Report on Critical Success and Failure Factors of Business Incubation in HEI

Part 1 - Literature Review

SUPER – Start-Up Promotion for Entrepreneurial Resilience
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Summary overview

This paper draws upon, and presents, a broad and exhaustive range of literature across the subjects related to the Start-Up Promotion for Entrepreneurial Resilience (SUPER) project.

The paper is structured in such a way that the reader is able to follow a logical thread through the key areas of discussion and debate that relate to the SUPER project and that will inform its understanding of key success and failure factors in entrepreneurship education and incubation within higher education institutions (Output O2).

The paper begins with an introduction to the SUPER project, contextualising it against the backdrop of European policy and the general higher education institution context. The paper then moves to discuss entrepreneurship education, highlighting the content, evaluation and effectiveness of such programmes. The paper then defines and discusses incubation activities, highlighting the role of incubators. The paper importantly highlights types of incubator models and explores the various attempts to sort incubators activities into typologies across a range of factors. The paper also explores the ways in which incubator activity is evaluated in terms of its effectiveness, and the role of the regio-context in incubation.

The paper finishes by presenting a range of selected case studies spanning the United States, Canada, Europe and Asia.
There is a broad European policy commitment to entrepreneurship. The EU is focusing on entrepreneurship as the key to ignite the engine of growth. The European Commission (2016) states that, “Europe’s economic growth and jobs depend on its ability to support the growth of enterprises. Entrepreneurship creates new companies, opens up new markets, and nurtures new skills…” and the Commission’s objective is “to encourage people to become entrepreneurs and also make it easier for them to set up and grow their businesses”. As part of this objective, the European Commission aims to educate young people about entrepreneurship. The Commission has therefore identified Higher Education Institutions (HEIs) as organisations through which this aim can be achieved.

Entrepreneurship in higher education is a core element of the EU2020 objectives of smart, sustainable, inclusive growth. HEIs play a crucial role in training students in the skills and knowledge needed for societal advancement and, thus, are crucial conduits for changing attitudes and developing the skills and knowledge that enable entrepreneurship.

In December 2014, the EU Council argued in “Conclusions on Entrepreneurship in Education” that there is a need to promote and support student venture initiatives, for example by providing sound guidance at all levels of education and make available mentoring and incubators for aspiring entrepreneurs.

Entrepreneurship education tends to be focused on awareness raising and on developing entrepreneurial skills. Incubation, on the other hand, provides actual business support. Both are important for the promotion of entrepreneurship – before action is taken to start and grow a business, individuals need to be aware of entrepreneurship as a career option as well as have the desire and intention to become an entrepreneur (Fayolle, 2003).

Many Higher Education Institutions (HEIs) offer entrepreneurship education, but there is a difference between awareness/education and actual business support. At present in the EU, few HEIs provide practical and concrete support to students in establishing their start-ups and creating enterprises. Indeed, the disconnect between business incubation and HEIs is highlighted as a major shortcoming for entrepreneurship promotion by the EU Council in “Conclusions on Entrepreneurship in Education”, (2014) that calls on the EU Commission
and Member States to promote and support student venture initiatives, for example by providing sound guidance at all levels of education and make available training and incubators for aspiring entrepreneurs.

Whilst business incubation is a relatively common mechanism throughout the EU for entrepreneurship promotion, there are still many challenges affecting their effectiveness. Most importantly there is a clear disconnect between incubation and HE: the EU Court of Auditors' Special Report No 7 (2014) states that “incubation programmes were of a basic nature (…) provision of incubation services was rather limited”. The Report goes on to deplore, “…the disappointing results delivered by the audited incubators”, and highlight the importance of establishing and sharing good practice. Importantly, and supported by the academic literature, the Report argues that business incubators should be created in close cooperation with the educational system.

Whilst we have reported that few HEIs across Europe offer practical business support in addition to entrepreneurship education, many are now beginning to establish business incubation mechanisms to support the entrepreneurship potential of their students; nonetheless, the development of an effective incubation mechanism requires careful consideration of specific technical and operational aspects, above all opportunity costs, risk of adverse selection, efficiency and impact. Thus there is an immediate need to empower HEIs to make informed operational decisions and develop virtuous incubation mechanisms.

Against this background, SUPER addresses the immediate needs of HEIs in relying on proven successful procedures of support to start-ups, identifying the most suitable entrepreneurship support mechanisms to promote business creation and turn entrepreneurship education into action.

SUPER has the objective of overcoming the barriers between education and entrepreneurship by developing

1) A toolkit for HEIs to develop effective mentoring and incubators support systems for aspiring entrepreneurs and

2) A set of training resources and business toolkits for HEI students on how to put entrepreneurship into practice and develop their businesses.
Entrepreneurship Education

It has become commonplace to view entrepreneurship education as a component of the remedy for stagnating or declining economic activity (see for example EC (2016); OECD, (2014)). In mature economies, it is argued, more and better entrepreneurship education will result in growth in the quantity and quality of entrepreneurial activity. Indeed it is believed that entrepreneurship is important in driving economic growth (particularly through knowledge economy), and that entrepreneurs contribute society in general (Williamson et al, 2013). Furthermore, it is argued, entrepreneurship education can be viewed as an effective Segway for a graduate population to self-employment or to become job creators (Matley and Carey, 2007; Bae et al, 2014; Jones and Iredale, 2014).

Entrepreneurship education functions as the important first step in raising awareness and increasing the intentions of students to become entrepreneurs. Thus, entrepreneurship education has a broad reach across the student audience and should not be underestimated when considering the task of supporting student entrepreneurship.

As Bae et al. (2014, p. 219) summarize, entrepreneurship education consists of “any pedagogical [program] or process of education for entrepreneurial attitudes and skills”. It has a relatively long history and has developed into a widespread phenomenon (Katz, 2003; Kuratko, 2005). Most university-level programs are intended to increase entrepreneurial awareness and to prepare aspiring entrepreneurs (Weber, 2011) whilst empowering students to develop entrepreneurial skills, and to assist them in choosing a career (Liñán, 2004).

However, there are varying types of entrepreneurship education targeted toward particular stages of development (Bridge et al, 1998; Gorman et al, 1997; McMullan and Long, 1987). Pittaway and Edwards (2012) make a distinction between four different types of entrepreneurship education: education about entrepreneurship, for entrepreneurship, through entrepreneurship and embedded in other non-business programmes. Education about entrepreneurship is a content driven approach in which students acquire knowledge about entrepreneurship. It follows more traditional pedagogical approaches of lectures and seminars with learning assessed through exams and essays. Education for entrepreneurship aims to equip students with key skills and competences for becoming entrepreneurs, tends to engage students in experiential and project based activities and is often assessed through students
producing a business model or a business plan that is pitched in front of invited investors. Education through entrepreneurship overlaps to some extent with the previous category but with a greater emphasis on learning by doing through students starting and running ventures.

Interestingly, despite entrepreneurship being a topic which focuses on innovation and action, the majority of entrepreneurship modules within HEIs in the USA and UK take an about approach and use traditional teaching methods (Pittaway and Edwards, 2012). However, current research on real entrepreneurs indicates that entrepreneurs learn through experience and reflection upon that experience (Cope, 2005; Cope, 2011; Pittaway, 2004). They experiment, make mistakes and solve problems. Thus there is a general call for entrepreneurship education to move toward a through approach and allow students to experience entrepreneurship themselves through experiential learning (Honig, 2004; Noyes and Brush, 2012).

