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Are Social Incubators different from other incubators? Evidence from Italy

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Abstract
This paper defines and analyses incubators that mainly support start-ups with a significant social impact. In 2016, a survey was conducted on the 162 incubators active in Italy, and a total of 88 responses were received. An analysis of the literature and of this dataset led to the identification of three types of incubators: Business, Mixed, and Social. Thirty of the respondents sent information on their tenants. Thanks to the data regarding 247 tenants, it was possible to analyse the impact of the three different types of incubators (Business, Mixed, and Social) on the tenants' growth through OLS regression analyses. A Social Incubator is here defined as an incubator that supports more than 50% of start-ups that aim to introduce a positive social impact. The study shows that Social Incubators perceive social impact measurement and training/consulting on business ethics and CSR as being more important services than other incubator types. The regression analyses explain that Social Incubators are as efficient as other incubators, in terms of tenants' economic growth, notwithstanding the focus of Social Incubators on start-ups that do not pursue only economic objectives. Finally, this study indicates that policymakers can foster Social Incubators to support social entrepreneurship.

Keywords Incubators; Accelerators; Social Start-up; Social Entrepreneurship; Social Innovation; Entrepreneurship

1. Introduction

Since entrepreneurship represents a driver of social and economic development (Van Praag and Versloot, 2007; Acs et al., 2008; Hessels et al., 2008; Zahra and Wright, 2016), entrepreneurial support activities are growing (Feldman, 2001; Amezcua et al., 2013; Cohen et al., 2019). Incubators[1] play a central role in these support activities (Colombo and Delmastro, 2002; Albort-Morant and Ribeiro-Soriano, 2016; Mian et al., 2016), and foster entrepreneurial teams and start-ups to survive and grow by providing several services from space and capital to human capital training and support (Aernoudt, 2004; Grimaldi and Grandi, 2005; Aerts et al., 2007). The support benefits offered by incubators are likely to be linked to several human capital improvements for start-ups (Pandey et al., 2017).

Several studies have shown that incubators can decrease the failure rate of start-ups (e.g., European Commission, 2002). This indicates that incubators encourage innovation and regional development (Phan et al., 2005; Hochberg and Fehder, 2015; Mas-Verdú et al., 2015). For instance, one of the most famous incubators, Y Combinator, has

[1] Some authors prefer to use the terms "incubator" and "accelerator" as synonyms, while others consider the two concepts as being distinct from each other. The main differences between an accelerator and an incubator are that the latter focuses more on providing office space and in-house support, and its incubation time is longer (Bruneel et al., 2012; Pauwels et al., 2016). Moreover, in accelerators, tenants start their programmes together, while they do not do so in incubators (Cohen and Hochberg, 2014). However, since accelerators have the same aim as incubators (Mian et al., 2016) and the differences are not always straightforward, in this work the term incubator also includes accelerators.

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supported start-ups (e.g., Dropbox and Airbnb) which now have a combined value of over $80 billion (Y Combinator Press, 2018).

Policymakers and private organisations also foster the creation of incubators (Messeghem et al., 2018; Nordling et al., 2020). According to Mustar and Wright (2010), the French Ministry of Research encouraged the creation of incubators over the 2004-2006 period by allocating €25 million through the support of European Social Funds.

In short, incubators represent an effective instrument for encouraging innovation and entrepreneurship (Aerndout, 2004; Aerts et al., 2007) and are still increasing throughout the world (Pauwels et al., 2016; Messeghem et al., 2018). Station F in Paris in 2017 (Colombo et al., 2018) and Indie Bio in San Francisco in 2014 are only two of the recent and significant international examples.

The characteristics of incubators are continuously evolving (Bruneel et al., 2012; Pauwels et al., 2016) and research on this evolution is still needed (Pauwels et al., 2016), especially in terms of services offered (Mian et al., 2016) and their impact on tenants (Barbero et al., 2012).

Some incubators are now focusing on supporting start-ups which have the aim of introducing a positive social impact (Sonne, 2012; Nicolopoulou et al., 2017; Pandey et al., 2017). These start-ups can be defined as hybrid-organisations that aim to realize both social and environmental returns and financial returns (Doherty et al., 2014; Leborgne-Bonassié et al., 2019). The Unreasonable Institute, which was established in East Africa in 2013 (Pandey et al., 2017), and Yunus Social Business[2], set up in Germany in 2011, are two examples. Although different types of incubators have been analysed in the literature, (see Mian et al., 2016 for a recent literature review) only a few studies (Sonne, 2012; Nicolopoulou et al., 2017; Pandey et al., 2017) have investigated the characteristics of social incubators (Galbraith et al., 2019). This typology of incubator is quite new and a clear definition is not available in the literature. Even the existing papers on social incubators suggest that further studies are needed since they represent a new emerging theme (Nicolopoulou et al., 2017; Pandey et al., 2017). Moreover, the differences between social incubators and the other types of incubators – if any – have not yet been examined.

This research aims to fill these gaps by examining the Italian incubator ecosystem through empirical analyses. In 2017, the authors identified all the Italian incubators that were operating in 2016 (162) and sent a survey to all of them. A representative and high response rate of 54% was obtained (88 incubators). This study, which makes reference to the obtained data, presents the characteristics of the diffusion of Italian incubators. Of the 88 respondents, 30 also sent their tenants' names, for a total of 407 tenants who were supported in 2016. It was then possible to calculate the growth of 247 out of 407 tenants from 2015 to 2016. This paper, on the basis of the data regarding these 247 tenants, analyses the impact of different types of incubators (Business, Mixed, and Social) on tenants' growth through OLS regression analyses. The revenues' and employees' growth (from 2015 to 2016) were used to study the tenants' growth. To do this, a taxonomy of incubators (Business, Mixed, and Social) was developed and the human capital theory was applied, as a theoretical construct, to these three different types of incubators. A definition of what a Social Incubator is has been drawn up in this taxonomy. The study also shows that Social Incubators perceive social impact measurement and training/consulting on business ethics and Corporate Social Responsibility (CSR) as being more important services than other incubator types. The regression analyses indicate that Social Incubators are as efficient as the other incubator types (Business and Mixed), in terms of tenants' growth, despite their focus on supporting tenants that are not exclusively interested in economic performances.

The paper is structured as follows. The next section offers a review of the literature on incubators. It presents an overview of the studies on incubators, an analysis of the few studies on social incubators and the contribution of this paper to the literature. Section 3 presents the research design, and the taxonomy and the definition of Social

[2] Yunus Social Business was established in Germany in 2011 for social entrepreneurs working in seven developing and emerging countries, http://www.yunussb.com/.

