Contrasting Models of Incubation for Enterprise Creation: Exploring Lessons for Efficacy and Sustainability from Higher Education Institutions in India and the United Kingdom

Rakesh Basant
Sarah Cooper

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Rakesh Basant[1]
Sarah Cooper[2]

Abstract

Encouraging the establishment and growth of technology-based ventures continues to be the focus of attention from policy-makers globally, linked to enhanced levels of innovation, economic activity and wealth/employment creation. Higher education institutions (HEIs) are prominent among the public, private and not-for-profit organisations supporting the commercialisation of scientific outputs. Modes and vehicles adopted include spin-outs, science parks, intellectual property exploitation and different forms of incubation activity. Some HEIs in the United Kingdom have significant experience of commercialisation and technology transfer activities and have developed markedly different approaches. Meanwhile, HEIs in India are broadening their attention from their teaching-research focus to wider engagement in supporting venture creation. While approaches differ between HEIs all face issues of efficacy and sustainability. Set within the wider context of the HEI commercialisation agenda this paper focuses on incubation models, with particular attention to efficacy and sustainability dimensions. Using six case studies (three each from UK and India), we identify contrasting ways in which incubation was undertaken. Findings raise questions regarding whether and if so how HEIs should be involved in the business of incubation to enhance efficacy and provide a more broadly-based and robust platform for underpinning sustainability.

Keywords: incubation; enterprise creation; higher education institutions; sustainability; efficacy; India-UK comparison.

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[1] Indian Institute of Management, Ahmedabad 3, INDIA, email: rakesh@iimahd.ernet.in
[2] University of Edinburgh Business School, The University of Edinburgh, United Kingdom

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1. Introduction

Encouraging the establishment and growth of technology-based ventures continues to be the focus of attention from policy-makers globally, linked to enhanced levels of innovation, economic activity and wealth/employment creation. Higher education institutions (HEIs) are prominent among the public, private and not-for-profit organisations supporting the commercialisation of scientific outputs via a range of government-supported/encouraged initiatives (Geuna & Muscio, 2009) and those offered via individual and cross-institutional collaborations. Modes and vehicles adopted include spin-outs, science parks, intellectual property exploitation (through patenting and licensing) and different forms of incubation activity. Some higher education institutions (HEIs) in the United Kingdom (UK) have significant experience of commercialisation and technology transfer activities and have developed markedly different approaches. Meanwhile, HEIs in India are broadening their attention from teaching-research focus to wider engagement in supporting venture creation. While approaches differ between HEIs all face issues of efficacy and sustainability.

The paper draws on literature on the wider context of HEI engagement in commercialisation and studies which explore contrasting models adopted and drivers/motivations which have influenced institutional choices. We also consider measures of effectiveness and sustainability which may be applied in the HEI context. Set within the wider context of the HEI commercialisation agenda, this paper focuses on incubation models, with particular attention to efficacy and sustainability dimensions. Evidence was gathered using a qualitative, case-based approach, investigating experiences of HEIs in India and the UK in the area of business incubation. Three institutional case studies were undertaken in each country, with data collected via in-depth interviews with key HEI actors and some beneficiaries of incubation support.

The rest of the paper is divided into three sections. We briefly review the relevant literature in the next section, focusing briefly on studies which have explored factors which have encouraged universities to become engaged in commercialisation activity and then consider those which have explored incubation drivers and practices in HEIs and addressed issues of efficacy and sustainability of incubation related activities in these institutions. In the third section of the paper we build on this discussion to explore dimensions of effectiveness and

sustainability which emerged from our case studies. These dimensions are then used to undertake a comparative analysis of the six incubators/institutions that we have studied. The final section concludes with some questions that the policymakers as well as the leaders of the HEIs may wish to address in order to make the incubation activity in HEIs more meaningful.

