-ups that obtain knowledge and develop their skills to make a profit from their ideas, so the equity share is a common practice for UBIs to cover the expenses (Clayton et al., 2018; Markman et al., 2005). However, depending on regional policies, the government might take responsibility for supporting UBIs through various innovation-promoting state programs (Baier-Fuentes et al., 2021; Etzkowitz et al., 2005). Moreover, the host universities of the incubators often propose their space and infrastructure (Guerrero et al., 2021) for free or at subsidised (Festel, 2013) prices that allow UBIs to optimise the expenditure, and, commonly, the UBI team is from the university staff (Guerrero et al., 2020).

Conclusion

This study has examined the applicability of the BMC business model concept to UBI start-up supporting organisations. This study has identified the conditions of value creation, customer identification, and resources needed to supply UBIs with the driving role within an entrepreneurial ecosystem. This study has shown that the UBI model may be adapted to surrounding realities depending on the external environment and policy. For instance, some UBIs charge fees for their tenant firms, whereas others do not because they are supported by the university to which they are linked. The findings indicate that UBIs strive to follow their missions or goals that have a mainly social impact context rather than profit generation, which resonates with previous works that stated the non-profit nature of UBIs.

The research has also shown that UBIs stress their intangible resources, such as networking, mentoring, and other services. Moreover, the negotiation power of UBIs that operate under the brand of the university provides benefits for start-ups that are at the beginning of their entrepreneurial journey and face different challenges, especially in establishing B2B relationships with established corporations. This finding of the current study suggests that incubation activities might be tacit and unclear from a value proposition perspective. Hence, some of these activities are mentioned here to clarify how UBIs can strengthen their positioning in a market. The findings will interest university management, which searches for opportunities to commercialise academic results, and policymakers in developing the entrepreneurial ecosystem as a mechanism for social and economic development.

Recommendations for further research

- The question raised by this study is whether it is possible to apply the business models to entrepreneurial supporting organisations.
- The study should be repeated using an expanded sample size that includes more continents and will provide a more holistic picture.
- A natural progression of this work is a deeper analysis of the values created by UBIs to highlight their significance for their partners.
- More broadly, research is also needed to determine the measurable outcomes of UBI's workflow.

A key strength of the present study was its contribution to the incubation literature and opening the discussion of applying different approaches to setting sustainable UBI. The findings in this report are subject to at least three limitations. First, the research sample presents only three continents, which can be an issue in overcoming the geographical bias. Second, due to COVID, observation as a research method was problematic and was not applied in the data collection process. Finally, the sample selection is based on different benchmarks and international rankings. However, it should be considered that some productive UBIs are not taking part in such activities and are left out of the scope of this research. Despite its limitations, based on the data received from experts, the study certainly adds to our understanding of the UBIs start-up supporting process.

CHAPTER 3

University Business Incubator Model Input-Process-Output Approach

Abstract

University Business Incubators are one of the instruments connecting industry and academia, as they support ideas born in labs with a practical component and, through applied research, are helping industry partners find new and better solutions. Therefore, they are drivers of innovation policies in most developed countries that attract the attention of developing countries interested in increasing their technology independence and economics by producing products with high value-added. In the previous chapter, UBIs were considered from the BMC perspective, which allows for distinguishing the main aspects required for running them. However, one of the weaknesses of BMC is the 'static view' of business processes. Most studies in the field of the UBI model have only focused on the resources available for start-ups within incubation, neglecting the importance of understanding what is taken as the starting point and what should be expected because of the incubation process. This study used the input-process-output (IPO) model approach to analyse the roles played by aspects of incubation at each stage. Interview expert views were analysed on NVivo software using a line-by-line coding method. This study should be of value to practitioners wishing to set up an incubation process by taking needed actions in the proper

order and without forgetting to take needed steps at the right time.

Introduction

UBIs are a significant part of an entrepreneurial ecosystem; they support innovative ideas that appear mainly in university labs and have commercialisation potential (Lee & Osteryoung, 2004b; Nicholls-Nixon et al., 2021; Wann et al., 2017). For the last three decades, there has been a steady increase in business incubation studies (Hausberg & Korreck, 2020), showing the growing attention of academia to this topic from a management field perspective. Investigating UBIs is a continuing concern within the demand for practical knowledge of incubation for scholars who attempt to launch a start-up to commercialise their R&D results (Berggren, 2017) and balance a company's research and operations (Marvel & Droege, 2010; Ometto et al., 2019; Treanor & Henry, 2010).

Due to the context of social impact and input into human resources development that the incubation process provides, one of the most significant challenges is the performance assessment of the start-up support process, as they have particular difficulties measuring the intangible results (Barbero et al., 2012; Fukugawa, 2018; Mian, 1994; Wann et al., 2017). Therefore, up to today, several attempts have been made to define the outcomes of UBI workflow and propose their operational model (Grimaldi & Grandi, 2005; Rubin et al., 2015a; Tang et al., 2021b; von Zedtwitz, 2003; Woolley & MacGregor, 2021). However, UBI model research has accentuated the heterogeneity of approaches to organising the incubation working process, from idea recruitment to marketing and first sales in the sense of process outcomes.

Recent evidence suggests that the UBI model's features change over time depending on the level of UBI itself and the services it provides at each stage of the lifecycle (Nicholls-

Nixon et al., 2020). The uniqueness of UBIs is that they work with advanced technologies based on intellectual property that are under testing for market fit with high promises, which mainly require government grants due to high potential risks (Woolley & MacGregor, 2021). A number of researchers investigated the model from a resource-based perspective, focusing on the services and tangible aids available for new firms (Kiani Mavi et al., 2019; M'Chirgui et al., 2018; Somsuk & Laosirihongthong, 2014; Verbano et al., 2020). However, little is known about how UBI's model is organised in each step of the idea incubation process, from recruiting to the first sales.

There is little published information on whether the UBI model is unique compared to other start-up support organisations at each stage of new firm development facilitation. Surprisingly few studies have analysed UBIs applying the IPO model to demonstrate the incubation inputs, how the process is organised, and expected outcomes. Therefore, this empirical study has four key aims. First, applying the IPO approach to answer how the UBI conceptual model can be developed. Second, analysing the idea recruiting stage to see the inputs needed before the actual incubation process. Next, the goal is to observe the process and propose practical insights for stakeholders. Finally, this research is done to clarify the outcomes of the UBI's workflow.

This study utilised interview data from UBI experts, and content analysis was applied to explore the incubation process. Understanding the UBI model through the IPO approach will contribute to the business incubation literature and generate recommendations for policymakers in the innovation field. This study cannot encompass all types of incubators; thus, only university-related incubators are observed.

The thesis is divided into three distinct sections. The first section gives a brief literature review of UBIs' background, definition, and examples of previously applied IPO research approaches. The second section describes the methodology

used to explore the university-based incubation process. The third section provides the results through the themes that emerged from the interviews' content analysis. The final section draws together these various findings, discussing the results.

Literature review

University Business Incubator

There is a large volume of published studies describing the role of UBIs in entrepreneurial development. As an essential part of the entrepreneurial ecosystem, educational programs of such organisations promote an entrepreneurial mindset (Secundo et al., 2020), intent, and behaviour (Overall et al., 2018). Different stakeholders, like business owners, are also involved in initiating, orchestrating, and sustaining the theory of entrepreneurial education programs by providing practical constituents in new firms' development (Liu, 2020). A significant part of the entrepreneurship literature that explores the UBIs highlights networking as one of the main activities they provide in supporting new firms (Aaboen, 2009; Cooper et al., 2012; Kiran & Bose, 2020; McAdam & Marlow, 2008; Redondo & Camarero, 2017).

Early examples of research into UBI include Campbell and Allen (1987), Cooper (1985b), and Hisrich and Smilor (1988). Incubators' development, in general, is intended to link academia and industry within R&D commercialisation. The Triple Helix model demonstrates the incubators' connecting role with the three main actors: universities, government, and industry (Etzkowitz, 2002). However, business incubation is diverse and depends on many aspects that influence their organisational strategy and structure, which impact the overall workflow, the instruments applied, and the target group to

recruit. Therefore, Zedtwitz (2003) develops research exploring this diversity to see the patterns that allow segmenting them into groups within the whole incubation view. This study becomes one of the first to concentrate on the importance of differentiating incubators and distinguishing UBIs as the distinct archetype on the row with the regional or independent commercial ones.

Several studies have begun to examine the model of start-up creation facilitating tools within the university, where UBIs are one of the most prevalent organisational types. Grimaldi and Grandi (2005) propose two models of incubation with different target groups of start-ups based on the market segments on which they concentrate. For instance, regional incubators are interested in start-ups that plan to operate in the local market. In contrast, independent private incubators set goals to reach the global market, and according to the authors, UBIs are somewhere between these two models. Baglieri et al. (2018) continue to compare UBIs' strategies to local and global market orientations by defining the type of incubators according to the number of launched patent-based start-ups.

UBIs mainly work with start-ups in the very early stages, as their target group of scholars is research-focused and usually has little knowledge about business processes. The same is true for students, who are the second target group. For this reason, pre-incubation, as the preliminary stage of the incubation process, grabs the attention of management researchers. Pre-incubation is a proven mechanism to test the idea for market readiness and entrepreneurial skills in a more risk-safe environment surrounded by professional support (Pallotta & Campisi, 2018; Voisey et al., 2013b).

The number analyses have used a qualitative case study approach to examine the incubation process and define how ideas evolve in companies. Chan and Lau (2005) illustrate the incubators' contribution and the services they provide at each

stage of tech start-up development, from setting up an office to first sales. Patton et al. (2009) suggest that the incubation process includes a steady flow of new ideas, empathy with founders, the creation and maintenance of internal and external networks, and appropriate exit strategies for firms leaving the incubator. Recent evidence suggests that the services provided by incubators for open innovation development involve many elements of the whole entrepreneurial ecosystem (Fernández Fernández et al., 2015).

Input Process Outcomes

The primary source that proposed the IPO model framework is McGrath (1964), which was generated thanks to the study of team effectiveness (Mathieu et al., 2008). Later, the idea was supported by Hackman and Morris (1975): The fundamental assumption underlying the paradigm in Fig. 1 (IPO model) is that 'input factors affect performance outcomes through the interaction process' (p. 6). The model is well known and frequently used in team performance research and can be applied to examine both real and virtual teams. Here, the input represents the resources available at the starting point; the process is the interaction between team members; and the outcomes are the logical results of the team's or group's functioning (Martins et al., 2004). Although the IPO model has some limitations, there is no doubt about the influential impact it renders on empirical studies in teams and organisational performance, and to this day, researchers apply it as one of the recognised instruments in management research. Although the IPO model has some limitations (Ilgen et al., 2005), there is no doubt about its influence on empirical studies on teams and organisational performance. Therefore, researchers use it to this day as one of the most recognised instruments in management research.

The business and management literature screening demonstrates the number of studies investigating different organisational aspects using the IPO model approach. For instance, the understanding of value creation in the strategic entrepreneurship construct was expanded through this model development (Hitt et al., 2011). Moreover, some researchers prefer to apply the IPO model in their literature review studies to examine electronic word-of-mouth activities, as online comments can impact people's decision-making (Chan & Ngai, 2011). Another systematic literature review with a similar approach was used by Ghezzi et al. (2018) on the crowdsourcing theme, examining its research agenda development and providing direction for future research. Recently, a study applying the IPO model perspective, devoted to the heterogeneity of entrepreneurial teams, has found a positive correlation between the team members' interaction and decision-making performance (Zhang et al., 2021).