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Incubator are developed. Section 4 is dedicated to the analysis of the results, which were obtained by means of both qualitative and quantitative analyses. Section 5 discusses the results and the empirical data that supported the research on the definition of the phenomenon of Social Incubators. Section 6 presents the conclusions and implications of this work as well as the limits and suggestions for future research.

2. Literature review

2.1 Overview of the studies on incubators

Several studies have examined the concept and the evolution of incubators. Hackett and Dilts (2004) defined incubators as "enterprises that facilitate the early-stage development of firms by providing office space, shared services and business assistance". Hausberg and Korreck (2020) highlighted that the concept of incubators encompasses a heterogeneous range of institutions characterised by different aims, types and models. Hausberg and Korreck (2020) have given a broader definition of incubators as organisations that "support the foundation and/or growth of new businesses as a central element of their organizational goal".

Aerts et al., (2007) stated that incubators are an important instrument to stimulate innovation and entrepreneurship. Cavallo et al., (2019) and Colombelli et al., (2019) showed that incubators are important to set up an entrepreneurial ecosystem. These results are primarily due to the fact that incubators offer a safe environment in which start-ups can survive (Messeghem et al., 2018) and develop (Hackett and Dilts, 2004). Their wide offer of services, which varies from basic physical infrastructure to added value services (e.g., human capital training), is essential for the creation and growth of start-ups (Rice 2002; Marvel and Lumpkin, 2007; Mas-Verdù et al., 2015). Xiao and North, (2018) found that Chinese incubators had a positive impact on all the stages of innovation activity across all regions as a result of their technical and financial services.

Since collaboration and networking are crucial for the performance of innovative start-ups (Hahn et al., 2019), many incubators support start-ups by leveraging on their business and social relationships with both external stakeholders and within the incubator itself (Bøllingtoft and Ulhøi, 2005; Apa et al., 2017). Yang et al., (2009) suggested that incubators stimulate tenants' growth by creating a clustering effect and by establishing connections between start-ups and various other organisations. The tenants within an incubator help each other in creating close collaborations, and these can be leveraged on by generating learning communities (Branstad and Saetre, 2016). The networking effect is particularly effective for incubators linked to universities. Such incubators can in fact help academic institutions improve their technology transfer activities (Markman et al., 2005; Rothaermel and Thursby, 2005; Sharif, 2012; Villani et al., 2017; Soetanto and van Geenhuizen, 2019). Accordingly, several universities are establishing their own incubators in order to set up "entrepreneurial universities" (Dalmarco et al., 2018).

Most studies in the literature have found that incubators are a fundamental instrument for tenants' performances (Mian et al., 2016). Only a few studies have highlighted a negative or no significant effect of incubation on sales revenues and job creation (e.g., Lukeš et al., 2019). On the basis of a survey conducted in Italy, Colombo and Delmastro (2002) found that tenants have higher growth rates (in terms of the number of employees) than their off-incubator counterparts, as a result of the provision of added value to start-ups. These empirical results were also confirmed by Lindelöf and Löfsten (2002), who found that new on-incubator technology-based firms show better performance, in terms of employment and sales growth. These results can also be derived from the human capital theory (Cooper et al., 1994; Gimeno et al., 1997; Becker 2009), since incubators offer several services that are able to improve management know-how and industry-specific know-how (Pandey et al., 2017).

Many investments have been made in the last decade to support and foster the creation of start-ups (Henry and Treanor, 2013). These investments are also aimed at improving the entrepreneurial ecosystem through the creation

of business clusters (Messeghem et al., 2018; Varano et al., 2018). National and European governments are putting considerable efforts into supporting incubators (Aerts et al., 2007). These initiatives may have an indirect positive effect on start-ups. As explained by Colombo and Delmastro (2002), tenants have easier access to government grants than their off-incubator counterparts. Atherton and Hannon (2006) pointed out that the UK government has supported incubators since the late 1990s and that many different incubator types and models have been created. These policies have been aimed at supporting the incubators themselves, and the economic and social development of the regions around them (e.g., Gibson and Naquin, 2011).

Since incubators play a central role in supporting entrepreneurship (e.g., Colombo and Delmastro, 2002) and policymakers foster their creation (e.g., Aerts et al., 2007), the number of incubators in the world has risen (Cohen et al., 2019). Tsai et al., (2009) and Bruneel et al., (2012) explained that incubation services are continuously evolving and that there are different types and models of incubators.

Table 1 presents the types and models of incubators in the literature, ordered by year of publication. The types of incubators are distinguished by their governance or by their tenants. A corporate incubator is one example of a type of incubator. Another example is a university incubator. An incubation model describes the way in which the incubator works, and more in general the rationale behind how it creates, delivers and captures value. A low selective incubator is an example of an incubation model, as suggested by Clarysse et al., (2005).

Table 1. Types and models of incubators

Year	Author	Types of incubators	Incubation models
1985	Cooper; Allen and Rahman; Plosila and Allen	Business incubators.	
1987	Smilor	Corporate incubators.	
1990	Allen and McCluskey	Four types of incubators: for-profit property development; non-profit development corporation; academic; for-profit seed capital.	
2000	Nowak and Granthamr	Virtual incubators.	
2002	European Commission	Four types of incubators: business and innovation centres; science/technology park incubators; specialised incubators (e.g. rural); other types.	
2004	Aernoudt	Five types of incubators: mixed; economic development; technology; social; basic research.	
2005	Bøllingtoft and Ulhøi	Networked incubators.	
2005	Carayannis and von Zedtwitz	Five types of incubators: regional business; university; independent commercial; company internal; virtual incubators.	
2005	Clarysse et al.		Three distinct incubation models: low selective; supportive; incubator.
2005	Grimaldi and Grandi	Four types of incubators: business innovation centres; university business incubators; independent private incubators; corporate private incubators.	Two distinct incubation models: public (business innovation centres) and private (independent private incubators and corporate private incubators).
2006	von Zedtwitz and Grimaldi	Five types of incubators: university; regional business; company-internal; independent commercial; virtual incubators.	

2012	Barbero et al.	Four types of incubators: basic research; university; economic/regional development; private incubators.	
2016	Adomdza	Student-run accelerators.	
2016	Pauwels et al.	Accelerators.	
2017	Mrkajic		Two distinct incubation models: nascent and seed.
2019	Moschner et al.		Four models of corporate accelerators: in-house accelerator; hybrid accelerator; powered by accelerator; consortium accelerator.