The content of entrepreneurship education

Morris et al (2013) argue that the entrepreneur is one of a number of key factors that determine the ultimate performance of a new venture. Therefore, it follows that focusing on competencies is a way of capturing and developing those competencies that will impact on venture performance. Morris et al identify entrepreneurial which competences should be supported, in entrepreneurship education (as well as in incubators). These include the following:

1) opportunity recognition, 2) opportunity assessment, 3) risk management and mitigation, 4) conveying a compelling vision, 5) tenacity and perseverance, 6) creative problem solving and imaginativeness, 7) resource leveraging, 8) guerilla skills, 9) value creation, 10) maintain focus yet adapt, 11) resilience, 12) self-efficacy and 13) building and using networks. More complex and less practical approach is taken by Markman (2007) who bases entrepreneurial competences in KSA framework and discusses knowledge (e.g. access to unique information and experience), skills (e.g. organizational and product/service development skills) and abilities (e.g. overcoming adversity). The stronger the competences, the higher is the likelihood that, in case a person pursues entrepreneurship career, such effort will be successful (Markman, G.D., 2007).
The European Commission (2016) takes a broad view, arguing that entrepreneurship is itself a ‘transversal competence’, arguing that it applies to all spheres in life. In its ‘(The) Entrepreneurship Competence Framework’ the Commission argues that a key hindrance to the development of entrepreneurial learning in Europe is that of a lack of comprehensive learning outcomes. The framework therefore identifies 3 areas of competence and 15 competences in all, split across varying levels of proficiency:

**Competence: ‘Into Action’**

- Taking the initiative
- Planning and management
- Coping with ambiguity, uncertainty and risk
- Working with others
- Learning through experience

**Competence: ‘Resources’**

- Self-awareness and self-efficacy
- Motivation and perseverance
- Mobilising resources
- Financial and economic literacy
- Mobilising others

**Competence: ‘Ideas and Opportunities’**

- Spotting opportunities
- Creativity
- Vision
- Valuing Ideas
- Ethical and sustainable thinking
The authors of the framework, as a result of the development of the framework, provide a list of 442 learning outcomes in tabular format (n.b. see pages 23 – 35 of the document for a synthesis of learning outcomes, proficiency level and competency).

The evaluation of entrepreneurship education activities

Whilst the espoused outcomes of entrepreneurship education can be seen to be contextual, in as much as there will be variance between countries and policies (see, for example, Quality Assurance Agency for Higher Education (UK), 2012), the underpinning aim of many programmes is to generate a shift in attitudes towards entrepreneurship (Fayolle and Gailley, 2015; OECD, 2009). This, though, raises issues around the evaluation methodology of entrepreneurship education activities. Instead of hard outcome evidence, there is likely required a need to understand softer outcomes, such as attitudinal change. Therefore, OECD (2009) argues that evaluation of entrepreneurship programmes can have both forward or/and backward looking purposes, and can be either formative or summative in nature. In order to generate useful data for such purposes, OECD suggests the use of a range of methodological approaches, which can lead to benefits, such as providing important feedback on issues of content, planning, design, as well as data on outcomes and outputs of the programme. These are important considerations for anyone involved in the development and/ or delivery of entrepreneurship education programmes as they will ultimately lead to a better understanding of the effectiveness of such programmes.

The effectiveness of entrepreneurial education

The literature has identified two theoretical perspectives that positively relate entrepreneurship education with entrepreneurial intentions: (1) human capital theory (Becker, 1975) and (2) entrepreneurial self-efficacy (Chen et al, 1998; De Noble et al, 1999; McGee, Peterson et al, 2009). Entrepreneurship education could enhance entrepreneurial self-efficacy because students are exposed to proactive interaction with successful practitioners (e.g. Honig, 2004). Such pedagogical elements facilitate coping strategies, which help maintain motivation and interest, leading to greater expectations of success (Stumpf et al, 1987) and increased entrepreneurial self-efficacy. Recently, Chen (2010) found that entrepreneurial self-efficacy was a positive mediator of the relationship between entrepreneurship education and entrepreneurial intentions.
Martin et al (2013) conducted a meta-analysis from which they concluded that there was a small but positive relationship ($r = .14$) between entrepreneurship education and entrepreneurial intentions. Bae et al. (2014) aimed to provide more insight into conditions under which entrepreneurship education is more or less likely to be associated with entrepreneurial intentions. They meta-analyzed 73 studies on the relationships between entrepreneurship education (defined as education for entrepreneurial attitudes and skills) and entrepreneurial intentions (defined as desires to own or start a business). They found a significant but a small correlation between entrepreneurship education and entrepreneurial intentions ($r = .14$), essentially the same result as by Martin et al (2013). This correlation was greater than that of business education and entrepreneurial intentions. However, after controlling for pre-education entrepreneurial intentions, the relationship between entrepreneurship education and post-education entrepreneurial intentions was not significant - self-selection bias exists indicating that entrepreneurial students more likely enroll into entrepreneurship courses. In the same line of reasoning, von Graevenitz et al (2010) demonstrated that there is a strong and positive correlation between students’ ex-ante beliefs and ex-post intentions. Changes in intentions during entrepreneurship education are thus less likely to occur if a student’s perceived, pre-course feasibility of launching a business is strong and consistent (e.g. negative or positive). Further, possible attributes of entrepreneurship education (i.e., the duration of entrepreneurship education and the specificity of entrepreneurship education), had no significant impact on the entrepreneurship education – entrepreneurial intentions relationship. Finally, there may be differences between cultures: entrepreneurship education – entrepreneurial intentions relationship becomes more positively associated in (1) high in-group collectivistic countries, (2) low gender egalitarianism countries, and (3) low uncertainty avoidance countries. Overall, Bae et al (2014) concluded that entrepreneurship education needs to be improved and much more targeted if the goal is to change entrepreneurial intentions.

Furthermore, in developing entrepreneurship education, particularly experiential learning approaches, the role of the educator in the process changes, and must be an important consideration. An experiential approach requires a move away from the traditional role of knowledge disseminator to more facilitative role, where the educator instead manages and organises activities that seek to develop student intentions, and address those aims and objectives previously discussed (Mason and Arshed, 2013; Haase and Lautenschlager, 2011).
For those students who have intentions to start a business, university-run incubators offer this facilitative role, through organising activities such as workshops, mentoring, networking events which help students to start-up their own businesses. In the next section, we turn to the literature on business incubation to present an overview of what incubation is, what support it provides and what models of incubation currently exist.

**Incubation**

**Defining incubation**

The initial problem of reviewing the business incubation literature is defining the boundaries of the subject. Indeed, it can be seen from the plethora of literature that exists, that there are equally numerous definitions of incubation. Many sources provide narrow, and somewhat simplistic, definitions of incubation, emphasising that incubation involves a physical location providing services to entrepreneurs/companies (Davies, 2009; UKBI 2009; Lewis *et al.* 2011). This can be at one of 3 stages of business development: start-up, early stage business or established small business with new products and/or directions (UKBI, 2009). However, more process-oriented definitions also exist. For example, Khalil and Olafsen (2010) argue that business incubation is the process aimed at supporting the development and scaling of growth-oriented, early-staged enterprises. Such arguments, though, can be seen to be broad and somewhat lacking in exactness. Nesta embraces this breadth, using incubation as an umbrella term for start-up programmes, emphasising process as well as service elements of the activity, defining incubation as, "a collection of techniques that can be used to prove an idea, develop a team and de-risk ventures for later stage investors. It happens in accelerator programmes, co-working spaces, social venture academies and learning programmes, competitions and through the work of very early-stage investors" (Dee *et al.*, 2015, p. 10). This, then, provides a wide definition of incubation that is useful for our purposes because these programmes all have the same over-arching aim: to give practical support to enable the creation of viable start-ups. It is the emphasis on practical support for a viable start-up which distinguishes business incubation from entrepreneurship education in HEIs as entrepreneurship education tends to be focused on awareness raising and education and even though some entrepreneurship modules do require students to start a business, the aim of the
modules tends to be the development of students’ knowledge, skills and attitudes rather than developing a viable business that will continue after the programme.

It is worth especially noting here that some ambiguity exists regarding the stage at which incubation becomes ‘accelerator’ and the explicit difference between the two. However, in general terms incubators can be seen to work with business earlier in the process, typically at the start-up and early venture stage and offer support for core business activities and needs: office space, internet access etc. On the other hand, accelerators will often work with firms at a later, albeit early, development stage, and programmes can be short and extremely intense. It can also be seen that incubators will often engage in ‘acceleration’ as their business clients develop, and there is no ‘progression criteria’ from incubator to accelerator in most cases. Due to this ambiguity throughout this document we refer to incubation across a range of stages. We accept that ambiguity and difference in interpretation exists among subject authors. Throughout this section of the work we refer to ‘incubation’ in the context of the role of incubators outlined below and in subsequent sections. However, where a distinction is made by individual authors we highlight this for the reader.