Previous studies have explored the relationships between universities and the real sector of the economy as part of business incubation within an academic environment. This relationship can be described based on the IPO model as with any other organisation type to measure the success at each stage of university-industry alliance collaboration (Perkmann et al., 2011). For instance, see Albats et al. (2018), where the authors employ the model to find the key performance indicators of R&D activities between universities and industry collaboration. The IPO model is also applicable to the literature review to determine the boundaries of university-business collaboration and draw the stakeholders' cooperation opportunities map in the start-up support process (Galan-Muros & Davey, 2019). Relatively comparable to the current analysis, the research on the incubation IPO model is proposed by Jangbua and Igel (2014) in a conference paper and is devoted to general business incubation without allocating the university-based incubators as a unique group.

Method

Research design

Studies of incubation have traditionally applied a resource-based view in exploring the organisational model of the UBI start-up support system. Various methods have been utilised to see inside the process and contribute to the incubation literature by proposing a conceptual model of UBIs. However, for the purpose of methodological contribution, this paper employs the IPO approach and is based mainly on the data from UBI experts who are involved in the process in a real-life context. Therefore, the case study is 'an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident' (Yin, 2009, p. 18).

According to Adams (2015), semi-structured interviews are appropriate for evaluating formative programs by applying them to one-on-one interviews with program managers. Therefore, they are used to collect the data for this research. The questionnaire contained twenty-two questions that were conditionally divided into six main blocks, including four for general information regarding respondents' backgrounds and an overall overview of the UBI they manage or work for. Inductive coding of interview reports for the content analysis was conducted on the NVivo software. Ten UBI representatives—eight managers, one coach, and one venture capitalist—were personally interviewed in 2021. The UBI's websites were used, apart from the interview reports, which described the incubation process from idea recruiting to managing relations with the graduates; international

benchmarking reports and articles were also analysed to supply the data source triangulation.

Sampling and data analysis

The research sample formation includes three independent runs launched simultaneously, listed below. First, the invitation to participate in this research was sent to the UBIs present in the UBI-Global report as one of the most recognised benchmarking tools for such organisations. Then, through contacts by e-mail, the incubators from universities of QS-ranking were proposed to contribute to the study. At the same time, to avoid any bias, the random web search of UBIs with significant results assisted in forming the sample.

The content analysis is applied to answer the research question and generate the IPO conceptual model for the UBI workflow. All interviews in this research went through content analysis, from open coding to modelling the concept proposed by Elo and Kyngäs (2008). The linear process for qualitative research (Williams & Moser, 2019) was managed using the NVivo software, starting with line-by-line coding (Khandkar, 1998). After the data saturation, the decision was taken to start open coding, which reduced the number of codes by gathering them into subcategories. Axial coding, the next level of coding, was conducted to create categories. In some sources, they are called themes, and the total number is ten, which provides main ideas suitable for grouping into the selective coding that is the next step of a linear process of qualitative research. Selective coding results are the main groups that correspond to the approach applied for this research and are labelled as input, process, and outcomes.

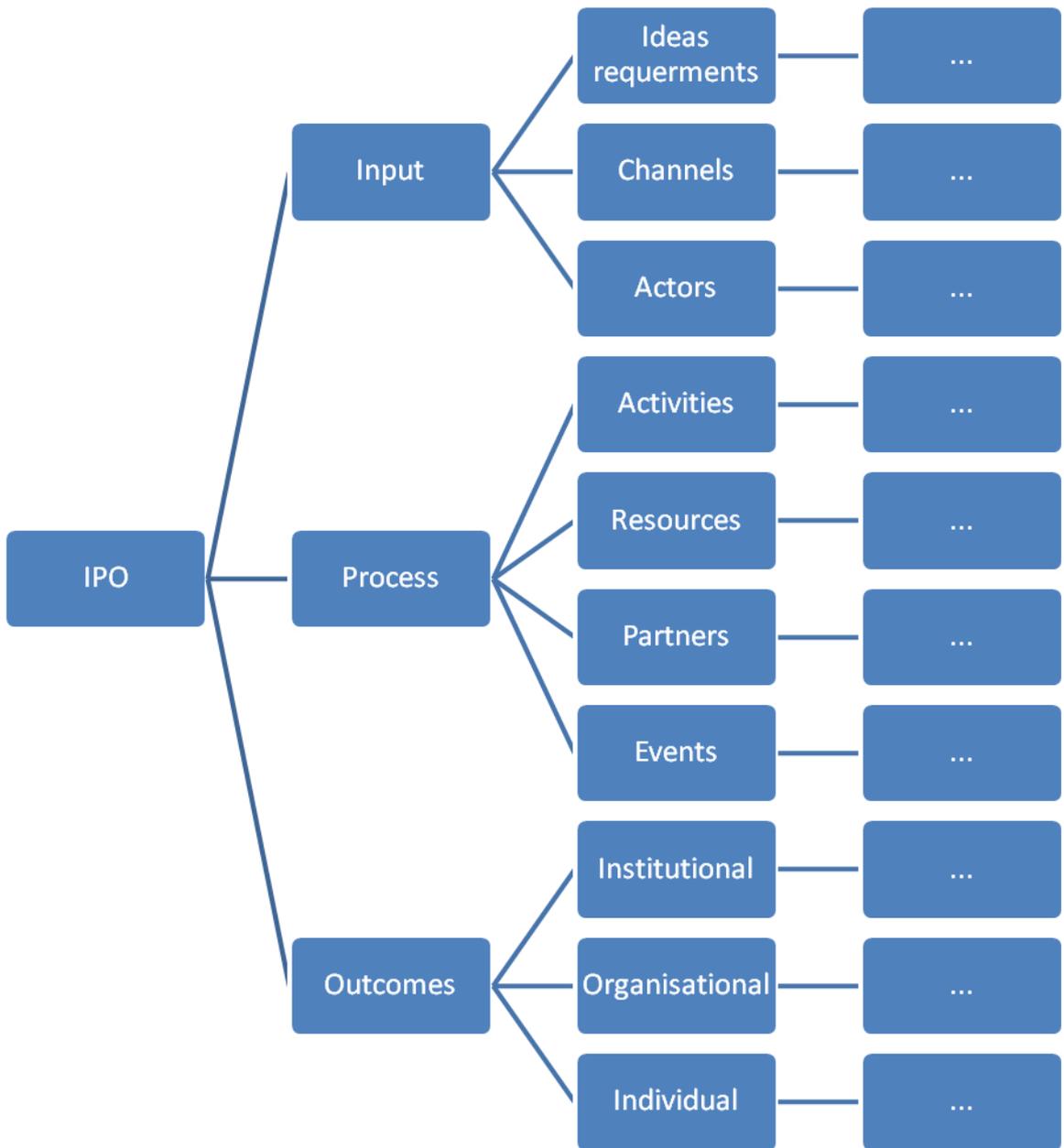


Figure 6 Interview coding process

Results

The questionnaire addressed to the UBI experts consisted of three main blocks of the incubation workflow: idea recruiting, incubation, and result evaluation. The purpose was

to identify the main aspects of the UBIs as organisations from the IPO model perspective. Figure 1 provides an overview of the results with the essential groups for each model part.

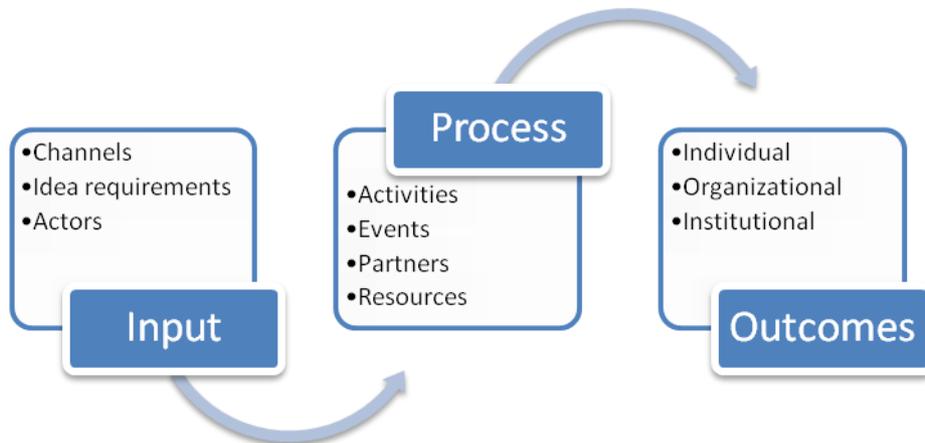


Figure 7 Essential groups of the IPO model of UBIs

From the figure above, the input part of the model includes channels, idea requirements, and actors, whereas the process part has four groups: activities, events, partners, and resources; finally, the outcomes part shows the incubation results from three-level perspectives: individual, organisational, and institutional.

The typical situation was when the respondents mentioned goals they tried to achieve at the beginning of the interview before discussing the outcomes that have similar meanings to the goal.

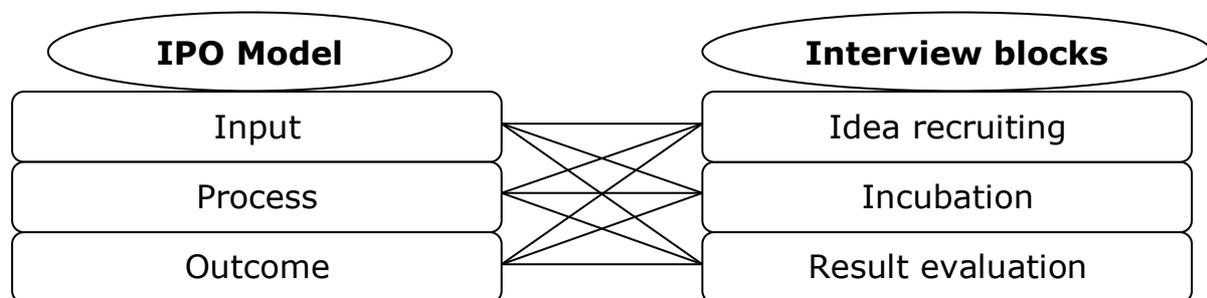


Figure 8 Data extraction process

Therefore, it should be emphasised that there is a flexible approach in this study to extracting data; for instance, the recruiting ideas blocks of the interviews are not directly linked to the 'input' parts of the model but can also contribute insights to the process and output parts (Fig. 2). In the following result descriptions, an illustration of each part of the model is proposed.

Input

The incubation process starts with the first contact between the idea and UBI. Here, potential entrepreneurs search for the most suitable place to transfer their idea to a firm. UBIs put effort into attracting ideas that can pass the incubation program with solid results. Therefore, this stage demands certain conditions for idea recruiters and future entrepreneurs. Based on the experts' interviews, these conditions of the input part are built on three main features: the communication channel, the actors involved, and the requirements for ideas to be engaged in incubation.