2. Insights from the Literature

There is increasing attention targeted towards and financial pressure on HEIs to generate economic and social impact from their research and wider educational activities. Forming one of the three pillars of the triple helix (Ezkowitz & Leydesdorff 2000), which brings together government, academia and industry players, HEIs have the potential to contribute to innovation and economic renewal. The commercialisation and transfer of HEI-generated know-how and technology, reflecting the successful transformation, exploitation and commercial acceptance of outputs of academic research, represents a key example of how institutions are able to demonstrate their ability to generate academic, economic and social impact and value (Markman, Siegel & Wright, 2008)

By contributing to innovation and the enhancement of economic activity, and consequent wealth and employment creation, exploitation of outputs from the science base of an HEI can also help enhance its institutional reputation. The means and vehicles via which research outputs are commercialised, in the form of products, services and know-how varies, and whilst an early focus of commercialisation activity tended to be on the transfer of technology to the commercial world via licensing of patented technology to external organisations and the creation of technology-based spin-outs, the focus has shifted to emphasise also how universities can educate and develop human capital. Students and staff are key examples of the talent to be developed so that individuals are more 'entrepreneurial' and, arguably, better-placed to engage in the entrepreneurial process. Thus, HEIs have turned their attention to putting in place systems and structures to help nurture and incubate ideas/technology and new ventures, and the people capable of leading commercialisation and venture creation.

HEIs are, therefore, becoming increasingly entrepreneurial and a source and locus for start-ups and spin-out company formations (Rothaermel, Agung & Jiang, 2007; Siegel, 2006; Sheen & Broadfoot, 2002). The increase in levels of academic entrepreneurship, for example via the establishment of spin-out companies reflects this trend, with HEI staff exploiting technological opportunities generated through their research (Rosa & Dawson, 2006; Van Burg et al, 2008; Fuentes et al, 2012). While entrepreneurial HEIs are seen as

having an important policy role to play in regional and economic development (Bercovitz & Feldman, 2006; Bathelt, Kogler & Munro, 2010; Etzkowitz et al, 2000), the growing links between HEIs and business benefit not only the HEIs, but also impact firms' innovative output by making them more attractive to alliances resulting in a reduction in in-house R&D expenditure (George et al, 2002).

As levels of commercialisation activity have risen there has been a commensurate increase in the emergence of different types of structures to support and facilitate commercialisation in its various forms. Such structures include technology transfer offices, science parks, incubators and industry-university research centres (Cooper, 2001; Perkmann, Tartari, McKelvey, et al., 2013), intended to assist the creation and growth of spin-off firms by providing targeted support facilities such as low-cost space, access to consultants and other forms of advice. Different forms of incubation activity (e.g. physical and virtual) constitute one among a variety of the modes and vehicles for commercialisation used by HEIs, e.g., spin-outs, intellectual property licensing and outreach.

van Burg et al. (2008) argue that to stimulate higher levels of engagement in commercialisation activities, and particularly spin-outs, HEIs should (i) create institution-wide awareness of entrepreneurship opportunities, stimulate ideas and screen entrepreneurs and ideas by programmes targeted at academics and students, (ii) support start-up teams by providing them access to advice, coaching and training, (iii) help start-ups in obtaining access to resources and developing their social capital by creating a network of investors, managers and advisors, (iv) set clear and supportive rules and procedures which regulate the university spin-off process, enhance fair treatment of those involved and separate spin-offs from teaching and academic research, and (v) create a culture of academic entrepreneurship by creating norms and exemplars that encourage entrepreneurial behaviour.

2.1 University business incubation

In supporting directly and indirectly HEI-based incubators, the agendas of both governments and HEIs essentially have commercialisation of scientific output as a key dimension. According to Etzkowitz (2002) the academic 'incubator' concept originated at Rensselaer Polytechnic Institute in the US, several decades ago. Sheen & Broadfoot (2002) identify the first European pre-incubator as being established in Germany in 1977 at the University of Bielefeld with an objective of producing academic entrepreneurs to help make the University's spin-offs more sustainable. Similar incubation activities can be seen in Europe, for example in a range of Scandinavian HEIs (Efthimiadou, Prokopiou & Kokorotsikos, 2011; Rasmussen & Sørheim, 2006).