The role of incubators

A fundamental question regarding incubators, is why do they need to exist at all? Why is the support for start-ups that incubators provide necessary? A large body of literature from the incubation industry espouses the positive impact of incubators for communities, economies, business, individuals and policy-making. It has been suggested that business incubation is an invaluable tool for both stimulating enterprises and developing businesses with growth potential, both in practical and policy-making terms (Drapier & Chaffer, ND). Pompa (2013) argues that incubators also save money and time through the acceleration of enterprise growth, achieving this through the provision of an enabling environment for business in the start-up stage, helping to reduce the costs associated with launching an enterprise and increasing the confidence of entrepreneurs and linking them to the resources and networks required to scale the business. Furthermore, it is argued that incubators contribute to local and regional economies. Indeed, government subsidies for incubation programmes, it is argued, can be seen as a strong investment in local and regional economies. It is argued that incubators contribute to
economies in a variety of ways with incubator graduates going on to become job creators locally, nationally and regionally and incubators assisting in the commercialisation of new technologies, strengthening local, national and regional economies. Davies (2009, p. 5) summarises the argument for incubators well in stating that incubation, “…is recognized as a way of meeting a variety of economic and socio-economic policy needs which can include:

- Employment and wealth creation
- Support for small firms with high growth potential
- Transfer of technology
- Promoting innovation
- Enhancing links between universities, research institutions and the business community
- Industry cluster development
- Assessment of a company’s risk profile”

However, to some degree the industry literature is self-serving as it is important for it to justify their existence and the public funding that many incubators receive. The academic literature is more circumspect about how effective incubators are in fulfilling these goals. Public investments in entrepreneurship policies cost billions of euros and include trade-offs across alternative growth incentives. It is therefore important to deliver empirical background for the development of effective evidence-based policies (Sanderson, 2002; Autio and Rannikko, 2016) since some policies may be heavily misguided (Lerner, 2010). Peña (2004) even warns that empirical evidence in his study suggests that a portion of newly incubated firms may cause the exit of more efficient firms that do not receive policy support. This is an issue that we will return to later in the review.

Spending public money is efficient when market failures exist and benefits of such support exceed the costs. If the potential social returns of the innovation are higher than private returns, the incubation process may well be the efficient way for a start-up to exploit a new innovation (Phan, Siegel and Wright, 2005). However, academic literature does not yet understand fully the type of market failures for which business incubators should be the best solution. Nesta (2011), though, suggests that market failures are likely to stem from the relatively high costs and risks associated with supporting start-up companies – if the potential
return from a start-up is uncertain, private institutions are unlikely to be willing to absorb the costs and risks associated with supporting it.

It can be seen that the understanding of which market failures that incubators are seeking to address have shifted over time leading to a change in how incubators are organized. Different generations of incubator models have been noted in the literature (Bruneel et al, 2012). In the 1980s, the first generation incubators were primarily providers of shared office space and infrastructure in order to provide small start-ups economies of scale. In the 1990s, in the second generation, the emphasis shifted to providing business support in order to accelerate the start-up learning curve. The third generation of incubators emerged at the end of the 1990s with an emphasis on facilitating access to external resources, knowledge and legitimacy. Additionally, the newer generation of incubators have a stronger focus on more specific sectors, in particular high-tech, ICT as well as targeting the most promising innovative start-ups (Aerts et al, 2007). The changes in incubator models over time has consequences for research as the studies conducted on earlier generations of incubators do not necessarily apply to the present incubators and it is thus important to survey more recent data. However, nowadays, even older generation incubators tend to offer a similar portfolio of services to incubates and new generation, thus the provisions of most incubators are quite similar (Bruneel et al, 2012).

Figure 1. 3 generations of incubation models (adapted from Bruneel et al, 2012)

<table>
<thead>
<tr>
<th>Offerings</th>
<th>1st Generation 1980s</th>
<th>2nd Generation 1990s</th>
<th>3rd Generation 2000 +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical Rationale</td>
<td>Economies of scale</td>
<td>Accelerating the learning curve</td>
<td>Access to external resources, knowledge and legitimacy</td>
</tr>
<tr>
<td>Business support</td>
<td>Business support via coaching and training</td>
<td>Access to networks</td>
<td></td>
</tr>
</tbody>
</table>

Next, we turn to discussing the different incubation services in more detail. Whilst, as seen in Fig. 1 (Bruneel et al, 2012) argues that the functions of incubator services have changed overtime – moving from a focus on activities to achieve economies of scale through accelerating the learning curve and, presently, facilitating access to external resources, knowledge and legitimacy, a more concise framework put forward by Amezcua et al (2013 – see Fig. 2) divides incubation activities into “buffering” and “bridging” functions that limit the likelihood of start-up failure. Buffering protects new firms from their external...
environment by providing resources to shelter new firms against lack of own resources (Amezcau et al, 2013), thus encouraging the survival of new firms. Bridging, on the other hand, enables new firms to actively engage in their external environment by facilitating the building of connections with external organisations and developing social capital and legitimacy (Amezcau et al, 2013). This is intended to encourage business growth. **Fig. 2** categorises the different activities and services incubators provide according to their function.

*Figure 2. A comparison of buffering and bridging activities (adapted from Amezcau et al, 2013)*

<table>
<thead>
<tr>
<th>Role</th>
<th>Buffering</th>
<th>Bridging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incubation activities</td>
<td>Helping new firms develop their internal resources</td>
<td>Helping new firms connect with external resources</td>
</tr>
<tr>
<td>Subsidized office space</td>
<td>Subsidized office support service</td>
<td>Networking</td>
</tr>
<tr>
<td>Subsidized training and development services</td>
<td>Subsidized business advisory services</td>
<td>Agglomeration</td>
</tr>
<tr>
<td>Provision of financial resources</td>
<td></td>
<td>Field development</td>
</tr>
</tbody>
</table>

**Buffering activities in incubation**

Incubators provide a buffer against the external environment through the provision of services such as shared office space and office support services under favourable conditions, training and development services, business advisory services, mentoring and provision of financial resources.

**Shared office space and office support services**

Appropriate office space allows for start-ups to bypass some early stage problems faced – inflexible lease terms, expensive rents, individual resource barriers (e.g. reception staff, office equipment security and so on…) and unattractive locations (Davies, 2009; UKBI, 2009). Access to appropriate office space is therefore of key importance. Whilst this could be at a discounted rate, Zablocki (2007) argues that incubators will tend to charge market rates for office space rental, and offering further services as a value added benefit to the incubate for locating in a particular across from switchboard, accounting, IT, PR and recruitment. (Grimaldi and Grandi, 2005; Phan et al, 2005; Colombo and Delmastro, 2002). Each of these activities helps start-ups reduce overhead costs. As discussed above, this can be seen to be
useful to start-ups at the early stages as this represents a significant resource barrier at early stages of business development.

**Training and development activities**

It is argued that training and development activities for early stage business is critical. This can be seen to be the case after the initial start-up phase where expansion and/or growth are likely to be key targets for the business, and streamlining of operations and increasing the robustness of business decision making can be seen to be essential. Additionally, areas such as government or other institutional compliance are of key importance and, as such, training and development can be seen to be an essential component of the incubation process (Clow, 2014).

**Business advisory services**

Business advisory services, which are also one of the main activities offered by incubators and include elements such as legal and intellectual protection rights advice, were found to be positively associated with firms’ sales growth and other outcome variables (Cumming and Fischer, 2012). Similarly, McAdam and Marlow (2012) present empirical evidence which suggests that advisors associated with a business incubator act as sense makers between venture fund managers and high-technology entrepreneurs. Further, some incubators are founded in cooperation with universities or other research institutions and thus should provide tenant firms better scientific expertise and access to research results (Colombo and Delmastro, 2002).