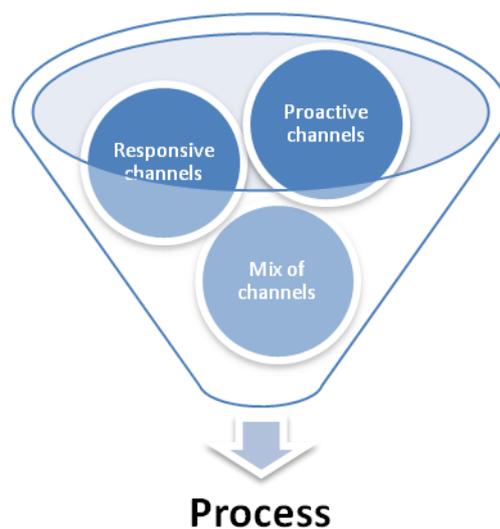


Figure 9 The role of the channels in the IPO model

The channels through which UBIs attract potential entrepreneurs are proactive and responsive. Guest lectures, round shows, and contest events are classified as proactive channels. They tend to raise awareness of the UBIs, establish contacts, and encourage start-ups to apply for incubation. As one interviewee said:

'So, it's, I don't know, every year we [definitely] have like six speeches at the university. So, I would say something like that',

and another respondent supports this statement, saying:

'And the most relevant source of ideas is competition'.

Responsive channels are designed to process flows of applications from start-up owners who express their intention to convert their idea into a company. For instance, such channels may include social media marketing, online applications, and open coaching sessions. During the discussion about this topic, an interviewee said:

'We were ranked by UBI Global as the number one [accelerator] in the world and [one of the] top world accelerators. [So,] we've built a reputation to reflect the level of services that we offer. So now we have a waitlist of candidates [who] are waiting for our application periods to apply'.

Surprisingly, one interviewee proposed a unique idea for a recruiting method that is a mix of two kinds of channels. They search for research papers from the university that are possible to commercialise and contact the researcher directly.

'So, there are a couple ways. There are obviously a lot of documents around the university [that are] about your inventions or research papers. So, I mean, we do have access to that. So, we look at that, [and] we say, "Okay, this might pick up, this possibly could become a business in the future". And then we will door-knock the professor and talk'.

Fig. 3 illustrates the input part and the role of the channels in the IPO model. Despite the channel type, both have one purpose: to launch the start-up cohort funnel that will run through the incubation process. However, specific requirements are set for admission to be eligible for the incubation program, and the requirements are discussed below.

Idea requirements mentioned by experts are sounded differently but, in most cases, have similar meanings, which allow us to segment them into three main groups: unique, scalable, and in the early stage.

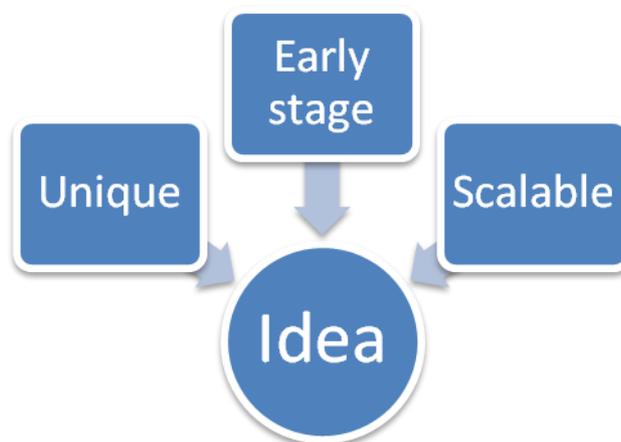


Figure 10 Idea requirements

The range of instruments is developed to demonstrate the uniqueness of the idea; in other words, the innovativeness of the start-up should be defined through several criteria at the

beginning of the incubation. For instance, some UBIs are strict about this point, and research-based start-ups are prioritised. At least future entrepreneurs must demonstrate that there is patentable value behind the idea. Although most UBIs search for innovative ideas, some are not so focused on this, and creative ideas would be enough to be admitted to an incubation program. As one interviewee put it:

'And also, as we mentioned earlier, it is also possible to, let's say, provide support not only to these highly innovative high-tech start-ups but also to more traditional creative ideas. So that is something that is probably unique in our program'.

The scalable idea meets the following criteria that UBI experts are looking for to decide if it is eligible for incubation. One interviewee argued that the start-up idea should have the potential to become a scalable business model with a global market view. The statement was supported by another respondent, who said:

'So, once they apply to fill out the online application form, we then review those applications [to determine] whether they meet our intricacy criteria of being high-tech [with] high growth potential. If they do, we then invite them in for the interview, [which] is a one-hour-long with two members of our team'.

Early-stage ideas as requirements for start-ups were dictated by the nature of the UBIs within an entrepreneurial ecosystem. The realities of a non-profit entity, in which UBIs usually operate, have certain conditions that shift their focus to the idea phase of entrepreneurs. The reasons for these conditions are discussed in depth in this study's 'process' section.

Process

If we now turn to the actual incubation process, it begins after admitting the applications, interviewing, and selecting the ideas that satisfy program conditions. Figure 5 provides an overview of patterns in the data extracted from the experts' interviews taken for this study. Practice shows that four main aspects of having a packed program should be considered: events, activities, resources, and partners.

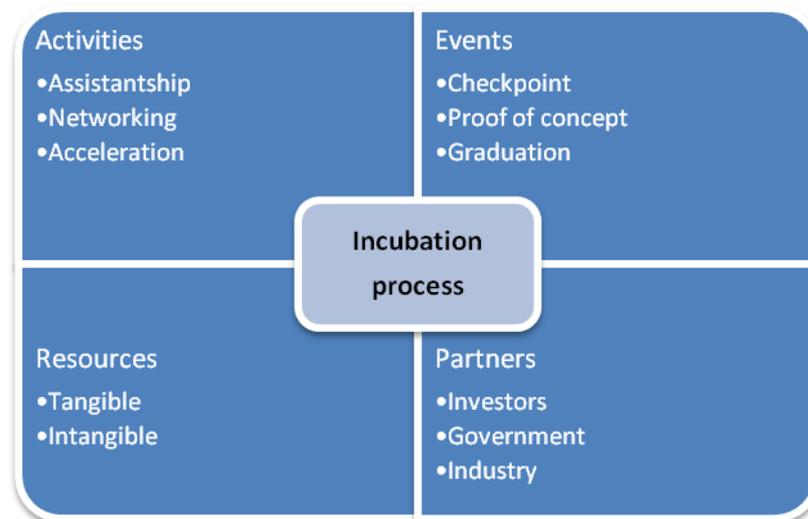


Figure 11 Incubation process aspects

As can be seen from the figure above, activities are one of the four aspects of the incubation process. Within an incubation program, activities are organised to convert the idea into a company and consist of assistantship for reducing the load of operational work, acceleration for furthering the company's launch, and networking for supplying start-ups with the necessary contacts.

The assistantship is needed to shape a convenient environment for start-ups to support their focus on the

product, thanks to the possibility of delegating part of the effort-consuming operational work to the UBIs team. The interviewed experts stressed the UBIs team's availability with essential competencies (e.g., law, accounting, and marketing). Due to the requirements for the uniqueness of the start-up idea and the potential of a product's patentability, experts often mention the importance of having intellectual property managers on the team. One incubator specialising in attracting start-ups from abroad mentioned the 'soft-landing' support for start-ups. Besides this, they also assist in board formation, which can be seen as networking. Finally, acceleration is the activity that includes education, coaching, and mentorship. It aims to aid the idea owners in maturing for the decision of whether they should launch a company or sell to the industry, and going back to research would be enough.

The events, such as making a decision, are called a checkpoint, which starts the company's formation and market proposition. This event is the initial stage of the future company and is the beginning of a line of other growing points on the entrepreneurial path. Following this checkpoint, the previously listed activities prepare start-ups for the subsequent stages of company development. The subsequent scaling stage requires funds to be invested in companies as the developed product needs marketing, mass production, and other aspects of running a business. Therefore, the proof of concept is a subsequent event intended to attract investment, and start-ups receive an opportunity to share their view in order to receive investment for further development. Succeeding in attracting the budgets and investing them into forming a mature company that is ready for self-running start-ups that became companies is graduating from UBIs.

The resources, the third aspect of the figure above, can be divided into two main groups: tangible and intangible. As a rule of thumb, UBI, as an organisational unit apart from office spaces, does not own the infrastructure (e.g., labs, equipment,

and tools). In rare cases, they provide the conditions needed for prototyping a product. However, before attracting considerable investment, it is common practice for start-ups to raise capital by receiving non-refundable pre-seed grants that can be expended to purchase the tools needed for prototyping. The incubation process includes the following intangible resources: the image, environment, and software. Due to their lengthy existence, universities build a brand that lets start-ups be associated with that image and self-position. The environment of like-minded people allows for sharing ideas and overcoming concerns dealing with the loneliness that many entrepreneurs feel at the start of their path.

The partners of UBIs are organisations and people involved in the incubation process who contribute their resources and time to support start-ups, both trying to find benefits for collaboration and just for volunteering purposes. A common view among interviewees is that companies from various industries participate in UBIs' networking events and other activities as experts in their fields, providing professional feedback, mentoring, and strategizing. Such activities often enable collaboration between start-ups and companies. The second group of partners are investors who finance new-born companies and are prepared to take the risk of dealing with a developing business concept, as start-ups often are. However, it should be considered that, in some cases, the third group of UBI's partners, the government, is sharing the risks, for instance, by subsidising venture capitalists through public-private partnership instruments.

Outcomes

When questioned about whether UBI is an entity that operates for returns, all respondents reported that their organisation is non-profit. This statement assumes that revenue is not the primary purpose of the incubation process

and encourages exploring other success measures rather than only capital generation. Therefore, based on the insights of this study's respondents, the incubation outcomes could be grouped into the following levels: individual, organisational, and institutional.

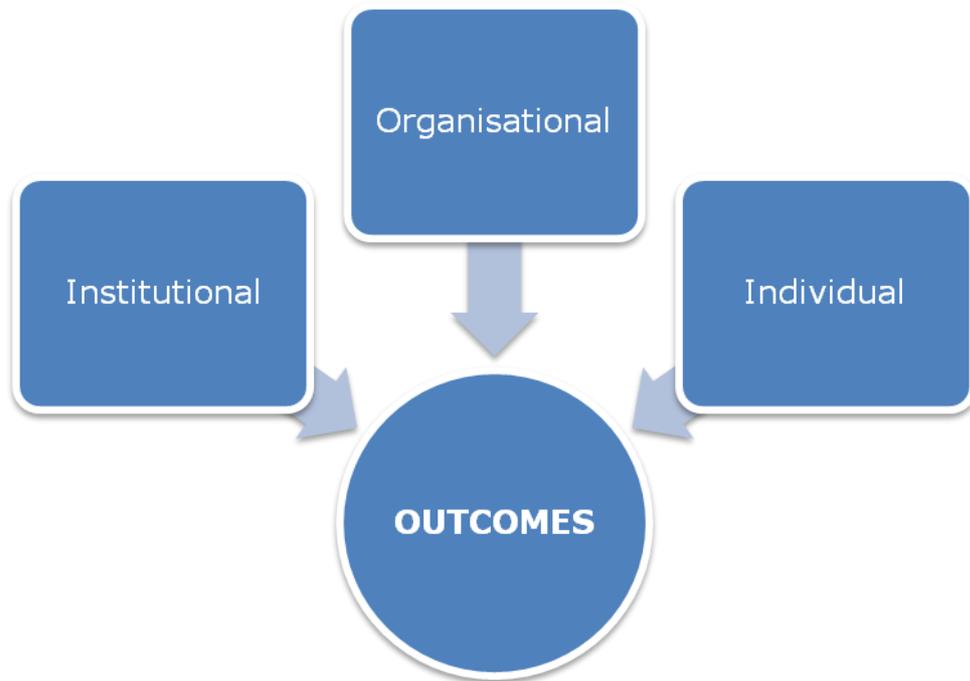


Figure 12 The levels of outcomes of the incubation program

In order to define incubation outcomes on an individual level, the respondents were asked how they understand the success of the start-ups they support and what indicators UBIs use to measure the results of the service they provide directly to the new firm's owner. Respondents' opinions differed on whether a start-up should have a significant result after incubation or whether an attempt to launch a company by passing through an entrepreneurial routine is also an outcome. Some informants reported that first sales or at least having a minimum vital product (MVP) by the end of the program was considered a result. In contrast, another noticed that they set more ambitious goals, such as, for instance, putting their start-

ups in an initial public offering (IPO). It needs to be mentioned that perhaps the last example should be at the organisational level of the incubation outcomes concerned below.