These types and models are usually focused on business incubators that support 'traditional' start-ups. Aerts et al., (2007) mentioned that incubators that are specialised in a limited number of sectors and services may be more competitive, since they become a concentration of high competences and may offer complementary assets to their tenants, as proposed in Teece's work (Teece, 1986). In this context, some incubators have recently focused on supporting start-ups which have the aim of introducing a positive social impact (Sonne, 2012; Casasnovas and Bruno, 2013; Pandey et al., 2017). The few studies on social incubators are analysed in the following sub-section.

2.2 Social incubators

Even though social entrepreneurship (Miller et al., 2012; Fugate et al., 2019) and its support activities (Arena et al., 2018; Leborgne-Bonassié et al., 2019) are increasing throughout the world, little attention has been paid to social incubators (Galbraith et al., 2019).

Aernoudt (2004) was the first to introduce the concept of social incubators. According to Aernoudt (2004), social incubators offer the same services as other incubators, but have a different mission. The author explained that the aim of social incubators "is to stimulate and to support the development, growth and continuity of companies employing people with low employment capacities" (p. 129). A similar definition was used by Etzkowitz et al., (2005). Sonne (2012), instead, gave a broader definition. According to the author, social incubators are those that support social entrepreneurs. Casasnovas and Bruno (2013) defined social incubators in a similar way as "programs that support the scaling process of organizations that mainly target social challenges through innovative and market-oriented solutions". Pandey et al., (2017) applied a similar definition.

Sonne, (2012), through a case study on India, found that a social incubator is an important instrument to foster social entrepreneurs. Social incubators can provide financial and non-financial support to help tenants attract additional finance and/or to commercialise an innovation that has to be launched onto the market. Arena et al., (2018) and Battisti (2019) stated that incubators may promote the creation and growth of social tech start-ups, as a result of their services.

Nicolopoulou et al., (2017) discovered that social incubators emphasise the importance of social capital through dyadic value-based partnerships and collaboration activities between incubators, tenants and stakeholders. These activities are driven by social innovation, with the aim of having a social impact. According to Eichler and Schwarz (2019), this can derive from fostering one of the five specific aspects of social innovation. These five aspects are: social need; innovative element; implementation and execution; improvement; relationships and collaborations.

Pandey et al., (2017) defined several key services of social incubators, such as training, mentorship, networking with customers, partners and entrepreneurs, direct funding with seed capital, indirect funding with access to investors, and building reliability and awareness. From a worldwide database of 4,000 social entrepreneurs and 55 social incubator programmes, Pandey and colleagues showed that these key services can have different

relationships, according to the human capital of the start-up founding team, as well as a significant social impact. The authors found, for instance, that, on the one hand, mentorship has a positive relationship with a higher educational level of the founding team but, on the other hand, it has a negative relationship with those teams that have a high level of management experience. These results may be due to the fact that teams with a higher education level are more able to assimilate the notions of their mentors, while teams with more management experience are likely to have pre-existing experience and are less inclined to learn from mentors. Pandey et al., (2017) found these results by considering the theoretical groundings of population ecology, the sponsorship theory and human capital theory perspectives.

Casasnovas and Bruno (2013) stated that social incubators are extremely important for the development of social entrepreneurship. The authors explained that social incubators have a positive impact on the development of social start-ups, as they increase their possibility of surviving and of scaling their business.

Klofsten et al., (2020) highlighted that, among their tenants, sustainability-oriented incubators have start-ups that do not focus primarily on the offering of green products and services. This may be due to the fact that these incubators appear to be more attractive to such actors as funders and authorities because of their image, reputation and possible benefits. It appears that there may be mixed incubators in the incubation ecosystem that support both social start-ups and more 'traditional' ones.

2.3 Contribution of the paper

Although the literature has analysed different types and models of incubators (Mian et al., 2016), only a few studies have investigated social incubators (Galbraith et al., 2019) and, there is no clear definition of what a social incubator is. In addition, the differences between social incubators and the other types of incubators, if any, have not yet been analysed.

This research aims to fill these gaps by analysing Social Incubators and other types of incubators. First, this study presents a definition of what a Social Incubator is. Then, according to this definition, some key characteristics of Social Incubators, which are different from those of other incubators, are presented. Finally, the impact of different types of incubators (Business, Mixed, and Social) on tenants' performances is evaluated.

3. Research design

3.1 Sample and data collection

Like similar studies (e.g., Tsai et al., 2009), this research has focused on one specific country – Italy – to reduce the impact of different national policies (Barbero et al., 2012).

An updated Italian database was developed on the basis of previously made lists of Italian incubators (Colombo and Delmastro, 2002; Grimaldi and Grandi, 2005; Cavallo et al., 2018). The database was updated with several lists, such as certified Italian incubators[3], PNICube[4] and Italia Start-up associations[5]. Overall, a population of 162 incubators, operating in 2016, was identified.

[3] The certified Italian incubators are the Italian incubators that are recognised by law, see the link: http://startup.registroimprese.it/isin/static/startup/index.html?slideJump=33.
[4] PNICube is an Italian association of incubators and business plan competitions. PNICube presents a list of Italian incubators at: http://www.pnicube.it/enti-associati/.
[5] Italia Startup is a non-profit association that supports and gives voice to the Italian start-up ecosystem. Italia Startup presents a list of Italian incubators at: http://www.italiastartup.it/soci/?ct=acceleratore_incubatore.

An online survey, based on the literature, was then created on SurveyMonkey. The survey was also tested and developed by a specialised committee composed of members of Italian incubators and entrepreneurial associations working with incubators and start-ups. In the summer of 2017, the final version was submitted to the Italian population of incubators operating in 2016.

Out of the 162 contacted incubators, 94 answered, although some of the answers were incomplete and/or incorrect. After an examination of the responses, 88 were considered valid. A representative response rate of 54% was thus reached. This high response rate was achieved thanks to the work of four researchers and the specialised committee.

Like other studies based on Italian data (e.g., Cucculelli and Bettinelli, 2015; Lasagni et al., 2015), this study has used the AIDA database in order to gather financial information on incubators and tenants. The AIDA database is the Italian version of the Amadeus-Bureau Van Dijk database and contains financial data from the Italian chambers of commerce.