**Mentoring**

It is argued that, during the start-up phase/incubation period, mentoring is important in assisting the entrepreneur. It allows for an element of foresight and can speed the growth process as mentors are able to identify problems and risks in advance, resulting in less time spent learning from inevitable mistakes. In addition, it is claimed, ”mentoring is shown to increase the confidence and risk taking capacity of entrepreneurs”. Additionally, it is argued that mentors don’t exist in incubation to help run the business, but instead to assist in managing the learning process that any small business entrepreneur needs to undertake (Bury and Lonsdale, 2010). Additionally, Davies (2009, p. 8) argues that, “frequently a mentoring relationship that exists between an accomplished professional and a bright, ambitious younger person (involves) sharing ideas, techniques, visions, or criticisms. These relationships can frequently develop into funding opportunities, business contracts, or even employment.”
Provision of financial resources
Evidence from the literature suggests that financing obstacles affect small businesses twice as much as large ones. Specifically, financing constraints reduce enterprise growth by six percentage points, on average, for large firms but by 10 percentage points in the case of small firms (Demirgüç-Kunt, and Maksimovic, (2005) in Pompa (2013)). In addition, the lack of access to specific forms of financing such as export, leasing, and long-term finance is significantly more constraining for small firms. “Access to finance is a key component to create an economic environment in which enterprises can grow and flourish. Imperfections in the credit and financial markets, credit constraints and a lack of capital in general have been identified as restraints for enterprise growth. Particularly in developing countries, enterprises, especially SMEs, face significant constraints to access to finance, such as high cost of capital, high collateral requirements and lack of experience with financial intermediaries” (Pompa, 2013, p 5).

Bridging activities in business incubation
Bridging activities provided by incubators help new firms to connect with external resources. Bridging occurs through networking with external connections, agglomeration and networking with internal connections, and field development.

Networking with external connections
Making connections with others is essential not just for start-up businesses but throughout the life of a business. It has been argued that smaller organisations are disadvantaged in comparison to larger firms in establishing networks with external sources of expertise (Rothwell, 1991). Networking allows for connections with those that can assist in the development of the business, finding potential customers and suppliers, and being recognised by potential investors (Small Business, 2014).

Agglomeration and networking with internal connections
Within more targeted incubators, tenant firms are more likely to benefit from agglomeration economies, due to the fact that numerous innovative firms are clustered in a relatively small area (Colombo and Delmastro, 2002; Phan et al, 2005). Agglomeration supports the initiation and development of inter-firm relationships due to casual meetings and conversations, identification of shared interests and reduction of uncertainty and transaction costs (Vásquez-Urriago et al, 2016). Previous studies showed mixed results regarding the effect of this internal networking. Ebbers (2014) found that networking behaviour of incubated firms is positively related with the number of business partners to whom, but not from whom
entrepreneurs give/receive business assignments. In a recent study on a large sample of Spanish firms, Vásquez-Urriago et al. (2016) concluded that science parks help in fostering cooperation for innovation because geographical proximity supports the development of diverse cooperation. A higher number of tenant firms in a particular incubator may provide an important advantage, because it provides broader opportunities for networking, knowledge transfer and experience sharing (Bergek and Norrman, 2008; Bollingtoft and Ulhoi, 2005; Rothshild and Darr, 2005). Thus, the larger the size of an incubator the more valuable may be the tenancy (Phan et al., 2005).

Field building and other incubation activities
Firms within a particular field may benefit from field building activity, facilitated within an incubator. Field building seeks to establish organisational fields, defined as, “socially constructed domains of self-referencing and mutually dependent organizations” (Di Maggio, 1997, in Amezcua et al. 2013, p. 8). This can be beneficial, given that, though entrepreneurs will often act independently, their actions often begin to intersect with others seeking similar resources and opportunities, presenting an opportunity for collaboration. This, then, results in the further crystalisation and development of more concentrated communities. This, in turn, fosters beneficial outcomes for all members – knowledge dissemination, mutual interest groups and so on. Importantly a further outcome is that of legitimacy – legitimising particular industries and developing fields in newer areas of expertise (Amezcua et al., 2013).

Further important bridging activities for incubators include:

- Event programmes
- Sales & Marketing Assistance
- Strategy and business plan development
- IP protection services/expertise

Salido et al. (2014) argue that a range of other initiatives exist to foster entrepreneurship, but that these are either focussed on broader areas of incidence or a particular aspect of entrepreneurship, thus rendering them less important for the purposes of our study. However, it is important to note that role, best practice activities, and evaluation of those activities will be heavily influenced by contextual factors. We discuss these contextual factors in the following sections: Incubation models, typologies of incubators, evaluation of incubators and region specific factors.
Incubation models

Typologies of incubation programmes

It is difficult to create a typology that fits all incubation programmes because there is much heterogeneity. But many reports have some sort of categorisation incubation to enable understanding of the different models that exist. Key differentiating characteristics for incubation programmes that are pulled out by the literature are the:

- Broad incubator type (Grandi and Grimaldi, 2005)
- Overall goals (Bergek and Norman, 2008)
- Funding model (Dee et al, 2015; Miller and Stacey, 2014).
- Funder (Clarysse et al, 2015).
- Programme’s objectives (Clarysse et al, 2015).
- Stage or type of start-ups in the programme (Dee et al, 2015; Lewis et al, 2011).
- Services provided (Miller and Stacey, 2014).
- Sector (Lewis et al, 2011).
- Propensity to screen applicants against a balanced set of criteria (Pompa, 2013).

Dee et al (2015) have developed a simple yet effective typology which manages to capture most types of incubation programmes whilst also highlighting some trade-offs and ecosystem characteristics required by the different incubation models. Based on the broad definition of incubation programmes as "a collection of techniques that can be used to prove an idea, develop a team and de-risk ventures for later stage investors", it differentiates start-up programmes along two inter-linked characteristics:

1. when programmes intervene in the start-up journey: pre-start-up, start-up, early stage, later stage
2. how they make money: growth-driven, fee-driven or income independent of start-ups

There are various stages of starting a business. Dee et al (2015) separate the stages into: pre-start-up, start-up, early stage and late stage. Incubation programmes often focus on
supporting entrepreneurs at a certain stage in the start-up journey as the support needed varies during the stages.

Miller and Stacey (2014) document a set of archetypes for helping entrepreneurs to pin-point what support they need, which has been developed by Bethnal Green Ventures. Entrepreneurs are categorised as being one of the following five archetypes:

1. Team formers: entrepreneurs may be looking for help to find co-founders to fill certain knowledge gaps in their venture team. Incubation programmes can help team formers by providing opportunities to meet co-founders and develop an understanding of basics of running a business.

2. Proposition seekers: proposition seekers need help turning their initial ideas into fully developed venture propositions. Incubators can aid proposition development by providing training in product design such as understanding customer needs, testing propositions and rapid prototyping and a good structure for them to apply these principals and obtain constructive feedback from mentors and potential customers.

3. Customer hunters: entrepreneurs seeking their first customers. Incubation programmes can help customer hunter start-up teams with making first contacts with customers.

4. Model clarifiers: early-stage ventures are likely to have had some success in developing their business but are likely to need support in working out and testing their growth model. Incubation programmes can help start-ups at this stage by providing strategic business advice and education on expansion strategies, intellectual property, finance as well as access to working capital.

5. Scalers: Scalers are ventures that have found a sound business model and are in a position to scale. They will be growing sales and likely to be growing in employees which can lead to challenges such as changing team relations and culture. Incubation programmes can help with investor relationships to access finance for scaling, legal support with the new issues they face, recruitment advice for hiring the new employees necessary to meet growing demand and flexible office space.

These archetypes fit well to the stage of venture development and indicate how the needs of start-ups vary across the start-up process. In the pre-start-up stage entrepreneurs are team formers and proposition seekers. Moving into the start-up phase are the customer hunters,
followed by model clarifiers at the early venture stages. At the late venture stage Scalers are found. One stage that is missing in this scheme is the pre-start-up phase. Incubation programmes may also initially aim at inspiring individuals to become entrepreneurs (aspiration and intention phases), though this is unlikely to be commonplace across private incubators. Instead, this is likely to be particularly relevant for university incubators that link with entrepreneurship programmes within the HEI. The example of Bethnal Green ventures shows that some incubation programmes are equipped to support entrepreneurs and ventures across most of start-up journey, however many incubation programmes focus on a particular stage. Consequently, the stage of start-up which is supported by the incubation programme offers a characteristic on which to develop a typology of incubation programmes.