The organisational level of incubation outcomes touches the results of the whole start-up team as an entrepreneurial unit. The number of employees hired by start-ups and job openings created indicates a growing company and could be considered an incubation outcome. However, this outcome, just like revenue generation, another performance indicator, is usually outside the scope of UBIs. According to data from interviews in this study, UBIs see the investment attracted by start-ups as one of the outcomes. Another result is the company's behaviour in a market; for instance, expanding the geography and presence of the incubated firms in a global market. However, the start-up's expansion might happen by cooperating with other companies or being successfully sold to corporations, which can also be treated as an incubation outcome. The UBIs usually follow the 'open doors' policy and motivate graduates to keep their alumni network, and as experts, they are invited to activities for new start-up support.

Institutional-level outcomes mean the contributions produced by incubation programs benefit the environment and society at large, and some of them are easy to measure. For instance, the survival rate of new-born firms can be monitored by the number of start-ups that attended the program, opened firms, and operated three to five years after graduation. However, another indicator, like the level of entrepreneurial mindset that developed among program members, is not easy to measure, particularly after they graduate from the UBI. Being attached to the university for incubators provides an opportunity to work with researchers and scholars, and R&D commercialisation impacts value-added for the products they produce, creating conditions for innovation. The UBIs drive a local entrepreneurial ecosystem.

Discussion

Several recent studies have attempted to explore a model of the incubation process in general, including a focus specifically on UBIs. (Baglieri et al., 2018; Carayannis & Von Zedtwitz, 2005; Grimaldi & Grandi, 2005; McAdam & McAdam, 2008; Nicholls-Nixon et al., 2020; Pellegrini & Johnson-Sheehan, 2021; Tang et al., 2021a). The literature review has shown that the resource-based view approach is one of the most widely applied in UBI model research (Berbegal-Mirabent et al., 2015; Mavi et al., 2019; McAdam & McAdam, 2008; Verbano et al., 2020). However, very little was found in the literature on the question of how the phases of the incubation process are organised to support start-ups' development within the university. Therefore, the initial objective of the study was to apply the IPO approach to elucidate the components required to provide the holistic support needed to start-ups at each stage of their journey from idea to company. This study indicates that organising start-up support within UBI conditions has specific indicators for each stage of new company development presented in Figure 7.



Figure 13 IPO approach for UBI

The most prominent finding from the analysis is that UBI operational outcomes on an institutional level are generally intangible, making it challenging to evaluate their effectiveness. For instance, an entrepreneurial mindset can be evaluated using instruments such as a well-developed business plan and a prepared presentation (Secundo et al., 2020). Still, they are indirect measurements of incubation results due to issues connected to assessing changes in the human mindset. However, the measurable increase in the number of sustainable entrepreneurs indicates a growing survival rate (Prokop, 2021b) that generally influences the entrepreneurial ecosystem and positively affects the local economy of the region of the university location.

Another important finding is that even though UBIs target launching new firms as much as possible, they pay much attention to the entrepreneurial potential of the researcher as an idea owner. In the case of understanding that a better solution is to sell the developed technology (Davenport et al.,

2002) to the industry rather than open a new firm, UBI managers propose to do that when they see that applicants are good at research and that running a business often requires different skills. Nevertheless, the researchers' decision to set up a self-driven company is welcomed by UBIs. They put effort into supporting investment attraction and collaboration (Baraldi & Havenvid, 2016) with well-established companies or exiting to IPO (Festel, 2013), which is another measurement of success at the organisational level.

Individual-level outcomes of UBIs in this study show that more or less tangible results are expected here. When an idea is taking shape and on the way to preparing for the market proposition yet does not have all the necessary features to be called a ready product, it is the minimum viable product (MVP) (Pallotta & Campisi, 2018; Stayton & Mangematin, 2019; van Stijn et al., 2018) or cosmetically viable product (Kruger & Steyn, 2020) stage that is one of the incubation outcomes. Despite the weaknesses of the relatively low readiness of MVP for production, this is not causing barriers to attempts for first sales (Hausberg & Korreck, 2020; Lasrado et al., 2016; Marvel & Droege, 2010). Hence, even the early stages of product development can be an opportunity to evaluate the potential of a start-up.

This study confirms that networking is a significant part of the incubation process (Cooper et al., 2012; Kiran & Bose, 2020; McAdam & Marlow, 2008), as some UBIs have a virtual concept (von Zedtwitz, 2003), and they still develop pretty successful start-ups without any tangible resources. This result may be explained by the fact that experts involved in the incubation process are representatives of a real economic sector and possess the entire necessary infrastructure. Thus, through mentorship activities, they can supply needed equipment to the start-up for prototyping purposes at subsidised fees or even for free as part of their business social responsibility.

What is surprising is that although job creation is the most critical objective for most incubation programs and the number of generated spin-offs is counted as a KPI indicator (CSES, 2002), the UBIs have slightly different views. This study's results show that UBIs provide more 'scholar-centred' services, and the number of commercialised R&D projects is the most valuable criterion, even without launching a company. Therefore, comparing the findings with those of other studies confirms the crucial role of pre-incubation (Cooke et al., 2006; Pallotta & Campisi, 2018; Voisey et al., 2013b) as an instrument for a rational approach to scholars' conscious decision-making on whether it is worthwhile to launch a company or whether gainful technology sales would be enough.

This study might be assumed to be one of the rare papers that attempt to uncover the idea of recruiting within the context of input, which is an element of the start-up support process. Together with the proposed differentiation of channels for communication with potential start-ups and attracting ideas for incubation (namely proactive, responsive, and mixed), this study also proposes that published papers by scholars can be used as a trigger for starting a proactive proposition for collaboration. This insight reiterates the importance of the researcher as the core element of UBI's existence as a unique form in the incubator's family and distinguishes them from similar organisations. Moreover, uniqueness as a requirement for idea evaluation for admittance to the incubator can be seen as additional justification for the view of the crucial role of research in entrepreneurship development.

Conclusion

The present research applies the IPO perspective to examine the UBI model as one of the crucial parts of an entrepreneurial ecosystem that complements the link between academia and industry. This investigation aims to assess the

components of the incubation program needed to organise a sustainable pipeline of start-ups in university conditions. Returning to the question posed at the beginning of this study, it is now possible to state that the IPO model, like many other organisations, is suitable for application in managing UBIs. It helps identify the basics needed for launching the ideas: recruiting as input, incubation as a process, and new innovative companies as outcomes.

The idea of recruiting is a fundamental stage, as the number of qualitative applications creates the basis of the incubation program. This study has identified three aspects that UBI's managers should focus on to attract entrepreneurial ideas: channels, idea requirements, and actors involved. The interaction channels are essential for maintaining communication within the university, attracting talent (Cadorin et al., 2021), and linking external stakeholders (Zavale & Schneijderberg, 2021). Setting up the requirements for the ideas submitted for incubation allows for receiving the information needed to assess their potential before admitting them. This also helps balance the demand and supply of applicants (Klofsten et al., 2020) that will collaborate with other stakeholders such as investors (Prokop, 2021).

The incubation process itself includes components that can be conditionally segmented into four groups: activities, events, resources, and partners. As a rule, activities such as assistance (Redondo & Camarero, 2017) and networking (Breznitz et al., 2018) are directed to support the start-ups during the whole process to prepare them for the events where some intermediate results can be evaluated (Woolley & MacGregor, 2021). For instance, the proof-of-concept event is held after painstaking work with mentors or the UBI team (McAdam et al., 2009). This research confirmed the results of previous studies that indicated resources, both tangible and intangible, are essential for the incubation process (Soetanto & Jack, 2013; van Stijn et al., 2018; Venturini & Verbano, 2017).

The outcomes of the business incubation program within the universities due to the non-profit nature of UBIs are measured not only by profit generated but also by the social and environmental impact that can be seen from three-level perspectives: individual, organisational, and institutional.

References

- Aaboen, L. (2009). Explaining incubators using firm analogy. *Technovation*, 29(10), 657–670. <https://doi.org/10.1016/j.technovation.2009.04.007>
- Adner, R. (2017). Ecosystem as structure: an actionable construct for strategy. *Journal of Management*, 43(1), 39–58. <https://doi.org/10.1177/0149206316678451>
- Aguillo, I. F., Bar-Ilan, J., Levene, M., & Ortega, J. L. (2010). Comparing university rankings. *Scientometrics*, 85(1), 243–256. <https://doi.org/10.1007/s11192-010-0190-z>
- Ahmad, A. J., & Ingle, S. (2011). Relationships matter: Case study of a university campus incubator. *International Journal of Entrepreneurial Behaviour and Research*, 17(6), 626–644. <https://doi.org/10.1108/13552551111174701>
- Albats, E., Fiegenbaum, I., & Cunningham, J. A. (2018). A micro level study of university industry collaborative lifecycle key performance indicators. *Journal of Technology Transfer*, 43(2), 389–431. <https://doi.org/10.1007/s10961-017-9555-2>
- Alexander Osterwalder, Y. P. (2010). *Business model generation*. John Wiley & Sons.
- Ali, F., Rasoolimanesh, S. M., Sarstedt, M., Ringle, C. M., & Ryu, K. (2018). An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research. *International Journal of Contemporary Hospitality Management*, 30(1), 514–538. <https://doi.org/10.1108/IJCHM-10-2016-0568>
- Allahar, H., & Sookram, R. (2019). Emergence of university-centred entrepreneurial ecosystems in the Caribbean. *Industry and Higher Education*, 33(4), 246–259. <https://doi.org/10.1177/0950422219838220>
- Amit, R., & Zott, C. (2001). Value creation in e-business. *Strategic Management Journal*, 22(6–7), 493–520. <https://doi.org/10.1002/smj.187>

- Ashby, A., Leat, M., & Hudson-Smith, M. (2012). Making connections: A review of supply chain management and sustainability literature. In *Supply Chain Management* (Vol. 17, Issue 5, pp. 497–516). <https://doi.org/10.1108/13598541211258573>
- Baden-Fuller, C., & Haefliger, S. (2013). Business models and technological innovation. *Long Range Planning*, 46(6), 419–426. <https://doi.org/10.1016/j.lrp.2013.08.023>
- Baglieri, D., Baldi, F., & Tucci, C. L. (2018). University technology transfer office business models: One size does not fit all. *Technovation*, 76–77(May), 51–63. <https://doi.org/10.1016/j.technovation.2018.05.003>
- 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? *Technological Forecasting and Social Change*, 163(November 2020). <https://doi.org/10.1016/j.techfore.2020.120439>
- Baraldi, E., & Havenvid, M. I. (2016). Identifying new dimensions of business incubation: A multi-level analysis of Karolinska Institute's incubation system. *Technovation*, 50–51, 53–68. <https://doi.org/10.1016/j.technovation.2015.08.003>
- Baraldi, E., & Ingemansson Havenvid, M. (2016). Identifying new dimensions of business incubation: A multi-level analysis of Karolinska Institute's incubation system. *Technovation*, 50–51, 53–68. <https://doi.org/10.1016/j.technovation.2015.08.003>
- Barbero, J. L., Casillas, J. C., Ramos, A., & Guitar, S. (2012). Revisiting incubation performance. How incubator typology affects results. *Technological Forecasting and Social Change*, 79(5), 888–902. <https://doi.org/10.1016/j.techfore.2011.12.003>
- Barbero, J. L., Casillas, J. C., Wright, M., & Ramos Garcia, A. (2014). Do different types of incubators produce different types of innovations? *Journal of Technology Transfer*, 39(2), 151–168. <https://doi.org/10.1007/s10961-013-9308-9>

- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Barney, J. (2001). Is the resource-based "view" a useful perspective for strategic management research? Yes Author (s): Jay B. Barney Source: The Academy of Management Review, Vol. 26, No. 1 (Jan., 2001), pp. 41-56 Published by: Academy of Management Stable. *Academy of Management Review*, 26(1), 41–56.
- Barney, J. B., & Wright, P. M. (1998). On becoming a strategic partner: The role of human resources in gaining competitive advantage. *Human Resource Management*, 37(1), 31–46. [https://doi.org/10.1002/\(SICI\)1099-050X\(199821\)37:1<31::AID-HRM4>3.0.CO;2-W](https://doi.org/10.1002/(SICI)1099-050X(199821)37:1<31::AID-HRM4>3.0.CO;2-W)
- Berbegal-Mirabent, J., Ribeiro-Soriano, D. E., & Sánchez García, J. L. (2015). Can a magic recipe foster university spin-off creation? *Journal of Business Research*, 68(11), 2272–2278. <https://doi.org/10.1016/j.jbusres.2015.06.010>
- Berggren, E. (2017). Researchers as enablers of commercialization at an entrepreneurial university. *Journal of Management Development*, 36(2), 217–232. <https://doi.org/10.1108/JMD-06-2016-0117>
- Bocken, N. M. P., Short, S. W., Rana, P., & Evans, S. (2014). A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, 65, 42–56. <https://doi.org/10.1016/j.jclepro.2013.11.039>
- Bodolica, V., & Spraggon, M. (2021). Incubating innovation in university settings: building entrepreneurial mindsets in the future generation of innovative emerging market leaders. *Education and Training*, 63(4), 613–631. <https://doi.org/10.1108/ET-06-2020-0145>
- Bohnsack, R., Pinkse, J., & Kolk, A. (2014). Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles. *Research Policy*, 43(2), 284–300. <https://doi.org/10.1016/j.respol.2013.10.014>

- Boons, F., & Lüdeke-Freund, F. (2013). Business models for sustainable innovation: State-of-the-art and steps towards a research agenda. *Journal of Cleaner Production*, 45, 9–19. <https://doi.org/10.1016/j.jclepro.2012.07.007>
- Breznitz, S. M., Clayton, P. A., Defazio, D., & Isett, K. R. (2018). Have you been served? The impact of university entrepreneurial support on start-ups' network formation. *Journal of Technology Transfer*, 43(2), 343–367. <https://doi.org/10.1007/s10961-017-9565-0>
- Breznitz, S. M., & Zhang, Q. (2019). Fostering the growth of student start-ups from university accelerators: An entrepreneurial ecosystem perspective. *Industrial and Corporate Change*, 28(4), 855–873. <https://doi.org/10.1093/icc/dtz033>
- Cadorin, E., Klofsten, M., & Löfsten, H. (2021). Science Parks, talent attraction and stakeholder involvement: an international study. *Journal of Technology Transfer*, 46(1), 1–28. <https://doi.org/10.1007/s10961-019-09753-w>
- Campbell, C., & Allen, D. N. (1987). The small business incubator industry: micro-level economic development. *Economic Development Quarterly*. <https://doi.org/https://doi.org/10.1177/089124248700100209>
- Carayannis, E. G., Grigoroudis, E., Campbell, D. F. J., Meissner, D., & Stamati, D. (2017). *The ecosystem as helix: an exploratory theory-building study of regional co-opetitive entrepreneurial ecosystems as Quadruple / Quintuple Helix Innovation Models*. <https://doi.org/10.1111/radm.12300>
- Carayannis, E. G., & Von Zedtwitz, M. (2005). Architecting gloCal (global-local), real-virtual incubator networks (G-RVINS) as catalysts and accelerators of entrepreneurship in transitioning and developing economies: Lessons learned and best practices from current development and business incubation. *Technovation*, 25(2), 95–110. [https://doi.org/10.1016/S0166-4972\(03\)00072-5](https://doi.org/10.1016/S0166-4972(03)00072-5)
- Chan, K. F., & Lau, T. (2005). Assessing technology incubator programs in the science park: the good, the bad and the

- ugly. *Technovation*, 25, 1215–1228. <https://doi.org/10.1016/j.technovation.2004.03.010>
- Chan, Y., & Ngai, E. W. T. (2011). Conceptualising electronic word of mouth activity: An input-process-output perspective. *Marketing Intelligence and Planning*, 29(5), 488–516. <https://doi.org/10.1108/02634501111153692>
- Clayton, P., Feldman, M., & Lowe, N. (2018). Behind the scenes: Intermediary organizations that facilitate science commercialization through entrepreneurship. *Academy of Management Perspectives*, 32(1), 104–124. <https://doi.org/10.5465/amp.2016.0133>
- Cooke, P., Kaufmann, D., Levin, C., & Wilson, R. (2006). The biosciences knowledge value chain and comparative incubation models. *Journal of Technology Transfer*, 31(1), 115–129. <https://doi.org/10.1007/s10961-005-5025-3>
- Cooper, A. C. (1985a). The role of incubator organizations in the founding of growth-oriented firms. *Journal of Business Venturing*, 1(1), 75–86. [https://doi.org/10.1016/0883-9026\(85\)90008-4](https://doi.org/10.1016/0883-9026(85)90008-4)
- Cooper, A. C. (1985b). The role of incubator organizations in the founding of growth-oriented firms. *Journal of Business Venturing*, 1(1), 75–86. [https://doi.org/10.1016/0883-9026\(85\)90008-4](https://doi.org/10.1016/0883-9026(85)90008-4)
- Cooper, A. C. (1985c). The role of incubator organizations in the founding of growth-oriented firms. *Journal of Business Venturing*, 1(1), 75–86. [https://doi.org/10.1016/0883-9026\(85\)90008-4](https://doi.org/10.1016/0883-9026(85)90008-4)
- Cooper, C. E., Hamel, S. A., & Connaughton, S. L. (2012). Motivations and obstacles to networking in a university business incubator. *Journal of Technology Transfer*, 37(4), 433–453. <https://doi.org/10.1007/s10961-010-9189-0>
- Cravo, Jos. P. C., & Marques, J. P. C. (2019). Development of innovation in companies in incubation: the case of portugal. *International Journal of Innovation Management*, 23(2). <https://doi.org/10.1142/S136391961950018X>
- Croce, A., Grilli, L., & Murtinu, S. (2014). Venture capital

- enters academia: An analysis of university-managed funds. *Journal of Technology Transfer*, 39(5), 688–715. <https://doi.org/10.1007/s10961-013-9317-8>
- CSES. (2002). *Final report Final report* (C. for S. & E. Services (ed.); European C).
- Culkin, N. (2013). Beyond being a student: An exploration of student and graduate start-ups (SGSUs) operating from university incubators. *Journal of Small Business and Enterprise Development*, 20(3), 634–649. <https://doi.org/10.1108/JSBED-05-2013-0072>
- Davenport, S., Carr, A., & Bibby, D. (2002). Leveraging talent: spin-off strategy at industrial research. *R and D Management*, 32(3), 241–254. <https://doi.org/10.1111/1467-9310.00257>
- Davidsson, P., Hunter, E., & Klofsten, M. (2006). Institutional forces: The invisible hand that shapes venture ideas? *International Small Business Journal*, 24(2), 115–131. <https://doi.org/10.1177/0266242606061834>
- Del Bosco, B., Mazzucchelli, A., Chierici, R., & Di Gregorio, A. (2021). Innovative startup creation: the effect of local factors and demographic characteristics of entrepreneurs. *International Entrepreneurship and Management Journal*, 17(1), 145–164. <https://doi.org/10.1007/s11365-019-00618-0>
- Di Fatta, D., Caputo, F., & Dominici, G. (2018). A relational view of start-up firms inside an incubator: the case of the ARCA consortium. *European Journal of Innovation Management*, 21(4), 601–619. <https://doi.org/10.1108/EJIM-08-2017-0110>
- Díez-Vial, I., & Montoro-Sánchez, Á. (2016). How knowledge links with universities may foster innovation: The case of a science park. *Technovation*, 50–51, 41–52. <https://doi.org/10.1016/j.technovation.2015.09.001>
- Donegan, M., & Lowe, N. (2020). Going local: placing entrepreneurial microgeographies in a larger regional context. *Industry and Innovation*, 27(8), 871–891.

<https://doi.org/10.1080/13662716.2019.1706454>

- Dworkin, S. L. (2012). Sample size policy for qualitative studies using in-depth interviews. *Archives of Sexual Behavior*, 41(6), 1319–1320. <https://doi.org/10.1007/s10508-012-0016-6>
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107–115. <https://doi.org/10.1111/j.1365-2648.2007.04569.x>
- Emami, A., & Dimov, D. (2017). Degree of innovation and the entrepreneurs' intention to create value: a comparative study of experienced and novice entrepreneurs. *Eurasian Business Review*, 7(2), 161–182. <https://doi.org/10.1007/s40821-016-0068-y>
- Etzkowitz, H. (2002). Incubation of incubators: innovation as a triple helix of university-industry-government networks. *Science and Public Policy*, 29(2), 115–128. <https://doi.org/10.3152/147154302781781056>
- Etzkowitz, H., de Mello, J. M. C., & Almeida, M. (2005). Towards "meta-innovation" in Brazil: The evolution of the incubator and the emergence of a triple helix. *Research Policy*, 34(4), 411–424. <https://doi.org/10.1016/j.respol.2005.01.011>
- Fernández Fernández, M. T., Blanco Jiménez, F. J., & Cuadrado Roura, J. R. (2015). Business incubation: innovative services in an entrepreneurship ecosystem. *Service Industries Journal*, 35(14), 783–800. <https://doi.org/10.1080/02642069.2015.1080243>
- Festel, G. (2013). Academic spin-offs, corporate spin-outs and company internal start-ups as technology transfer approach. *Journal of Technology Transfer*, 38(4), 454–470. <https://doi.org/10.1007/s10961-012-9256-9>
- Fini, R., Grimaldi, R., Santoni, S., & Sobrero, M. (2011a). Complements or substitutes? The role of universities and local context in supporting the creation of academic spin-offs. *Research Policy*, 40(8), 1113–1127. <https://doi.org/10.1016/j.respol.2011.05.013>