In addition to the online survey, a list of names of the tenants supported by the incubators in 2016 was obtained. Thirty out of the 88 respondents sent their tenants' names for the year 2016, for a total of 407 tenants. Initially, there were nearly 450 tenants' names. Since this study has focused on start-ups, those founded before 2011 were excluded. In fact, five years is the limit set by Italian law for a start-up (Italian Government, 2012). In several cases, it was not possible to find financial information about the tenants because they were only entrepreneurial teams at that time, and they had not yet founded organisations. For these reasons, 407 tenants from 88 incubators were used for the descriptive analyses. Some of these tenants were founded in 2016 or 2017, and it was therefore impossible to calculate their growth from 2015 to 2016. In the end, 247 tenants from 30 different incubators were considered for the analyses of tenants' growth.

In the following sections, this study refers to the 162 incubators with the term "population", to the 88 incubators with the term "sample 1" and to the 30 incubators that provided the list of their tenants with the term "sample 2".

3.2 Methodology

The Italian incubator ecosystem and the characteristics and types of incubators are presented with reference to the population and sample 1. The qualitative analyses describe the geographical distribution and the legal form of the population. The aggregated revenues of the Italian incubators were estimated considering the data supplied by AIDA for the year 2016.

As a result of the survey, it was possible to analyse the typology of incubators and present a taxonomy. The survey in fact included a question on how many start-ups each incubator supported in 2016 and how many of those were aimed at introducing a positive social impact. The following Table 2 was drawn up with such information.

Table 2. Taxonomy of incubators (Business, Mixed and Social)

Label	Definition
Business Incubators	Incubators that do not support start-ups that have the aim of introducing a positive social impact.
Mixed Incubators	Incubators that support from 1 to 50% of start-ups that have the aim of introducing a positive social impact.
Social Incubators	Incubators that support more than 50% of start-ups that have the aim of introducing a positive social impact.

This taxonomy was also derived after informal meetings with specialised committees.

In order to develop this taxonomy, the paper applied the human capital theory as a theoretical construct, as suggested in previous papers on this topic (e.g., Pandey et al., 2017). The human capital theory was applied to this

table, since incubators may focus on supporting different start-ups according to their services (e.g., education and training) and their know-how (e.g., knowledge on social innovation). The human capital theory (Becker, 1994; Colombo and Grilli, 2005) suggests that an organisation may have different structures as a result of its knowledge and competences. An incubator can in fact be classified as a specific type on the basis of its human capital characteristics. The differential focus on training services, business management support and technological expertise for start-ups are some examples of these characteristics.

Information on the tenants was also considered for sample 2. Some descriptive analyses were performed for this sample with information pertaining to 407 tenants.

In order to understand whether Social Incubators are different from the other types of incubators, the impact of the different types of incubators (Business, Mixed, and Social) on tenants' growth was analysed with information regarding 247 tenants. Since the use of the survival rate has been criticised (e.g., Siegel et al., 2003; Barbero et al., 2012), the impact of incubator types on the growth of revenues and employees was examined in the same way as in other similar studies (e.g., Peña, 2004; Lukeš et al., 2019). In order to perform this analysis, OLS regression analyses were applied, since no panel dataset was available and the dependent variables were not dummy variables (Angrist and Pischke, 2009).

3.2.1 Regression variables

The dependent variables were the tenants' growth measured considering the growth in revenues and employees from 2015 to 2016. In order to perform a robust OLS regression analysis, several variables were considered.

Since OLS regression analyses do not require a normal distribution, the tenants' revenue growth rate was defined as follows:

$$(1)\ \ tenant_growth_revenues1_i = \frac{tenant_revenues_{\ i,t=2016} - tenant_revenues_{i,t=2015}}{tenant_revenues_{i,t=2015}}$$

As a robustness check, *tenant_growth_revenues1* was also used without outliers. Any *tenant_growth_revenues1* outside the 90 percentile was excluded from this check.

According to previous empirical works (e.g., Bottazzi et al., 2007), the following tenants' revenue growth rates were also considered:

$$(2)\ \ tenant_growth_revenues2_i = \ln\left(1 + revenues_{i,t=2016}\right) - \ln\left(1 + revenues_{i,t=2015}\right)$$

$$(3)\ \ tenant_growth_revenues3_{i,j,k} = tenant_growth_revenues2_i - \frac{1}{N}\sum_{i=1}^{n} tenant_growth_revenues_2_{i,j,k}$$

where N is the total number of tenants in region *j* and sector *k*. The second level of Nomenclature of Territorial Units for Statistics (NUTS) in Italy was used for region *j*, while the tenants' sector digit 1 from AIDA was considered for sector *k*. The latter tenants' growth rate effectively removes any average local and technology trends.

As a robustness check, *tenant_growth_revenues2* and *tenant_growth_revenues3* were also used, excluding any outliers outside the ± 3*standard deviation of their respective revenue growth distributions.

Finally, the tenants' employee growth rate was defined as follows:

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$$(4)\ tenant_growth_employees_i = \frac{number\ of\ employees_{\ i,t=2016} - number\ of\ employees_{i,t=2015}}{number\ of\ employees_{i,t=2015}}$$

Tenant_growth_employees without outliers was used as a robustness check. The *tenant_growth_employees* outside the 90 percentile was excluded from this check.

The considered predictor variables were the type of incubators (Business, Mixed, and Social), according to the taxonomy. Several control variables on incubators and start-ups were included.

The following Table 3 presents all the variables considered in the analyses.