The second characteristic put forward by Dee et al (2015) as a differentiating factor between incubation programmes is how they make money. This is major challenge for any incubation programme as providing supporting services to start-ups is costly and most start-ups are cash-strapped so are unable to pay the full value for the services themselves. Dee et al (2015) find three core strategies used by incubation programmes to finance their activities: growth-driven, fee-driven and independent.

In the growth-driven model the programme is designed to eventually be financed by the supported start-ups by generating revenue from equity, taking a share of the start-ups earnings or through appealing to business angels and venture capitalists. This funding model relies on the incubators having access to a stream of high-growth businesses but also backers who are willing to support the incubator for a number of years until returns from investment can be realised. This requirement means that growth-driven financed programmes tend to focus on ventures in early or later stage.

In the fee-driven model, the incubator programmes are financed directly by the start-ups who are charged regular fees such as rent, membership fees or service fees. As start-ups have to pay in order to participate in such programmes, fee-driven models tend to support start-ups that have already established a revenue-stream or have investment from which they can pay the fees. This means that they are not likely to support pre-start-up entrepreneurs or very early stage start-ups.

Independent incubator programmes are the third designated category. This means that the programmes do not rely on the start-ups as a source of income - as in the growth-driven and
fee-driven models. Instead, revenue comes from other sources, such as public bodies and corporate sponsors who see an advantage in establishing and running an incubator or through running events, hiring out spaces and providing catering using the incubator space. As these types of programmes do not rely on the start-up for generating income, they can service a wider range of stages of the start-up journey. However, the authors find that independently financed programmes tend to focus on the pre-start-up and start-up phase.

In their work on accelerators (defined as a model for intensive time limited incubation, as opposed to an entity removed from incubators/ incubation) Clarysse et al (2015) also focus on the funding model as the distinguishing feature of different types of accelerators. They find that there are 3 main archetypes of accelerator which lead from the funder and funding model:

1) **Investor led** – the key stakeholders are investors who have the objectives of developing ventures ready for follow up funding. This means that these incubator/accelerators are generally focused on later stage start-ups that have some proven track record and high growth potential.

2) **Matchmaker** - the key stakeholders are corporate customers. The aim is to match up later stage start-ups with some proven track record who have ideas or technology that is interesting to potential corporate customers and the incubator/accelerator will tend to use corporate mentors who guide start-ups through complex corporate decision-making structures.

3) **Eco-system builders** – for these organisations the key stakeholder is a government agency and the aim is to develop an ecosystem of start-ups within a region or technology. In this case, often the focus is on very early stage ventures.

Additionally, four categories of business incubator can be distinguished (Grimaldi and Grandi, 2005):

**Business innovation centres** (BICs)

Activities consist of offering a set of basic services to tenants such as the provision of space, infrastructure, communication channels, and information about external financing opportunities.
**University business incubators (UBIs)**

University activity is increasingly seen as a major contributor and driver of local and national economies. As such, universities are increasingly asked to devote time, resources and talent to such effort. It is believed that substantial contributions to local economies through research leading to patentable inventions and discoveries, spin-offs and technology transfers is possible through UBIs.

**Independent private incubators (IPIs)**

Investing their own money in the business, IPIs are set up by private individuals/groups to help entrepreneurs create and grow business. Grimaldi and Grandi suggest IPIs are often defined as ‘accelerators’ as they may not be involved in concept definition phase of business development.

**Corporate private incubators (CPIs)**

Incubators owned and set up by large companies with the aim of supporting the emergence of new independent business units (corporate spin-off). They may also host more generic start-ups as well.

Business incubators often try to leverage the local academic scientific and research base (Lerner, 2010), especially in the case of public non-profit incubators (Grimaldi and Grandi, 2005), whereas private profit oriented incubators more often focus on internet ventures.

Grimaldi and Grandi (2005) provide a comprehensive list of Incubators’ “characterizing” variables:

1) Institutional mission/strategy: it is possible to distinguish between non-profit and profit-oriented incubators. BICs and UBIs are non-profit institutions: they are set up by governmental authorities with the objective of promoting regional development.
2) Industrial sector: Incubators might focus on a specific industry and develop a capacity to attract start-ups in the same industrial sector or in different but related industries. The more clearly an incubator defines the incoming new venture profile, the better this incubator will be able to leverage his given competencies as well as create potential synergy effects among already resident start-ups.
3) Location: The physical location of an incubator has an important bearing on the types and nature of companies that the incubator manages to attract.

4) Market: The choice of which companies to target has important implications for the incubating models, as companies operating at a local level have different needs from those operating at a national and/or international one.

5) Origin of ideas: It is possible to distinguish between ideas coming from an already existing organization to which the incubator is affiliated (internal) and those coming from all other individuals/organizations (external). UBIs will be oriented mainly towards the valorization and exploitation of competencies and knowledge of the organizations to which they are affiliated. This means that they are more inward-oriented and give priority to business ideas coming from their “parent organizations”, thus spawning academic spin-offs.

6) Phase of intervention: Depending on the requirements of the hosted companies, the incubator might provide assistance from the first phase of business concept definition through to the independence of its ventures.

7) Incubation period: This factor depends on several other variables, which in turn depend on the business models of different companies (the period of time that a company needs to spend in an incubator depends on its strategy, its life cycle, the markets targeted, etc.).

8) Sources of revenue: Public incubators are non-profit, hence they cover their expenses through regional/national/ international funding, and partly through the fees paid by companies for the services they get. Some services are based on a pay-per-use model (e.g. rents and telephone lines). Private incubators do not benefit from public funding, fees + equity is the most commonly used by private incubators (see below for more on funding models).

9) Services offered: In general, BICs are more oriented towards the provision of tangible services (like spaces, offices, etc.), IPIs and CPIs towards the provision of intangibles (transfer of competencies and knowledge-based services). UBIs generally combine both tangible and intangible services.

10) Management teams: In private incubators, management teams invest their own money in the new ventures and are deeply involved in the management and day-by-day operational aspects. In public incubators management teams act as “intermediaries” between new ventures and different external entities.

An additional element that needs to be emphasised within any typology is the importance of the funder in defining the funding model and the incubator programme. The funder defines
the wider purpose of the programme which will drive the selections of incubatees and the types of services and training provided.

**Evaluation of incubation activities**

Business incubators are viewed worldwide as a tool for promoting the development of technology-based and growth-oriented firms. Considering the large amounts of money invested in incubators by national and regional governments, municipalities, universities and research institutions, the question of whether this investment into business incubators pays off is of utmost importance (Bergek and Normman, 2008; Phan, Siegel and Wright, 2005; Lukeš, Zouhar and Longo, 2016).

The importance of evaluation of business incubator performance is also acknowledged in a report by the European Commission (2002). The report states that business incubators generate 30,000 gross new jobs annually at an average cost of around 4,000 EUR per job and concludes that business incubators are a very cost-effective instrument. However, without the comparison with matched samples of non-incubated firms, such calculations are not useful. Moreover, the report admits that if support goes to new firms competing just locally with other firms, then the net value added is highly questionable. Certainly within the literature there is a general call for more measurement and evaluation of business incubation to find out if this public money is being well spent. Until this has taken place, Miller and Stacey (2014) caution us to not over promise what incubators can do.

Consequently, the evaluation of incubator performance has become a topic of previous studies. Most of them admit that evaluating incubators’ outcomes is a challenging task (e.g. Hackett and Dilts, 2004; Rubin, Aas and Stead, 2015). The number of such academic studies is not high and the question of what “performance” of an incubator really means is not answered in a straightforward way. Voisey et al (2006) provided a good overview of different measures of business incubator performance divided into firm-specific and incubator-specific hard measures, business incubator provision of services and soft measures specific to firm and to incubator. Firm-specific hard measures involve sales revenues, profitability, employment growth and graduation from incubator.
Figure 3: A conceptual framework identifying the performance measures of business practice in incubators (adapted from Voisey et al, 2006)

The European Commission (2002) suggests that the contribution of incubators for the development of innovative, high-growth firms and their capacity to create new jobs is more important than survival rates. Since incubators are specifically designed to maintain and increase the life span of incubated start-ups, using survival rate as a performance criteria has little validity (Phan et al, 2005). Moreover, it is possible that firms that spent many years in an incubator may have not developed capabilities to survive without subsidized resources. Schwartz (2009) found that graduation from an incubator can cause an instant negative effect on survival in the post-incubation period. However, performance during incubation might be a good predictor of business failure after graduation. In a follow up study (Schwartz, 2011) concluded that findings do not support the presumption of sustainable and strong firm growth after incubation.