- Fini, R., Grimaldi, R., Santoni, S., & Sobrero, M. (2011b). Complements or substitutes? the role of universities and local context in supporting the creation of academic spin-offs. *Research Policy*, *40*(8), 1113–1127. <https://doi.org/10.1016/j.respol.2011.05.013>
- Foss, N. J., & Saebi, T. (2017). Fifteen years of research on business model innovation: how far have we come, and where should we go? *Journal of Management*, *43*(1), 200–227. <https://doi.org/10.1177/0149206316675927>
- Fukugawa, N. (2018). Is the impact of incubator's ability on incubation performance contingent on technologies and life cycle stages of startups?: evidence from Japan. *International Entrepreneurship and Management Journal*, *14*(2), 457–478. <https://doi.org/10.1007/s11365-017-0468-1>
- Galan-Muros, V., & Davey, T. (2019). The UBC ecosystem: putting together a comprehensive framework for university-business cooperation. *The Journal of Technology Transfer*, *44*(4), 1311–1346. <https://doi.org/10.1007/s10961-017-9562-3>
- Gallant, M., Majumdar, S., & Varadarajan, D. (2010). Outlook of female students towards entrepreneurship. *Education, Business and Society: Contemporary Middle Eastern Issues*, *3*(3), 218–230. <https://doi.org/10.1108/17537981011070127>
- Geissdoerfer, M., Vladimirova, D., & Evans, S. (2018). Sustainable business model innovation: A review. *Journal of Cleaner Production*, *198*, 401–416. <https://doi.org/10.1016/j.jclepro.2018.06.240>
- Ghezzi, A., Gabelloni, D., Martini, A., & Natalicchio, A. (2018). Crowdsourcing: A review and suggestions for future research. *International Journal of Management Reviews*, *20*(2), 343–363. <https://doi.org/10.1111/ijmr.12135>
- Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: notes on the gioia methodology. *Organizational Research Methods*, *16*(1), 15–31. <https://doi.org/10.1177/1094428112452151>

- González-Pereira, B., Guerrero-Bote, V. P., & Moya-Anegón, F. (2010). A new approach to the metric of journals' scientific prestige: The SJR indicator. *Journal of Informetrics*, 4(3), 379–391. <https://doi.org/10.1016/j.joi.2010.03.002>
- Good, M., Knockaert, M., Soppe, B., & Wright, M. (2019a). Technovation The technology transfer ecosystem in academia . An organizational design. *Technovation*, 82–83(June 2018), 35–50. <https://doi.org/10.1016/j.technovation.2018.06.009>
- Good, M., Knockaert, M., Soppe, B., & Wright, M. (2019b). The technology transfer ecosystem in academia. An organizational design perspective. *Technovation*, 82–83(March 2017), 35–50. <https://doi.org/10.1016/j.technovation.2018.06.009>
- Gorączkowska, J. (2020). Enterprise innovation in technology incubators and university business incubators in the context of Polish industry. *Oeconomia Copernicana*, 11(4), 799–817. <https://doi.org/10.24136/OC.2020.032>
- Grandi, A., & Grimaldi, R. (2004a). Evolution of Incubation Models. *Industry and Higher Education*, 18(1), 23–31. <https://doi.org/10.5367/000000004773040933>
- Grandi, A., & Grimaldi, R. (2004b). Evolution of Incubation Models: Evidence from the Italian Incubation Industry. *Industry and Higher Education*, 18(1), 23–31. <https://doi.org/10.5367/000000004773040933>
- Green, S., Higgins, J. P., Alderson, P., Clarke, M., Mulrow, C. D., & Oxman, A. D. (2008). Introduction. In J. P. Higgins & S. Green (Eds.), *Cochrane Handbook for Systematic Reviews of Interventions: Cochrane Book Series* (pp. 1–9). John Wiley & Sons, Ltd. <https://doi.org/10.1002/9780470712184.ch1>
- Grimaldi, R., & Grandi, A. (2001). The contribution of university business incubators to new knowledge-based ventures: evidence from italy. *Industry and Higher Education*, 15(4), 239–250. <https://doi.org/10.5367/000000001101295731>

- Grimaldi, R., & Grandi, A. (2005). Business incubators and new venture creation: An assessment of incubating models. *Technovation*, 25(2), 111–121. [https://doi.org/10.1016/S0166-4972\(03\)00076-2](https://doi.org/10.1016/S0166-4972(03)00076-2)
- Guadix, J., Carrillo-Castrillo, J., Onieva, L., & Navascués, J. (2016). Success variables in science and technology parks. *Journal of Business Research*, 69(11), 4870–4875. <https://doi.org/10.1016/j.jbusres.2016.04.045>
- Guerrero, M., Liñán, F., & Cáceres-Carrasco, F. R. (2021). The influence of ecosystems on the entrepreneurship process: a comparison across developed and developing economies. *Small Business Economics*, 57(4), 1733–1759. <https://doi.org/10.1007/s11187-020-00392-2>
- Guerrero, M., Urbano, D., Cunningham, J., & Organ, D. (2014). Entrepreneurial universities in two European regions: A case study comparison. *Journal of Technology Transfer*, 39(3), 415–434. <https://doi.org/10.1007/s10961-012-9287-2>
- Guerrero, M., Urbano, D., & Gajón, E. (2020). Entrepreneurial university ecosystems and graduates' career patterns: do entrepreneurship education programmes and university business incubators matter? *Journal of Management Development*, 39(5), 753–775. <https://doi.org/10.1108/JMD-10-2019-0439>
- Hackett, S. M., & Dilts, D. M. (2004). A systematic review of business incubation research. *The Journal of Technology Transfer*, 29(1), 55–82. <https://doi.org/10.1023/B:JOTT.0000011181.11952.0f>
- Hackman, J. R., & Morris, C. G. (1975). Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration. *Advances in Experimental Social Psychology*, 8(C), 45–99. [https://doi.org/10.1016/S0065-2601\(08\)60248-8](https://doi.org/10.1016/S0065-2601(08)60248-8)
- Hausberg, J. P., & Korreck, S. (2020). Business incubators and accelerators: a co-citation analysis-based, systematic literature review. *Journal of Technology Transfer*, 45(1), 151–176. <https://doi.org/10.1007/s10961-018-9651-y>

- Hayter, C. S. (2016). A trajectory of early-stage spinoff success: the role of knowledge intermediaries within an entrepreneurial university ecosystem. *Small Business Economics*, 47(3), 633–656. <https://doi.org/10.1007/s11187-016-9756-3>
- Hisrich, R. D., & Smilor, R. W. (1988). The university and business incubation: Technology transfer through entrepreneurial development. *The Journal of Technology Transfer*, 13(1), 14–19. <https://doi.org/10.1007/BF02371496>
- Hitt, M. A., Ireland, R. D., Sirmon, D. G., & Trahms, C. A. (2011). Strategic Entrepreneurship: Creating Value for Individuals, Organizations, and Society. *Academy of Management Perspectives*, 25(2), 57–75. <https://doi.org/10.5465/amp.25.2.57>
- Ilgén, D. R., Hollenbeck, J. R., Johnson, M., & Jundt, D. (2005). Teams in Organizations: From Input-Process-Output Models to IMO Models. *Annual Review of Psychology*, 56(1), 517–543. <https://doi.org/10.1146/annurev.psych.56.091103.070250>
- Jangbua, A., & Igel, B. (2014). *Business incubation for ICT and Software Industry: The case study of Thailand Science Park Business Incubator*. 0–22.
- Jones, R., & Parry, S. (2011). Business support for new technology-based firms: A study of entrepreneurs in north Wales. *International Journal of Entrepreneurial Behaviour and Research*, 17(6), 645–662. <https://doi.org/10.1108/13552551111174710>
- Kevill, A., Brooks, R., & Mallinson, K. (2020). *From pipe dream , to enterprise incubator , to award-winning business : The case of Scriba PR. Figure 1*. <https://doi.org/10.1177/1465750319884851>
- Khandkar, S. H. (1998). Open coding. *Basics of Qualitative Research: ...*, 101–121. <http://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Open+Coding#0>

- Kiani Mavi, R., Gheibdoust, H., Khanfar, A. A., & Kiani Mavi, N. (2019). Ranking factors influencing strategic management of university business incubators with ANP. *Management Decision*, *57*(12), 3492–3510. <https://doi.org/10.1108/MD-06-2018-0688>
- Kiran, R., & Bose, S. C. (2020). Stimulating business incubation performance: role of networking, university linkage and facilities. *Technology Analysis and Strategic Management*, *32*(12), 1407–1421. <https://doi.org/10.1080/09537325.2020.1772967>
- Kohler, T. (2016). Corporate accelerators: Building bridges between corporations and startups. *Business Horizons*, *59*(3), 347–357. <https://doi.org/10.1016/j.bushor.2016.01.008>
- Kötting, M. (2020). Corporate incubators as knowledge brokers between business units and ventures: A systematic review and avenues for future research. *European Journal of Innovation Management*, *23*(3), 474–499. <https://doi.org/10.1108/EJIM-12-2017-0201>
- Kruger, S., & Steyn, A. A. (2020). Enhancing technology transfer through entrepreneurial development: practices from innovation spaces. In *Journal of Technology Transfer* (Vol. 45, Issue 6). Springer US. <https://doi.org/10.1007/s10961-019-09769-2>
- Lalkaka, R. (2002). Technology business incubators to help build an innovation-based economy. *Journal Change of Management*, *3*, 167–176.
- Lamine, W., Mian, S., Fayolle, A., Wright, M., Klofsten, M., & Etzkowitz, H. (2018). Technology business incubation mechanisms and sustainable regional development. *The Journal of Technology Transfer*, *43*(5), 1121–1141. <https://doi.org/10.1007/s10961-016-9537-9>
- Lasrado, V., Sivo, S., Ford, C., O’Neal, T., & Garibay, I. (2016). Do graduated university incubator firms benefit from their relationship with university incubators? *Journal of Technology Transfer*, *41*(2), 205–219. <https://doi.org/10.1007/s10961-015-9412-0>

- Lee-Ross, D. (2015). Personality characteristics of the self-employed: A comparison using the World Values Survey data set. *Journal of Management Development*, 34(9), 1094–1112. <https://doi.org/10.1108/JMD-06-2014-0062>
- Lee, S. S., & Osteryoung, J. S. (2004a). A comparison of critical success factors for effective operations of university business incubators in the United States and Korea. In *Journal of Small Business Management* (Vol. 42, Issue 4, pp. 418–426). <https://doi.org/10.1111/j.1540-627X.2004.00120.x>
- Lee, S. S., & Osteryoung, J. S. (2004b). A comparison of critical success factors for effective operations of university business incubators in the United States and Korea. *Journal of Small Business Management*, 42(4), 418–426. <https://doi.org/10.1111/j.1540-627X.2004.00120.x>
- Liu, Y. (2020). The micro-foundations of global business incubation: Stakeholder engagement and strategic entrepreneurial partnerships. *Technological Forecasting and Social Change*, 161(June), 120294. <https://doi.org/10.1016/j.techfore.2020.120294>
- Löfsten, H. (2015). Critical resource dimensions for development of patents — an analysis of 131 new technology-based firms localised in incubators. *Journal, International Vol, Innovation Management Management, Technology*, 19(1), 1–32. <https://doi.org/10.1142/S1363919615500061>
- M'Chirgui, Z., Lamine, W., Mian, S., & Fayolle, A. (2018). University technology commercialization through new venture projects: an assessment of the French regional incubator program. *Journal of Technology Transfer*, 43(5), 1142–1160. <https://doi.org/10.1007/s10961-016-9535-y>
- Markman, G. D., Phan, P. H., Balkin, D. B., & Gianiodis, P. T. (2005). Entrepreneurship and university-based technology transfer. *Journal of Business Venturing*, 20(2), 241–263. <https://doi.org/10.1016/j.jbusvent.2003.12.003>
- Markusen, A., & Oden, M. (1996). National laboratories as business incubators and region builders. *Journal of*