Table 3. Description of the regression variables

Type	Name	Definition
Dependent	Tenant_growth_revenues1$_i$	(2016 revenues – 2015 revenues) / 2015 revenues for each tenant *i*
	Tenant_growth_revenues1_noOutlier$_i$	(2016 revenues – 2015 revenues) / 2015 revenues for each tenant *i* inside the 90 percentiles
	Tenant_growth_revenues2$_i$	ln(1+2016 revenues) - ln(1+2015 revenues) for each tenant *i*
	Tenant_growth_revenues2_noOutlier$_i$	ln(1+2016 revenues) - ln(1+2015 revenues) for each tenant *i*, but excluding the growth outside a ± 3 * standard deviation
	Tenant_growth_revenues3$_i$	Tenant_growth_revenues2 – the tenants' mean of the same region and sector for each tenant *i*
	Tenantp_growth_revenues3_noOutlier$_i$	Tenant_growth_revenues2 – the tenants' mean of the same region and sector for each tenant, excluding the growth outside a ± 3 * standard deviation for each tenant *i*
	Tenant_growth_employees$_i$	(#2016 employees - #2015 employees) / #2015 employees for each tenant *i*
	Tenant_growth_employees_noOutlier$_i$	(#2016 employees - #2015 employees) / #2015 employees for each tenant *i* inside the 99 percentiles
Predictors	Inc_types_social$_i$	Dummy variable = 1, if tenant *i* is supported by a Social Incubator
	Inc_types_mixed$_i$	Dummy variable = 1, if tenant *i* is supported by a Mixed type incubator
	Inc_types_business$_i$	Dummy variable = 1, if tenant *i* is supported by a Business type incubator
Control – Incubators	Inc_employees$_i$	Number of employees of the incubator supporting tenant *i*
	Inc_logfunding_tenants$_i$	Funding received by all the tenants in 2016 in the incubator supporting tenant *i* expressed in log form
	Inc_uni$_i$	Dummy variable = 1, if the incubator supporting tenant *i* is associated with a university
	Inc_age$_i$	Age of the incubator supporting tenant *i*
	Inc_legalStatus$_i$	The legal status of the incubator supporting tenant *i*. 1 = public; 2 = private; 3 = public-private
Control – Tenant	Tenant_age$_i$	Tenant's age
	Tenant_logrevenues 2016$_i$	Tenant's revenues in 2016 expressed in log form
	Tenant_employees 2016$_i$	Tenant's number of employees in 2016
	Tenant_sector$_i$	Tenant's sector (AIDA digit 1)
	Tenant_region$_i$	Tenant's region (NUTS 2 Italy)

4. Results

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4.1 Italian incubator ecosystem, characteristics and types of incubators

Figure 1 presents a map of the locations of the Italian incubators operating in 2016.

Figure 1. Italian incubator ecosystem. No. = 162

Figure 1 shows that 60% of the population is located in the north of the country.

The population was also studied considering its legal form on the basis of the corporate structure of the incubators, as indicated in AIDA. This analysis identified three legal forms. Public incubators: organisations managed exclusively by public administrations; public-private incubators: organisations whose company structure includes both public and private shareholders; and private incubators: organisations managed exclusively by private actors. The results indicated that the majority of Italian incubators are private (63%). This result is in line with Nowak and Grantham (2000) who, in 2000, stated that, in the future, private incubators would have been the most widespread. However, Barbero et al., (2012), with reference to Spain, showed that the majority of incubators were public.

As far as sample 1 is concerned, it was first checked, through t-test analyses (95% confidence), that the sample was representative of the population. Table 4 presents the number and the percentage of different incubator types in sample 1 according to the taxonomy.

Table 4. Types of incubators in sample 1. No. = 83

Incubator types	**#**	**%**
Business Incubators	40	48%
Mixed Incubators	33	40%
Social Incubators	10	12%

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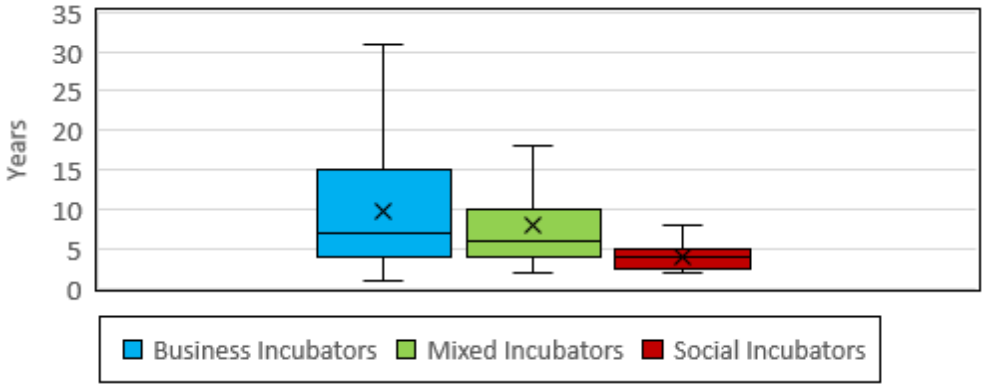
Total[6]	*83*	*100%*

Table 4 shows that little more than half of sample 1 (52%) supported start-ups with the aim of introducing a positive social impact (Mixed and Social Incubators).

The data highlight a growing trend in the number of Italian incubators in recent years. This aspect may be an effect of the "Decreto crescita 2.0" of 2012 (Italian Government, 2012) whereby the government encouraged the creation of incubators.

Figure 2 shows that Social Incubators are a recent phenomenon in Italy.

Figure 2. Age by incubator types - sample 1. No. = 83



As far as the number of employees is concerned, Italian incubators are small organisations. Their mean is 4.8 and their median is 3. This value is lower than the mean found by Aerts et al., (2007), which was equal to 12.

In the questionnaire, the incubators were asked about the importance of 10 services they offer. These services are aimed at improving such human capital resources as the knowledge, information, ideas, skills and health of the supported start-ups. The measurement scale ranged from 0 = not important at all to 3 = very important. The list of services was based on a literature review (e.g., Vanderstraeten and Matthyssens, 2012) as well as on two services correlated with the supported start-ups that aim to introduce a positive social impact. The list was comprised of 10 services: managerial support; physical spaces and shared services; entrepreneurial and managerial education; access to finance; administrative and legal services; Intellectual Property (IP) management support; networking; technology development and scouting support; social impact measurement services; training/consulting on business ethics and CSR.

[6] The total is not 88 because five incubators did not answer the question on how many start-ups they supported in 2016.