A further shortcoming of most previous studies, with some exceptions (such as Stokan et al, 2015), is that matched samples of on and off incubator firms are rather small (e.g. Grimaldi and Grandi, 2005; Phan et al., 2005; Colombo and Delmastro, 2002). There is a general lack of large scale empirical evidence on the performance of incubated vs. non-incubated firms (Colombo and Delmastro, 2002; Hackett and Dilts, 2004).
Several studies found positive results of incubation on outcome variables. Stokan, Thompson and Mahu (2015) showed in their analysis from the U.S. that incubators had a positive impact on tenant firms’ job creation, even if a matched comparison group was used, possibly due to receiving substantially more business services. Colombo and Delmastro (2002) compared a sample of 45 Italian technological firms located in technological incubators with matched control sample located outside incubators. Both input and output innovation measures did not substantially differ for firms on- and off- incubator. They however showed that firms in incubators grew quicker, a similar finding as in Westhead and Storey (1994). Further, they found that tenant firms tap more into public subsidies, international R&D programmes and cooperation with universities.

Most studies found only partial or indirect positive effects of incubation. For instance, firm growth was mainly the result of the entrepreneur’s own skills and certain characteristics of start-ups (Peña, 2004). Only management training and assistance services provided by the incubator were found important. Löfsten (2010) in his study on performance of incubated firms in Sweden found very limited connections between firm performance (measured as sales and employment) and various variables such as internal and external networks, financing and localization. The only significant link was between performance and bank loans. Similarly, Ferguson and Olofson (2004) reported that on-science park firms have higher survival rates, but do not outperform off-park firms in sales and employment growth. Löfsten and Lindelöf (2002) illustrated some differences between the experiences of Swedish firms located on- and off-science park. Tenant firms had more likely a link with a local university. They also concluded that initiatives to promote new technology based firms on science parks will yield a higher rate of job creation than policies to help these firms in general.

In the nineties, several papers by Westhead and colleagues (e.g. Westhead and Storey, 1997) analyzed a sample of firms located in science parks in the UK and found rather indirect positive effects of incubator tenancy, such as perceived prestige and the potential advantages from closer connection to universities (Westhead and Batstone, 1998). Similarly, a study by Felsenstein (1994) on Israeli science parks showed that science park location has only a weak and indirect relationship with the level of innovation, and is again more related to perceived
status and prestige. Similar findings came from Studdard’s (2006) study – the sole knowledge benefit gained by incubated firms was enhanced reputation. Contrary to some positive results, Vásquez-Urriago et al (2016) found no effect of on-park location on the economic performance, and Ensley and Hmieleski (2005) even reported that university-based start-ups performed worse than independent new ventures in terms of net cash flow and revenue growth.

The studies that have compared performance of on- and off-incubator firms have provided mixed results. Most studies report partial and indirect positive effect of business incubation. The evidence is not clear whether incubated firms perform better than comparable firms located outside incubators.

Furthermore, within the literature there is consensus that evaluation needs to take into account the different contexts and objectives of incubation programmes for example:

- The age of incubation programme: UKBI emphasises that it can take 7 to 12 years before an incubator is fully developed
- The objectives of the incubation programme: e.g. profitability of the incubator is unlikely for ecosystem incubators (Clarysse et al, 2015)

And whilst there is little in the way of prescriptive approaches in the literature regarding the evaluation of incubation activity, there are some best-practice benchmarking schemes, e.g;

- UBI global benchmarking scheme for university incubators
- UKBI – Inspire
- EU-BCI
- National Business Incubation Association- online toolkit for measuring incubator’s economic impact
- INBIA incubator assessment tool

These have been initially developed to help incubators to benchmark themselves against what are considered best practices and to gain some form of certification, but it is not clear whether they are able to provide wider insights into whether incubation is effective.
The Regional Context, Eco-System development and HEIs

Dodd and Hynes (2012) noted that educational institutions and their stakeholders are embedded in wider contexts, which include social, legal and economic factors. Consequently, in order to understand the role and analyse the effectiveness of both entrepreneurship education and incubation in HEIs, we must pay attention to the context in which these activities take place. Well-functioning regional eco-systems play a vital role in developing entrepreneurial culture in the region. For example, Neck et al (2004) describe how a developed entrepreneurial ecosystem in a particular region can encourage and support regional entrepreneurial activity, using the example of Boulder Country, Colorado.

From the perspective of evolutionary economic geography (Boschma and Frenken, 2011), it can be expected that economically more developed regions and larger cities create a dense environment for networking, and acquisition of knowledge and resources in general. The entrepreneurship capital of a region, its milieu of agents, routines, traditions and institutions is conducive to entrepreneurial behaviour and a culture of risk taking (Audretsch et al, 2008, p. 690).
Stam (2015) offered a more recent and complex view of current approaches to entrepreneurial ecosystems. They focus on the role of the (social) context in allowing or restricting entrepreneurship and have the entrepreneur as a focal point. Moreover, entrepreneurs are seen as central players (leaders) in the creation of the system and in keeping the system healthy. This “privatization” of entrepreneurship policy decreases the role of government compared to previous policy approaches - which does not alter the fact that this role maintains its importance, but rather as a “feeder” (e.g. adjusting laws and regulations) of the ecosystem than as a “leader” (Feld, 2012, see Figure 12).
Isenberg (2010) suggests that (public) leaders should follow nine principles when building an entrepreneurial ecosystem:

a) Emphasize the role of local conditions and bottom-up processes:

1. Stop emulating Silicon Valley. It is a common mistake when trying to emulate this success to study Silicon Valley as it is today, rather than during its formative years;
2. Shape the ecosystem around local conditions;
3. Engage the private sector from the start;
4. Stress the roots of new ventures;
5. Don’t over engineer clusters - help them grow organically.

b) Emphasize ambitious entrepreneurship:

6. Favor the high potentials;
7. Get a big win on the board.

c) Emphasize institutions:

8. Tackle cultural change head-on;
9. Reform legal, bureaucratic, and regulatory frameworks.

These principles are claimed to lead to the “creation of an ecosystem”, and a “vibrant business sector”.

The work of the World Economic Forum (2013) defines eight pillars (see Fig. 5) considered to make up an ecosystem and the individual components of each pillar. These pillars, it is argued, represent the composition of good entrepreneurial ecosystems.
Stam (2015) further describes several issues with postulating entrepreneurial ecosystem in a practitioners’ literature, such as tautological nature (unclear causality), no consistent explanation of cause and effect and unclear scope (city, region, but also sector). Thus, Stam (2015) proposes a model, in which the systemic conditions are the heart of the ecosystem: networks of entrepreneurs, leadership, finance, talent, knowledge, and support services.

Figure 6: Elements, outputs and outcomes of the entrepreneurial ecosystem (Adapted from Stam, 2015)
Universities can play a vital role in shaping the entrepreneurial eco-system. Fritsch and Aamoucke (2013) have found that the mere presence and size of local universities, regardless of their quality, has a positive effect on the creation of new innovative (but not on non-innovative) businesses. Thus, they demonstrated the importance of localized knowledge and public research for the emergence of innovative new businesses. Morris *et al* (2011) illustrate the transformative impact of university-based entrepreneurship programs can have on local economic development and provide recommendations for replications.

However, there is some evidence that perhaps university support mechanisms for venture creation acts as substitutes rather than a complements to the local environment. Fini *et al* (2011) examine the support available to academic spin-offs and conclude that university support mechanisms complement the legislative support offered to high-tech entrepreneurship whereas they have a substitution effect with regard to the amount of regional social capital, regional financial development, the presence of a regional business incubator, regional public R&D expenses as well as the level of innovative performance in the region. Additionally, Huggins (2008) notes that the presence of a university in a developed entrepreneurial eco-system does not mean that all universities are tied into and benefitting from the eco-system. Huggins (2008) examined HEI involvement in regional knowledge commercialization processes, using London as a case study. He found that many of the resources associated with successful knowledge commercialization are skewed towards London’s larger and more prestigious universities. As a consequence, the involvement of most HEIs in London in knowledge-based venturing processes is significantly lower than expected. These findings support the idea that regional settings’ idiosyncrasies should be considered for universities to develop effective entrepreneurship support policies.