- Technology Transfer*, 21(1-2), 93-108.
<https://doi.org/10.1007/BF02220312>
- Martins, L. L., Gilson, L. L., & Maynard, M. T. (2004). Virtual teams: What do we know and where do we go from here? *Journal of Management*, 30(6), 805-835.
<https://doi.org/10.1016/j.jm.2004.05.002>
- Marvel, M. R., & Droege, S. (2010). Prior tacit knowledge and first-year sales: Learning from technology entrepreneurs. *Journal of Small Business and Enterprise Development*, 17(1), 32-44.
<https://doi.org/10.1108/14626001011019116>
- Massa, L., Tucci, C. L., & Afuah, A. (2017). A Critical Assessment of Business Model Research. *Academy of Management Annals*, 11(1), 73-104.
<https://doi.org/10.5465/annals.2014.0072>
- Mathieu, J., Maynard, T. M., Rapp, T., & Gilson, L. (2008). Team effectiveness 1997-2007: A review of recent advancements and a glimpse into the future. *Journal of Management*, 34(3), 410-476.
<https://doi.org/10.1177/0149206308316061>
- Mayorga, L. K. (2019a). *HEIs and workforce development: Helping undergraduates acquire career-readiness attributes*.
<https://doi.org/10.1177/0950422219875083>
- Mayorga, L. K. (2019b). HEIs and workforce development: Helping undergraduates acquire career-readiness attributes. *Industry and Higher Education*, 33(6), 370-380.
<https://doi.org/10.1177/0950422219875083>
- McAdam, M., Galbraith, B., McAdam, R., & Humphreys, P. (2006a). Business processes and networks in university incubators: A review and research agendas. *Technology Analysis and Strategic Management*, 18(5), 451-472.
<https://doi.org/10.1080/09537320601019578>
- McAdam, M., Galbraith, B., McAdam, R., & Humphreys, P. (2006b). Business Processes and Networks in University Incubators: A Review and Research Agendas. *Technology Analysis & Strategic Management*, 18(5), 451-472.

<https://doi.org/10.1080/09537320601019578>

- McAdam, M., & Marlow, S. (2008). A preliminary investigation into networking activities within the university incubator. *International Journal of Entrepreneurial Behaviour and Research*, 14(4), 219–241. <https://doi.org/10.1108/13552550810887390>
- McAdam, M., & Marlow, S. (2011). Sense and sensibility: The role of business incubator client advisors in assisting high-technology entrepreneurs to make sense of investment readiness status. *Entrepreneurship and Regional Development*, 23(7–8), 449–468. <https://doi.org/10.1080/08985620903406749>
- McAdam, M., & McAdam, R. (2008). High tech start-ups in University Science Park incubators: The relationship between the start-up's lifecycle progression and use of the incubator's resources. *Technovation*, 28(5), 277–290. <https://doi.org/10.1016/j.technovation.2007.07.012>
- McAdam, M., McAdam, R., Galbraith, B., & Miller, K. (2010). An exploratory study of Principal Investigator roles in UK university Proof-of-Concept processes: An Absorptive Capacity perspective. *R and D Management*, 40(5), 455–473. <https://doi.org/10.1111/j.1467-9310.2010.00619.x>
- McAdam, R., McAdam, M., & Brown, V. (2009). Proof of concept processes in UK university technology transfer: An absorptive capacity perspective. *R and D Management*, 39(2), 192–210. <https://doi.org/10.1111/j.1467-9310.2008.00549.x>
- McCarthy, I. P., Silvestre, B. S., von Nordenflycht, A., & Breznitz, S. M. (2018). A typology of university research park strategies: What parks do and why it matters. *Journal of Engineering and Technology Management - JET-M*, 47(February), 110–122. <https://doi.org/10.1016/j.jengtecman.2018.01.004>
- McGee, C., Schwartz, N., & Ehrlick, S. (2021). The Music Den: A framework for entrepreneurship education in a university start-up incubator. *Industry and Higher Education*, 35(4), 360–366. <https://doi.org/10.1177/0950422221999222>

- Mesa-Gresa, P., Gil-Gómez, H., Lozano-Quilis, J. A., & Gil-Gómez, J. A. (2018). Effectiveness of virtual reality for children and adolescents with autism spectrum disorder: An evidence-based systematic review. *Sensors (Switzerland)*, *18*(8). <https://doi.org/10.3390/s18082486>
- Meyer, H. (2020). *UBI Global World Rankings of Business Incubators and Accelerators 2019- 2020. November 2019.* <https://doi.org/10.13140/RG.2.2.16066.53441>
- Mian, S. A. (1994). US university-sponsored technology incubators: an overview of management, policies and performance. *Technovation*, *14*(8), 515–528. [https://doi.org/10.1016/0166-4972\(94\)90151-1](https://doi.org/10.1016/0166-4972(94)90151-1)
- Mian, S. A. (1996a). Assessing value-added contributions of university technology business incubators to tenant firms. *Research Policy*, *25*(3), 325–335. [https://doi.org/10.1016/0048-7333\(95\)00828-4](https://doi.org/10.1016/0048-7333(95)00828-4)
- Mian, S. A. (1996b). Assessing value-added contributions of university technology business incubators to tenant firms. *Research Policy*. [https://doi.org/10.1016/0048-7333\(95\)00828-4](https://doi.org/10.1016/0048-7333(95)00828-4)
- Mian, S. A. (1997a). Assessing and managing the university technology business incubator: An integrative framework. *Journal of Business Venturing*, *12*(4), 251–285. [https://doi.org/10.1016/S0883-9026\(96\)00063-8](https://doi.org/10.1016/S0883-9026(96)00063-8)
- Mian, S. A. (1997b). Assessing and managing the university technology business incubator: An integrative framework. *Journal of Business Venturing*, *12*(4), 251–285. [https://doi.org/10.1016/S0883-9026\(96\)00063-8](https://doi.org/10.1016/S0883-9026(96)00063-8)
- Miller, K., McAdam, R., Moffett, S., & Brennan, M. (2011). An exploratory study of retaining and maintaining knowledge in university technology transfer processes. *International Journal of Entrepreneurial Behaviour and Research*, *17*(6), 663–684. <https://doi.org/10.1108/13552551111174729>
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *BMJ (Online)*, *339*(7716),

332–336. <https://doi.org/10.1136/bmj.b2535>

- Moray, N., & Clarysse, B. (2005). Institutional change and resource endowments to science-based entrepreneurial firms. *Research Policy*, *34*(7), 1010–1027. <https://doi.org/10.1016/j.respol.2005.05.016>
- Müller, J. M., Buliga, O., & Voigt, K. I. (2018). Fortune favors the prepared: How SMEs approach business model innovations in Industry 4.0. *Technological Forecasting and Social Change*, *132*(September 2017), 2–17. <https://doi.org/10.1016/j.techfore.2017.12.019>
- Munari, F., Pasquini, M., & Toschi, L. (2015). From the lab to the stock market? The characteristics and impact of university-oriented seed funds in Europe. *Journal of Technology Transfer*, *40*(6), 948–975. <https://doi.org/10.1007/s10961-014-9385-4>
- Nicholls-Nixon, C.L., Valliere, D., Gedeon, S. A., & Al., E. (2020). Entrepreneurial ecosystems and the lifecycle of university business incubators: An integrative case study. *International Entrepreneurship and Management Journal*. https://doi.org/10.1007_s11365-019-00622-4
- Nicholls-Nixon, Charlene L., Valliere, D., Gedeon, S. A., & Wise, S. (2021). Entrepreneurial ecosystems and the lifecycle of university business incubators: An integrative case study. *International Entrepreneurship and Management Journal*, *17*(2), 809–837. <https://doi.org/10.1007/s11365-019-00622-4>
- O’Gorman, C., Byrne, O., & Pandya, D. (2008). How scientists commercialise new knowledge via entrepreneurship. *Journal of Technology Transfer*, *33*(1), 23–43. <https://doi.org/10.1007/s10961-006-9010-2>
- Öberg, C., Klinton, M., & Stockhult, H. (2020). Inside the incubator – business relationship creations among incubated firms. *Journal of Business and Industrial Marketing*, *35*(11), 1767–1784. <https://doi.org/10.1108/JBIM-12-2018-0391>
- Ometto, M. P., Gegenhuber, T., Winter, J., & Greenwood, R.

- (2019). From Balancing Missions to Mission Drift: The Role of the Institutional Context, Spaces, and Compartmentalization in the Scaling of Social Enterprises. *Business and Society*, 58(5), 1003–1046. <https://doi.org/10.1177/0007650318758329>
- Osterwalder, A., & Pigneur, Y. (2010). *Aligning Profit and Purpose Through Business Model Innovation*. 1–17.
- Overall, J., Gedeon, S. A., Valliere, D., & St, V. (2018). *What can universities do to promote entrepreneurial intent? An empirical investigation*. 10(3), 312–332. <https://doi.org/10.1504/IJEV.2016.10006912>
- Pallotta, V., & Campisi, D. (2018). *STarmac: An environment for the stimulation and development of entrepreneurial projects in academic institutions*. <https://doi.org/10.1177/0950422218784880>
- Papagiannidis, S., Li, F., Etzkowitz, H., & Clouser, M. (2009). Entrepreneurial networks: A triple helix approach for brokering human and social capital. *Journal of International Entrepreneurship*, 7(3), 215–235. <https://doi.org/10.1007/s10843-009-0038-x>
- Patton, D., Warren, L., & Bream, D. (2009). Elements that underpin high-tech business incubation processes. *Journal of Technology Transfer*, 34(6), 621–636. <https://doi.org/10.1007/s10961-009-9105-7>
- Pellegrini, M., & Johnson-Sheehan, R. (2021). The Evolution of University Business Incubators: Transnational Hubs for Entrepreneurship. *Journal of Business and Technical Communication*, 35(2), 185–218. <https://doi.org/10.1177/1050651920979983>
- Perkmann, M., Neely, A., & Walsh, K. (2011). How should firms evaluate success in university-industry alliances? A performance measurement system. *R and D Management*, 41(2), 202–216. <https://doi.org/10.1111/j.1467-9310.2011.00637.x>
- 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. *Research Policy*, *42*(2), 423–442. <https://doi.org/10.1016/j.respol.2012.09.007>
- Phan, P. H., Siegel, D. S., & Wright, M. (2005). Science parks and incubators: Observations, synthesis and future research. *Journal of Business Venturing*, *20*(2), 165–182. <https://doi.org/10.1016/j.jbusvent.2003.12.001>
- Phillips, R. G. (2002). Technology business incubators: how effective as technology transfer mechanisms? *Technology in Society*, *24*, 299–316.
- Pierrakis, Y., & Saridakis, G. (2019). The role of venture capitalists in the regional innovation ecosystem: a comparison of networking patterns between private and publicly backed venture capital funds. *Journal of Technology Transfer*, *44*(3), 850–873. <https://doi.org/10.1007/s10961-017-9622-8>
- Pittaway, L., & Cope, J. (2007). Entrepreneurship education: A systematic review of the evidence. *International Small Business Journal*, *25*(5), 479–510. <https://doi.org/10.1177/0266242607080656>
- Prokop, D. (2021a). University entrepreneurial ecosystems and spinoff companies: Configurations, developments and outcomes. *Technovation*, *107*(May 2020), 102286. <https://doi.org/10.1016/j.technovation.2021.102286>
- Prokop, D. (2021b). University entrepreneurial ecosystems and spinoff companies: Configurations, developments and outcomes. *Technovation*, *107*(March), 102286. <https://doi.org/10.1016/j.technovation.2021.102286>
- Ratinho, T., & Henriques, E. (2010). The role of science parks and business incubators in converging countries: Evidence from Portugal. *Technovation*, *30*(4), 278–290. <https://doi.org/10.1016/j.technovation.2009.09.002>
- Redondo, M., & Camarero, C. (2017). Dominant logics and the manager's role in university business incubators. *Journal of*