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Figure 3. Incubator services – sample 1. No. = 88

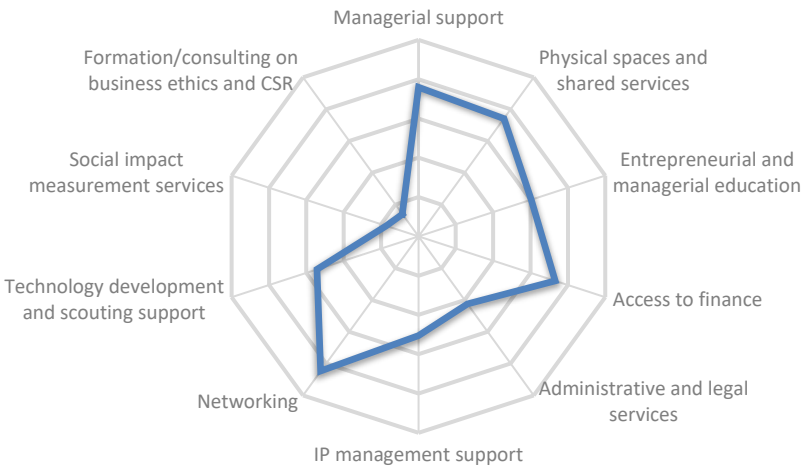
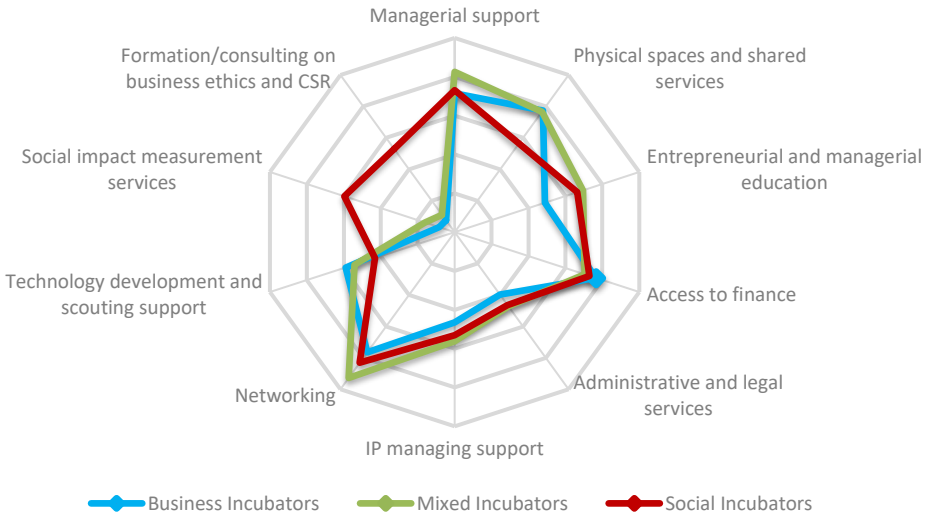


Figure 3 points out that incubators in general consider managerial support, physical spaces and shared services, access to finance, networking, and entrepreneurial and managerial education as being important. In line with the literature (Tötterman and Sten, 2005; Ebbers, 2014; Dutt et al., 2016; Cantù, 2017; Theodoraki et al., 2018), Figure 3 shows that networking is a key service for incubators. Nowak and Grantham (2000) suggested that a successful incubator environment should offer experienced business and management advice and mentoring, as well as access to professional expertise. Figure 3 confirms Nowak and Grantham's suggestions (2000). As far as the physical spaces and shared services are concerned, it is interesting to note that some incubators answered that these services were not important for them. This may indicate that some of them are virtual incubators[7]. Finally, the incubators on average gave little importance to social impact measurement services and training/consulting on business ethics and CSR.

It is interesting to analyse these 10 services considering the different types.

Figure 4. Incubator services by types – sample 1. No. = 83



[7] Virtual incubators have the aim of supporting and developing start-ups without any physical services (Nowak and Grantham, 2000; Carayannis and von Zedtwitz, 2005; von Zedtwitz and Grimaldi, 2006).

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Figure 4 points out that Social Incubators consider social impact measurement and training/consulting on business ethics and CSR more important than other types of incubators, while Mixed and Social Incubators give more importance to entrepreneurial and managerial education.

Surprisingly, less than half of the Social Incubators (44%) have social impact metrics for their tenants.

Only 23.5% of the incubators invested in their tenants. It is interesting to note that the incubators that invested in their tenants consider the administrative and legal services more important than those that did not invest. This result may be due to the fact that investors usually have both administrative and legal knowledge.

4.2 The impact of different incubators (Business, Mixed, and Social) on their tenants' performances

T-tests were conducted to show that sample 2 is representative of the population, in terms of the number of employees and revenues (t-test, 95% confidence).

Overall, 407 tenants were considered for the descriptive analyses of sample 2. The data indicate a mean of 13.57 tenants per incubator, which is in line with the previous information on sample 1 (mean of 14). In 2016, these 407 tenants employed 310 workers and earned revenues of €47 million. Using these values, it was estimated that Italian tenants employed more than 5,000 workers, and their revenues were about €320 million. On the basis of their year of foundation, the tenants' information shows that there is a growing trend. Almost half of the tenants (42%) operate in information and communication services. The second most represented sector pertains to professional, scientific and technical activities (26%). This may suggest that some incubators are related to universities. The third sector is the manufacturing sector (17%), probably due to the economic nature of Italy, which is characterised by a significant manufacturing industry (Federico, 2014).

Several regression analyses were carried out on sample 2 and on the AIDA data regarding 247 tenants in 2015 and 2016. These analyses were conducted to understand whether there is a different impact on the tenants' performances according to the type of incubator (Business, Mixed, or Social). Table 5 presents descriptive information of the variables.

Table 5. Descriptive information of the variables

Name	Source	Observations	Mean	Median	S.D.	Min	Max
Tenant_growth_revenues1	AIDA	245	3.6087	0.2427	21.0687	-1.0000	306.0497
Tenant_growth_revenues1_noOutlier	AIDA	220	0.6296	0.0073	1.3383	-1.0000	4.8217
Tenant_growth_revenues2	AIDA	245	0.0898	0.0944	0.8715	-5.2695	2.4843
Tenant_growth_revenues2_noOutlier	AIDA	239	0.1969	0.1087	0.5367	-2.1942	2.4843
Tenant_growth_revenues3	AIDA	245	0.0000	0.0000	0.7313	-4.3210	2.4988
Tenant_growth_revenues3_noOutlier	AIDA	239	0.0425	0.0000	0.5032	-1.9874	2.0472
Tenant_growth_employees	AIDA	208	0.3102	0.0000	0.8703	-1.0000	5.3333
Tenant_growth_employees_noOutlier	AIDA	206	0.2615	0.0000	0.7185	-1.0000	3.0000
Inc_types_social	Survey	247	0.2551	0.0000	0.4368	0.0000	1.0000
Inc_types_mixed	Survey	247	0.6356	1.0000	0.4822	0.0000	1.0000
Inc_types_business	Survey	247	0.1093	0.0000	0.3127	0.0000	1.0000
Inc_employees	Survey	247	10.0000	8.0000	7.5493	0.0000	24.0000
Inc_logfunding_tenants	Survey	205	6.3818	6.5441	0.9681	0.0000	7.2305
Inc_uni	Survey	247	0.4130	0.0000	0.4933	0.0000	1.0000
Inc_age	Survey	247	12.2591	14.0000	7.1059	1.0000	31.0000
Inc_legalStatus	Survey	247	2.3401	2.0000	0.7254	1.0000	3.0000
Tenant_age	AIDA	247	2.4008	2.0000	1.1848	1.0000	5.0000

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Tenant_logrevenues 2016	AIDA	200	10.8041	1.9780	1.9780	4.4188	15.6652
Tenant_employees 2016	AIDA	227	3.1938	1.0000	5.9278	0.0000	63.0000
Tenant_sector	AIDA	247	5.5587	6.0000	1.9200	0.0000	9.0000
Tenant_region	AIDA	247	8.5789	4.0000	6.4620	1.0000	20.0000

As can be seen in Table 5, the tenants' growth rates without outliers seem to be more reliable.