Research on entrepreneurship education has also begun to recognize the need to be more contextualized, the need to be better at recognizing the specific institutional context and acknowledging how this influences what is meant by “entrepreneurship”, or indeed, “enterprise education”, within the context studied (Pittaway and Cope 2007). Local economic, social and legal factors influence various aspects of entrepreneurship education, such as course content, learner intentionality and educational policy objectives. Pittaway and Cope (2007) provide an example: Greek students are more willing and eager to start their own business than other European students, although they experience limited if any entrepreneurship education at school. High levels of entrepreneurial intention and desirability
are supported through Greek students’ indirect enterprise experience, mainly through family businesses, in comparison with pupils from other nations (Drakopoulou et al, 2010). Thus, the regional context can be seen as developing local narratives of entrepreneurial identities and careers.

Interestingly, initial research into the relation between the regional context and the mode of entrepreneurship education (passive – theory lectures vs. active – simulations) shows that active modes are, irrespective of the regional context, positively related with intentions and attitudes towards entrepreneurship, whereas the effect of reflective modes is contingent on the regional context (Walter and Dohse, 2012).

Success/ Failure Factors – Incubators

Little literature exists explicitly addressing the success and failure factors for incubators. However, one influential piece (Dietrich et al, 2010) suggests that the following are key factors in the failure of incubation activity.

1. **An incomplete understanding of the Business Incubation System.**
   Where misunderstanding and inappropriate expectations are prevalent, poorly designed and ineffectual projects can result. Therefore it is essential that all stakeholders are clear on how the incubation system works and hold realistic expectations on outcomes.

2. **The Business Incubator is not embedded into the overall development policy of a region.**
   All successful incubation activities need to be integrated in the regio-context.

3. **There is not sufficient financial support to the Business Incubator.**
   Financing must be provided at a sustainable and realistic level to achieve incubation success.

4. **There is no sufficient demand for the service portfolio of the Business Incubator.**
   An understanding of the market, and more specifically the incubator model, is essential to its success.

5. **There is no suitable and low-cost building to accommodate the clients and the Incubator Management.**
6. The management team of the new business incubator lacks business experience and management skills.

A skilled management team, providers and mentors are needed to ensure successful incubatee outcomes, as well as incubator success.

Whilst the literature and case study work (see below) presented in this paper supports the majority of these perceived success/failure factors, literature also suggests that the following may be considered as additional success factors:

7. A strong understanding of the role of the incubator in delivering desired outcomes.
8. Delivery of quality services across the buffering and bridging activities discussed in this paper.
9. Creation of supportive and effective start-up eco-system leads to more successful outcomes for incubatees.
10. Strong entry criterion to ensure incubatee compatibility.
11. It is a crucial criterion for the success of a university incubator to have a department, center or more institutions providing support to start-up companies via different forms.
Successful Practices of Selected University Business Incubators (case examples)

United States

Los Angeles Cleantech Incubator (LACI) - University of California, University of Southern California, California State University in Northridge, California Institute of Technology and Otis College of Art & Design

In partnership with the city’s exceptional educational and research organizations – UCLA, USC, Caltech and Jet Propulsion Laboratory – LACI helps accelerate the commercialization of their clean technologies in addition to accelerating new products developed by independent entrepreneurs. LACI is a result of the Clean Tech Los Angeles (CTLA) alliance among the Mayor’s office, the City’s universities, the Los Angeles County Economic Development Corporation, the Los Angeles Business Council, the Los Angeles Area Chamber of Commerce, LADWP and the CRA/LA. Los Angeles has launched its cleantech business incubator to accelerate development of cleantech start-ups by offering flexible office space, CEO coaching and mentoring, and access to a growing network of experts and capital. LACI is the business equivalent of baseball’s farm system: it identifies local talent, nurtures it, and helps it get to market, resulting in more jobs and a bigger green economy in Los Angeles.

http://laincubator.org/

1871 - Northwestern University, University of Chicago, University of Illinois, Loyola University, Illinois Institute of Technology and DeVry University

1871 is Chicago’s entrepreneurial hub for digital startups. Located in the famed Merchandise Mart, the 75,000-square-foot facility provides Chicago startups with programming, access to mentors, educational resources, potential investors and a community of like-minded entrepreneurs that help them on their path to building successful businesses. 1871 is the flagship project of the CEC.

http://www.1871.com/
Stanford University – StartX's Accelerator Program, United States

Stanford University is one of a world leading universities in entrepreneurship, which also actively supports the creation and growth of new ventures. StartX is a non-profit organization whose mission is to accelerate the development of Stanfords top entrepreneurs through experiential education. The program was formed 2011. Accelerator's core components are community, mentorship, education and partners. Community of Stanford's top entrepreneurs in a wide range of industries including consumer and enterprise IT, medical and hardware, raising over $700M with a $3M+ average per company funding rate from leading investors such as Greylock Partners, Andreessen Horowitz, and Founders Fund. Mentorship from over 200 serial entrepreneurs, experts, angels and VCs, including individuals from LinkedIn, Google, Twitter, Genentech, Johnson & Johnson, Kaiser, and many more in Silicon Valley. Education through customized programming and on-demand experts delivered to match the founders' needs. Resources over $100,000 in value from our Partners, including cloud computing and storage credits, developer platforms, and payroll software in addition to drop-in office space and legal advice.

http://startx.com/

Harvard University – Harvard Innovation Lab (i-lab), United States

I-lab is a resource for any student at Harvard University interested in entrepreneurship and innovation. The program is designed to help students grow their ventures at any stage of development and covers a wide range of disciplines. I-lab was launched in November 2011. Every semester cross-university student teams apply to participate in Venture Incubation Program. It is a 12-week integrated program that combines mentoring, workshops and community to help the teams move their startup ideas to business. Post-graduation select teams and other qualified applicants move to Launch Lab, a prototype co-working space and program of funded alumni ventures.

https://i-lab.harvard.edu/

University of Michigan – U-M Tech Transfer, United States

U-M Tech Transfer is the university organization responsible for the transfer of university technology to the marketplace. It enhances these research discoveries to encourage licensing and broad deployment with existing businesses and newly-formed U-M start-ups. U-M Tech
Transfer has earned a reputation for performance among the top 10 of all universities. One of the primary goals of the U-M Tech Transfer is to provide proactive assistance in analyzing potential opportunities to form a start-up based upon U-M technology and encourage this interaction during the early invention reporting process. Skilled new business formation staff also provides hands-on business assistance, project planning and links to funding and people resources.

http://www.techtransfer.umich.edu/index.php

University of Arizona – Tech Launch Arizona (TLA), United States

The idea of the TLA is in establishing the ecosystem for start-up companies to meet the people they are looking for. Ecosystem development combines outreach and advocacy to create a regional business environment where inventors, entrepreneurs and established businesses have the resources they need to thrive, backed by sound policy and a culture of innovation. Economic development is a natural outcome as well as an organizational focus through programs such as Tech House, which helps small businesses connect to funding and prepare strong, competitive grant proposals. The interactive ground of Tech Parks Arizona also plays a vital role in ecosystem development by supporting innovation, research and development, generating more than $105.6 million in tax revenues for state, county and city governments.

http://techlaunch.arizona.edu/

University of Chicago – UChicagoTech, Center for Technology Development & Ventures, United States

UChicagoTech, the University of Chicago’s Center for Technology Development & Ventures, drives the transformation of UChicago’s research into tangible products and services by engaging with partners in the University, in industry, and across the broader innovation community. Commercialization of UChicago’s research has led to several hundred license agreements with leading companies and over 70 startups since the office was formed in 1987. Companies interested in exploring a partnership, connecting with leading-edge researchers, or learning about available technologies should visit industry partners. The path from research to practical application can be long and complex and frequently benefits from diverse expertise and insights. UChicagoTech offers many resources & programs to increase the accessibility of support for developing projects.
University of North Carolina at Chapel Hill – Office of Technology Development, United States