- Business and Industrial Marketing*, 32(2), 282–294.
<https://doi.org/10.1108/JBIM-01-2016-0018>
- Redondo, M., & Camarero, C. (2019). Social capital in university business incubators: dimensions, antecedents and outcomes. *International Entrepreneurship and Management Journal*, 15(2), 599–624.
<https://doi.org/10.1007/s11365-018-0494-7>
- Reitan, B. (1997). Fostering technical entrepreneurship in research communities: Granting scholarships to would-be entrepreneurs. *Technovation*, 17(6), 287–296.
[https://doi.org/10.1016/S0166-4972\(97\)00121-1](https://doi.org/10.1016/S0166-4972(97)00121-1)
- Robert K. Yin. (2003). *Case Study Research: Design and Methods (Applied Social Research Methods)* (3rd ed.).
- RobertK.Yin. (2009). Case Study Research Design and Methods Fourth Edition. In *SAGE Publications, Inc.* (Vol. 28, Issue 1).
<https://doi.org/300.72'2-dc22>
- Roig-Tierno, N., Alcázar, J., & Ribeiro-Navarrete, S. (2015). Use of infrastructures to support innovative entrepreneurship and business growth. *Journal of Business Research*, 68(11), 2290–2294.
<https://doi.org/10.1016/j.jbusres.2015.06.013>
- Rothschild, L., & Darr, A. (2005). Technological incubators and the social construction of innovation networks: An Israeli case study. *Technovation*, 25(1), 59–67.
[https://doi.org/10.1016/S0166-4972\(03\)00064-6](https://doi.org/10.1016/S0166-4972(03)00064-6)
- Rubin, T. H., Aas, T. H., & Stead, A. (2015a). Knowledge flow in Technological Business Incubators: Evidence from Australia and Israel. *Technovation*, 41, 11–24.
<https://doi.org/10.1016/j.technovation.2015.03.002>
- Rubin, T. H., Aas, T. H., & Stead, A. (2015b). Knowledge flow in Technological Business Incubators: Evidence from Australia and Israel. *Technovation*.
<https://doi.org/10.1016/j.technovation.2015.03.002>
- Salvador, E. (2011). Are science parks and incubators good “brand names” for spin-offs? The case study of Turin. *Journal of Technology Transfer*, 36(2), 203–232.

<https://doi.org/10.1007/s10961-010-9152-0>

- Sansone, G., Andreotti, P., Colombelli, A., & Landoni, P. (2020). Are social incubators different from other incubators? Evidence from Italy. *Technological Forecasting and Social Change*, 158(June), 120132. <https://doi.org/10.1016/j.techfore.2020.120132>
- Schwartz, M., & Hornyach, C. (2008). Specialization as strategy for business incubators: An assessment of the Central German Multimedia Center. *Technovation*, 28(7), 436–449. <https://doi.org/10.1016/j.technovation.2008.02.003>
- Secundo, G., Mele, G., Sansone, G., & Paolucci, E. (2020). Entrepreneurship Education Centres in universities: evidence and insights from Italian “Contamination Lab” cases. *International Journal of Entrepreneurial Behaviour and Research*, 26(6), 1311–1333. <https://doi.org/10.1108/IJEBR-12-2019-0687>
- Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, 16(15), 1699–1710. <https://doi.org/10.1016/j.jclepro.2008.04.020>
- Sjölundh, T., & Wahlbin, C. (2008). *Entrepreneurial students The case of students starting up*. 22(6), 441–452.
- Soetanto, D. P., & Jack, S. L. (2013). Business incubators and the networks of technology-based firms. *The Journal of Technology Transfer*, 38(4), 432–453. <https://doi.org/10.1007/s10961-011-9237-4>
- Sofouli, E., & Vonortas, N. S. (2007). S&T Parks and business incubators in middle-sized countries: The case of Greece. *Journal of Technology Transfer*, 32(5), 525–544. <https://doi.org/10.1007/s10961-005-6031-1>
- Somsuk, N., & Laosirihongthong, T. (2014). A fuzzy AHP to prioritize enabling factors for strategic management of university business incubators: Resource-based view. *Technological Forecasting and Social Change*, 85, 198–210. <https://doi.org/10.1016/j.techfore.2013.08.007>
- Sowmya, D. V., Majumdar, S., & Gallant, M. (2010). Relevance

- of education for potential entrepreneurs: An international investigation. *Journal of Small Business and Enterprise Development*, 17(4), 626–640.
<https://doi.org/10.1108/14626001011088769>
- Stayton, J., & Mangematin, V. (2016). Startup time, innovation and organizational emergence: A study of USA-based international technology ventures. In *Journal of International Entrepreneurship* (Vol. 14, Issue 3). Journal of International Entrepreneurship.
<https://doi.org/10.1007/s10843-016-0183-y>
- Stayton, J., & Mangematin, V. (2019). Seed accelerators and the speed of new venture creation. *Journal of Technology Transfer*, 44(4), 1163–1187.
<https://doi.org/10.1007/s10961-017-9646-0>
- Tang, M., Walsh, G. S., Li, C., & Baskaran, A. (2021a). Exploring technology business incubators and their business incubation models: case studies from China. *Journal of Technology Transfer*, 46(1), 90–116.
<https://doi.org/10.1007/s10961-019-09759-4>
- Tang, M., Walsh, G. S., Li, C., & Baskaran, A. (2021b). Exploring technology business incubators and their business incubation models: case studies from China. *Journal of Technology Transfer*, 46(1), 90–116.
<https://doi.org/10.1007/s10961-019-09759-4>
- Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning*, 43(2–3), 172–194.
<https://doi.org/10.1016/j.lrp.2009.07.003>
- Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, 51(1), 40–49.
<https://doi.org/10.1016/j.lrp.2017.06.007>
- Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, 14(3), 207–222.
<https://doi.org/10.1111/1467-8551.00375>
- Treanor, L., & Henry, C. (2010). Gender in campus incubation:

- evidence from Ireland. *International Journal of Gender and Entrepreneurship*, 2(2), 130–149. <https://doi.org/10.1108/17566261011051008>
- van Stijn, N., van Rijnsoever, F. J., & van Veelen, M. (2018). Exploring the motives and practices of university–start-up interaction: evidence from Route 128. In *Journal of Technology Transfer* (Vol. 43, Issue 3). Springer US. <https://doi.org/10.1007/s10961-017-9625-5>
- Vargo, S. L., & Lusch, R. F. (2014). Evolving to a new dominant logic for marketing. *The Service-Dominant Logic of Marketing: Dialog, Debate, and Directions*, 68(January), 3–28.
- Venturini, K., & Verbano, C. (2017). Open innovation in the public sector: Resources and performance of research-based spin-offs. *Business Process Management Journal*, 23(6), 1337–1358. <https://doi.org/10.1108/BPMJ-10-2016-0208>
- Verbano, C., Crema, M., & Scuotto, V. (2020). Adding the entrepreneurial orientation among the theoretical perspectives to analyse the development of research-based spin-offs. *International Journal of Entrepreneurship and Innovation*, 21(2), 113–126. <https://doi.org/10.1177/1465750319874592>
- Virtanen, M., & Laukkanen, M. (2002). Towards HEI-Based New Venture Generation. *Industry and Higher Education*, 16(3), 159–166. <https://doi.org/10.5367/000000002101296252>
- Voisey, P., Jones, P., & Thomas, B. (2013a). *The pre-incubator: a longitudinal study of 10 years of university pre-incubation in Wales*. 27(5), 349–363. <https://doi.org/10.5367/ihe.2013.0168>
- Voisey, P., Jones, P., & Thomas, B. (2013b). The Pre-Incubator: A Longitudinal Study of 10 Years of University Pre-Incubation in Wales. *Industry and Higher Education*, 27(5), 349–363. <https://doi.org/10.5367/ihe.2013.0168>
- von Zedtwitz, M. (2003). Classification and management of incubators: aligning strategic objectives and competitive

- scope for new business facilitation. *International Journal of Entrepreneurship and Innovation Management*, 3(1-2), 176-196. <https://doi.org/10.1504/ijeim.2003.002227>
- Walker, K. (2010). A systematic review of the corporate reputation literature: Definition, measurement, and theory. *Corporate Reputation Review*, 12(4), 357-387. <https://doi.org/10.1057/crr.2009.26>
- Wann, J. W., Lu, T. J., Lozada, I., & Cangahuala, G. (2017). University-based incubators' performance evaluation: a benchmarking approach. *Benchmarking*, 24(1), 34-49. <https://doi.org/10.1108/BIJ-02-2015-0018>
- Warren, L., Patton, D., & Bream, D. (2009). Knowledge acquisition processes during the incubation of new high technology firms. *International Entrepreneurship and Management Journal*, 5(4), 481-495. <https://doi.org/10.1007/s11365-009-0121-8>
- Williams, M., & Moser, T. (2019). The art of coding and thematic exploration in qualitative research. *International Management Review*, 15(1), 45-55.
- Wirtz, B. W., Pistoia, A., Ullrich, S., & Göttel, V. (2016). Business Models: Origin, Development and Future Research Perspectives. *Long Range Planning*, 49(1), 36-54. <https://doi.org/10.1016/j.lrp.2015.04.001>
- Wonglimpiyarat, J. (2016). The innovation incubator, University business incubator and technology transfer strategy: The case of Thailand. *Technology in Society*, 46, 18-27. <https://doi.org/10.1016/j.techsoc.2016.04.002>
- Woolley, J. L., & MacGregor, N. (2021). The Influence of Incubator and Accelerator Participation on Nanotechnology Venture Success. *Entrepreneurship: Theory and Practice*. <https://doi.org/10.1177/10422587211024510>
- Zedtwitz, M., & Grimaldi, R. (2006). Are service profiles incubator-specific? Results from an empirical investigation in Italy. *Journal of Technology Transfer*, 31(4), 459-468. <https://doi.org/10.1007/s10961-006-0007-7>
- Zhang, Z., Zhu, L., Chen, G., Shang, L., Zhao, Q., & Ren, F.

- (2021). How entrepreneurial team heterogeneity impacts decision-making performance? An input-process-output approach. *Chinese Management Studies*, 20. <https://doi.org/10.1108/CMS-12-2020-0564>
- Zobnina, M., Korotkov, A., & Rozhkov, A. (2019). Structure, challenges and opportunities for development of entrepreneurial education in Russian universities. *Foresight and STI Governance*, 13(4), 69–81. <https://doi.org/10.17323/2500-2597.2019.4.69.81>
- Zott, C., Amit, R., & Massa, L. (2011). The business model: Recent developments and future research. *Journal of Management*, 37(4), 1019–1042. <https://doi.org/10.1177/0149206311406265>