Table 5 also shows that, on average, 25.51% of the tenants were supported by Social Incubators (*Inc_types_social*). Mixed Incubators (*Inc_types_mixed*) supported 63.56% of the tenants and Business Incubators (*Inc_types_business*) supported 10.93% of the tenants.

T-tests were also used to first verify whether Social Incubators are as efficient as the other types (Mixed and Business), despite their focus on start-ups that are not only interested in economic performances. The t-tests were based on the average of the revenues and employees of the Social Incubator tenants versus the other types of incubators. The dependent variables for the t-tests were the four dependent variables presented in the methodology. Null hypotheses of these t-tests cannot be rejected with a level of significance of 0.05. These results suggest that Social Incubators are as efficient as other incubators.

Tables 6 and 7 present several regression analyses conducted to confirm these results.

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Table 6. OLS regression analyses of the tenants' revenue growth – Social vs. other incubators

Dependent variable:	Tenant_growth_revenues1_noOutlier		Tenant_growth_revenues2_noOutlier		Tenant_growth_revenues3_noOutlier							
	(1)		**(2)**		**(3)**		**(4)**		**(5)**		**(6)**	
	Model 1		**Model 2**		**Model 3**		**Model 4**		**Model 5**		**Model 6**	
Inc_types_social	0.295	(0.365)	0.359	(0.456)	0.073	(0.135)	0.107	(0.182)	0.015	(0.118)	-0.022	(0.139)
Tenant_age	-0.189*	(0.088)	-0.220*	(0.104)	-0.112**	(0.034)	-0.117**	(0.043)	-0.090**	(0.029)	-0.105**	(0.036)
Tenant_employees 2016	0.024	(0.017)	0.018	(0.018)	0.007	(0.007)	0.004	(0.007)	0.006	(0.006)	0.004	(0.006)
Inc_employees			-0.027	(0.034)			-0.023	(0.015)			-0.013	(0.008)
Inc_logfunding_tenants			0.083	(0.196)			0.083	(0.079)			0.010	(0.050)
Inc_uni			0.457	(0.683)			0.214	(0.288)			-0.034	(0.187)
Inc_age			-0.008	(0.031)			-0.002	(0.013)			0.012	(0.008)
Inc_legalStatus=1			0.000	(.)			0.000	(.)			0.000	(.)
Inc_legalStatus=2			-0.528	(0.727)			-0.138	(0.310)			0.260	(0.198)
Inc_legalStatus=3			-0.741	(0.839)			-0.186	(0.349)			0.205	(0.239)
Constant	2.664^{+}	(1.392)	0.309	(1.931)	0.661	(0.554)	0.106	(0.816)	0.246**	(0.081)	0.027	(0.330)
Observations	200		162		219		180		219		180	
Log likelihood	-323.19326		-252.54387		-156.11337		-130.89707		-154.85858		-128.88505	
Prob > F	0.0442		0.0642		0.0126		0.1120		0.0171		0.1178	
R-squared	0.2100		0.2830		0.2085		0.2351		0.0461		0.0782	
Adj R-squared	0.0752		0.0911		0.0918		0.0622		0.0328		0.0294	

Standard errors in parentheses. Dummy tenants' sector and region variables were included in models 1, 2, 3 and 4. Dummy tenants' sector and region variables were not included in models 5 and 4, since the dependent variable tenant_growth_revenues3_noOutlier included the region and sector of the tenants.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7. OLS regression analyses of the tenants' employees' growth – Social vs. other incubators

Dependent variable:	Tenant_growth_employees				Tenant_growth_employees_noOutlier			
	(1)		**(2)**		**(3)**		**(4)**	
	Model 1		**Model 2**		**Model 3**		**Model 4**	
Inc_types_social	0.078	(0.233)	0.032	(0.302)	-0.138	(0.200)	-0.208	(0.236)
Tenant_age	-0.072	(0.063)	-0.111	(0.078)	-0.066	(0.052)	-0.122*	(0.060)
Tenant_logrevenues 2016	0.114**	(0.036)	0.113**	(0.042)	0.083**	(0.031)	0.071*	(0.032)
Inc_employees			-0.018	(0.034)			-0.023	(0.026)
Inc_logfunding_tenants			0.281	(0.208)			0.313+	(0.160)
Inc_uni			0.282	(0.527)			0.677	(0.408)
Inc_age			-0.017	(0.027)			-0.013	(0.021)
Inc_legalStatus=1			0.000	(.)			0.000	(.)
Inc_legalStatus=2			-0.074	(0.669)			-0.063	(0.513)
Inc_legalStatus=3			-0.367	(0.744)			-0.656	(0.573)
Constant	-1.078	(0.779)	-2.301	(1.602)	-0.477	(0.655)	-1.605	(1.231)
Observations	176		143		174		141	
Log likelihood	-213.31537		-169.27884		-179.44022		-129.14065	
Prob > F	0.0452		0.2043		0.1665		0.1537	
R-squared	0.2173		0.2654		0.1871		0.2797	
Adj R-squared	0.0807		0.0517		0.0433		0.0663	

Standard errors in parentheses. Dummy tenants' sector and region variables were included in all the regression analyses.
$^{+}$ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Since the results of the analyses regarding the tenants' revenue growth rates with the outliers were equal, but worse in terms of r-squared and adjusted r-squared probability, Table 6 only presents the OLS regression analyses without the outliers.

Table 6 and Table 7 confirm our t-test results. Social Incubators have been found to be as efficient as other incubators, because the predictor dummy variable *Inc_type_social* is not statistically significant. Whether an incubator is Social (*Inc_type_social*=1) or not (*Inc_type_social* =0) it does not have any differential impact on tenants' growth.