The Office of Technology Development (OTD), in support of the university’s mission to encourage innovation and disseminate knowledge, serves the university and the public by licensing innovations developed by faculty, students and staff. Its services include evaluating, patenting, licensing and assisting faculty in obtaining research support from corporate sponsors.

http://research.unc.edu/offices/otd/

University of California, San Diego – Office of Innovation and Commercialization, United States

The University of California, San Diego (UCSD) recognizes the importance of fostering the development and utilization of innovations that result from research activities on campus for the public good. The proper management and protection of innovations as intellectual properties under various intellectual property laws and international trade treaties is an essential endeavour undertaken by the university to promote the successful placement of innovations for development and to advance the university’s missions. It is the goal of the university to nurture a highly proactive culture committed to the development and transfer of innovations from campus to the private sector for the benefit of society.

http://invent.ucsd.edu/invent/

Canada

The DMZ at Ryerson University

The DMZ at Ryerson University is one of Canada’s largest business incubators for emerging tech startups. The top-ranked university incubator in North America and third in the world, it helps startups succeed by connecting them with customers, advisors, influencers and other
entrepreneurs. The DMZ is open to all startups that meet its criteria — no Ryerson affiliation is required. Startups must: be addressing an important economic or social problem, make innovative use of technology, and have a prototype (at minimum) that is already in the market with or is ready to launch. At that stage, the DMZ can help fast-track their growth through connections and programming.

https://dmz.ryerson.ca/about/dmz-model/

Innovate Calgary – University of Calgary

Innovate Calgary is the technology-transfer and business-incubation centre for the University of Calgary. Working closely with Research Services and the Office of the Vice-President (Research), Innovate Calgary works to help bridge the gap between discovery and innovation. The story began with a recognition that a new approach to commercialization was required that focused on the needs of entrepreneurs/SME's, researchers/inventors and early stage investors. This balanced approach recognized that all stakeholders must have their needs met in order to achieve success. A new model catering to the full technology community was developed that facilitated connections among stakeholders, and offered a wide variety of programs and services.

http://www.innovatecalgary.com/

Europe

SETsquared Partnership – University of Bath, University of Bristol, University of Exeter, University of Southampton, University of Surrey, United Kingdom

The SETsquared Partnership is the enterprise collaboration between five leading research-intensive universities: Bath, Bristol, Exeter, Southampton and Surrey. Established in 2003 and funded by the Higher Education Innovation Fund (HEIF), the Partnership is a focus for enterprise activity and new business creation for the five university partners. SETsquared’s mission is to help turn an innovative idea into a thriving, commercial business. The aims of the SETsquared Partnership are to accelerate the growth of high-tech start-up companies through the five business incubation centres, to develop the entrepreneurial talents of the students at the five partner universities and help academic researchers realise the commercial
impact of their work. The incubation centres provide space and support for early-stage, high-growth potential technology ventures to help them develop into viable trading businesses. 80% of the incubated companies are from the external business world, 20% originate from within the universities. SETsquared encourages student entrepreneurship and provides opportunities for student enterprise groups to share their ideas across the five universities. Through a tailored programme of activities and events, students can gain valuable hands-on business experience and access expertise in order to get their own ventures off the ground. SETsquared also has a role in embedding entrepreneurial thinking and behaviour within the universities that it supports. It does this through a programme of student enterprise activity and also by supporting researchers and academics to realise the commercial and social impact of their research.

http://www.setsquared.co.uk/

**PoliHub Startup District & Incubator**

PoliHub is the business incubator of the Politecnico di Milano managed by Fondazione Politecnico di Milano and supported by the Milan Municipality. PoliHub offers: an entrepreneurship empowerment program, a unique business network for start-ups, dedicated spaces, a set of innovative value-added services for start-ups. PoliHub supports the growth of high-potential start-ups and the development of strong start-upper network.

http://www.polihub.it/en/

**INiTS – Vienna University of Technology, University of Vienna, Austria**

INiTS is a common business incubator of the Technical University of Vienna and the University of Vienna. The incubator is designed to improve the rate of startup success in Vienna by helping young entrepreneurs conceive, launch and grow the company. During an intensive incubation program, startups receive hands-on support, resources, a network and an office space to bring them to the next level. INiTS offers an 18-month long incubation program to selected startups. It has supported around 150 startups since 2002, in establishing a company, market entry and expansion. It offers up to 30,000 € funding per startup without taking shares of the startup, office and infrastructure, consulting and training through consultant team, access to network of experts and mentors and a competitive and innovative startup community. Support for startups consists of five steps: (1) application, (2) pre-incubation, (3) startup camp, (4) demo day, (5) development support. Development stage
lasts for 15 months. The aim is to support the startup for the challenges at this stage such as prototyping, market access, growth, strategic partnerships, and internationalization. Performance of the incubator: 158 startups, 383 patents, 980 jobs, 154 million Eur private capital, 93 Mio million funding.

http://www.inits.at/en/

ATP Innovations – The University of Sydney, Australian National University, The University of New South Wales, University of Technology Sydney, Australia

ATP Innovations is Australia’s leading business incubator. It is a common enterprise of four Australian universities. The incubator partners with technology-based businesses to give them the best chance of achieving commercial success as quickly as possible. ATP Innovations works with researchers and entrepreneurs to help them raise capital, build a team, secure government grants, create new products, grow revenue and ultimately exit the business profitably. ATP Innovations provides long-term business guidance and support throughout a company’s life cycle. Businesses accepted into the incubators are often past early stage of concept development. Customer validation and product market fit are key markers of suitability. Entry into the incubator is selective and the relationship between the entrepreneur, company and incubator is a long one, lasting until the effective sale of the business. Services offered by the incubator consists of: product development, team building, grants accessing, capital raising, revenue growing, business selling, office and lab facilities and a medical device program. The incubator has worked with more than 80 businesses since 2006, helping them raise over $150 million, file 250 patents and trademarks, sell products across the globe and for eight, sell their business. ATP Innovations hosts Sydney’s largest community of entrepreneurs within the National Innovation Centre, where more than 60 companies employ over 350 staff. The incubator strives to create a supportive entrepreneurial eco-system where innovation can thrive.


Imperial Innovations – Imperial College London, United Kingdom

Imperial Innovations is a technology commercialisation company, combining the activities of technology transfer, intellectual property licensing and protection, company incubation and investment. It is focused on the commercialisation of the most promising opportunities from a broad range of technology sectors, with particular expertise in therapeutics, medtech,
engineering & materials and ICT. Imperial Innovations is focused on commercialising leading UK academic research sourced from the golden triangle formed between Cambridge, Oxford and London. The Group was founded in 1986 as the technology transfer office for Imperial College London, to protect and exploit commercial opportunities arising from research undertaken at the College. In 1997, the Group became a wholly-owned subsidiary of Imperial College London and in 2006 was registered on the Alternative Investment Market of the London Stock Exchange, becoming the first UK university commercialisation company to do so. The Imperial Incubator at the Imperial Innovations is a hub for innovation and entrepreneurship, providing office and laboratory space for early-stage companies. The two-storey 24,000 foot Incubator facility contains 12 laboratories, 22 offices, meeting rooms and break-out areas. This state of the art premises is conveniently located in South Kensington, making it an ideal location for commuters. The Incubator contains a true entrepreneurial community who share the experience of developing technology business. Imperial Innovations runs a programme of seminars and events at the Incubator, designed specifically for entrepreneurs and inventors.

http://www.imperialinnovations.co.uk/

http://www.imperialinnovations.co.uk/technology-transfer/incubator/

Asia

Innovation Incubation Center Chaoyang University of Technology

Chaoyang University of Technology has established “Innovation and Incubation Center” in 1999. The Innovation and Incubation Center is located in Central Taiwan Science Park. The main tasks of the Innovation and Incubation Center are to integrate academic research, R&D of apparatus, and human resource of the Chaoyang University of Technology, help training the industrial entrepreneur in advanced management, innovation and renewal. The Center promotes industrial-academic cooperation and makes contribution towards upgrading industries. Tasks are listed as the following.

http://www.cyut.edu.tw/~incubatr/ushtml/1_1.php