As far as the control variables are concerned, tenants' age has a negative impact on revenue growth. This may be explained by the fact that, during the early stages, it is easier for start-ups to increase their revenues. Moreover, it is important to highlight that tenants' revenues have a positive impact on employees' growth rates. This could suggest that the revenues and employees of a start-up tend to grow together.

5. Discussion

This paper aims to contribute to the theory on incubators by introducing a new definition of Social Incubators. This definition of the phenomenon of a Social Incubator is derived from empirical data on the Italian incubator ecosystem. The data were taken from a total of 83 incubators. These 83 incubators answered the question: how many start-ups did your incubator support in 2016 and how many of those were aimed at introducing a positive social impact? With such information, this paper has defined a Social Incubator as an incubator that supports more than 50% of start-ups that aim to introduce a positive social impact. This definition is also derived from the human capital theory. Social Incubators may in fact focus on social start-ups, because they offer human capital training on social innovation and have advanced knowledge of social innovation.

In comparison with the current state-of-the-art literature on incubators, this paper applies an empirical perspective to create the definition of a Social Incubator. Sonne (2012), for example, explained that social incubators in general support social entrepreneurs. Casasnovas and Bruno (2013) defined social incubators as "programs that support the scaling process of organizations that mainly target social challenges through innovative and market-oriented solutions". Therefore, the current state-of-the-art literature on incubators presents qualitative and general definitions of social incubators. This paper presents a new definition of Social Incubator from a quantitative point of view.

Klofsten et al., (2020) discovered that sustainability-oriented incubators also support start-ups that do not focus primarily on the offering of green products and services. This finding indicates that mixed incubators exist and support both social start-ups and more 'traditional' ones. To understand this aspect more clearly, this paper developed a taxonomy of Business, Mixed and Social Incubators from an empirical perspective in order to contribute to the theory on incubators. This paper defines Business Incubators as Incubators that do not support start-ups that aim to introduce a positive social impact, and Mixed Incubators as Incubators that support from 1 to 50% of start-ups that aim to introduce a positive social impact.

The results illustrated in Figure 4 show how these three different types of incubators consider different services. Since Social Incubators mainly support social start-ups, they consider the services linked to social impact (e.g., social impact measurement) more important than other types of incubators do. Incubators that support social start-ups (Mixed and Social) consider 'entrepreneurial and managerial education' services more important. This may indicate that these types of incubators pay greater attention to human capital training. Finally, Business and Mixed Incubators consider physical spaces and shared services more important than Social Incubators do.

Moreover, the regression analyses (Tables 6 and 7) show that Social Incubators are as efficient as other Incubator types. The regression analyses were based on the growth of the revenues and employees of the tenants. The data pertain to 247 tenants from different types of incubators. The obtained result may be due to the fact that Social Incubators are specialised incubators with advanced knowledge of social innovation and may therefore be as efficient as other incubators.

6. Conclusion

Incubators are evolving and increasing throughout the world (e.g., Pauwels et al., 2016). Some incubators have in fact recently started focusing on supporting start-ups that have the aim of introducing a positive social impact (Sonne, 2012; Nicolopoulou et al., 2017; Pandey et al., 2017). However, there are various definitions of what a social incubator is, and these definitions are not clear. Moreover, no author has analysed whether there are differences between social incubators and the other types of incubators.

The aim of this research has been to fill these gaps on social incubators by investigating the Italian incubator ecosystem from an empirical perspective. This study presents a new taxonomy of incubators (Business, Mixed and Social) based on the supported start-ups and the human capital theory. This paper defines a Social Incubator as an incubator that supports more than 50% of social start-ups. This definition represents a theoretical contribution of this study as no definition, from an empirical perspective, was previously available. This definition will allow future analyses to be carried out from this perspective, considering the presented taxonomy.

The impact of different incubators (Business, Mixed, and Social) was also investigated on tenants' growth. The regression analyses show that Social Incubators are as efficient as other types of incubators, in terms of tenants' growth. This indicates that Social Incubators are as efficient as the other incubators, despite their focus on supporting tenants that are not only interested in economic performances. This is an important practical contribution for social entrepreneurs and the managers of Social Incubators. This result may be due to the fact that Social Incubators can become a concentration of knowledge on social innovation. Therefore, a Social Incubator can be an incubator that is specialised in social innovation. This study also suggests that policymakers should foster this type of incubation since Social Incubators are just as efficient as other incubators, notwithstanding the focus of Social Incubators on start-ups that pursue both economic and social objectives.

Although this study provides some interesting findings, some limitations should be noted. The samples are based on only one country. Future research could be conducted to analyse the taxonomy and the definition of Social Incubators in different countries. Since incubators are an important instrument to promote entrepreneurship in developing countries (e.g., Adegbite, 2001), it is important to analyse incubators in such contexts.

Moreover, since university entrepreneurship education may be linked to incubators (e.g., Fiore et al., 2019 a, b; Sansone et al., 2019), it would be useful to understand how and in which conditions this link can be useful

and effective for both universities and incubators.

Because corporations are interested in incubation programmes for their Open Innovation strategies (Chesbrough, 2003; Becker and Gassmann, 2006; Waltz, 2008; Kohler, 2016), it could also be interesting to analyse whether there are any corporate incubation programmes specialised in supporting start-ups aimed at introducing social innovation.

Since Social Incubators mainly support social start-ups, they can help these social start-ups to reach their aims by solving social and/or environmental issues. These social and/or environmental issues may be linked to the 17 Sustainable Development Goals (SDGs). Therefore, Social Incubators can indirectly support the 17 SDGs. Future studies may analyse how Social Incubators can contribute directly to the SDGs through their human capital training and knowledge.

It could also be useful to analyse the role incubators play in fostering digital entrepreneurship, as defined by such scholars as Nambisan (2017) and Cavallo et al., (2019).

Finally, since there are different types of incubators, it may also be useful to develop different indicators. Several studies (e.g., Peters et al., 2004; Bigliardi et al., 2006; Bergek and Norrman, 2008; Mrkajic, 2017) have suggested that it is important to introduce indicators to evaluate incubators. Only Voisey et al., (2006) and Messeghem et al., (2018) seem to have introduced reliable indicators to monitor the performance of incubators. These indicators need to include technological, economic and social variables, and should be differentiated according to the type of incubator.

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