The introduction of HEI-based business incubation infrastructure represents an important step towards development of entrepreneurial HEIs, signalling a shift in focus from development of individuals to development of organisations (Etzkowitz, De Mello & Almeida, 2005; Etzkowitz, 2002). Many of today's HEI-based business incubators are built around the premise that venture formation can be improved, and likely performance can be enhanced, by organising it as an educational and developmental process, with formal and informal aspects. Thus, there is also a growing trend for HEIs to offer entrepreneurship education and focus on learning by doing rather than the traditional teaching methods.

Aernoudt (2004) argues that the term 'incubator' has become more of an "umbrella word" used to describe similar institutions but with different objectives, and goes on to differentiate among different types of incubators based on their objectives and scope. Table 1 outlines the different types of incubator, highlighting similarities and differences in their objectives and operations.

Some focus on basic research while others on social or technology ventures. Similarly objectives can vary from start-up creation to regional/social development or basic research. While some are sector agnostic, others may focus on high-technology domains or social sectors. Typically, while incubators located in HEIs may have regional development as their objectives, their primary focus is enterprise creation using technology and/or research as a critical input (Grimaldi & Grandi, 2005).

Table 1: Typology of Business Incubators

Type of incubator	*Main philosophy dealing with*	*Main objective*	*Secondary objective*	*Sectors involved*
Mixed	Business gap	Start-up creation	Employment creation	All sectors
Economic development	Regional or local disparity	Regional development	Business creation	All sectors
Technology	Entrepreneurial gap	Entrepreneurship creation	Stimulate innovation, tech start-ups and graduates	All sectors or targeted, prioritised sectors
Social	Social gap	Integration of social categories	Employment creation	Non-profit sector
Basic research	Discovery gap	Blue-sky or fundamental research	Spin-offs	High technology

Source: Adapted from Aernoudt (2004)

Grimaldi and Grandi (2005) classify incubators according to four different categories: Business Innovation Centres, University Business Incubators, Corporate Private Incubators and Independent Private Incubators. A similar typology has also been used by Carayannis and von Zedtwitz (2005) who differentiate between profit and non-profit incubators, and also aim to propose an incubator model which consists of five defining services: office space, office support, access to financial resources, entrepreneurial start-up support, and access to financial resources and networks. The authors have also argued that all five services should be provided to start-ups in order to qualify it as an incubator in the strongest sense of the term, while fewer than four services will indicate that it is not an incubator.

Bathelt et al. (2010) propose a taxonomy of university spin-offs based on the different roles a university assumes in supporting the firm formation process of new ventures in a regional context. They highlight that the role of HEIs can vary in the spin-off process, and while many categorise spin-offs on the basis of the exploitation of HEI knowledge applied to the spin-offs, some do not have this as a requirement to call the new venture a spin-off. They classify sponsored spin-offs as those which exploit core HEI-generated technology while unsponsored spin-offs are linked with idea development based on broad generic knowledge and specific knowledge not so closely linked with the HEI.

Sheen & Broadfoot (2002) propose a set of practices which can be adapted to regions or institutions with the intention that individual institutions will determine their own set of best practices regarding pre-incubator establishment. They group issues to be taken into consideration into four categories: strategic fit, infrastructure, organisation and management, services to spin-offs and entrepreneurs. Under each heading they highlight a range of factors which should be taken into consideration in working out the shape and nature of the incubator being established. Their framework is intended to avoid problems further down the line with respect to focus, form and function.

Table 2: Issue to consider in incubator establishment

Strategic fit	Infrastructure	Organisation and Management	Services to Spin-offs
• Relationship with other functions within the university offering assistance for commercialisation • Services these structures can offer • Fulfillment of the needs of the entrepreneurs • How the pre-incubator adds to the regional infrastructure • What other assets/ stakeholders could be brought together in a supportive manner with what kind of anticipated return	• Ownership • Public/private finance • Legal status • Profit 'centres' with capacity to trade • Learning by doing • Timely access to expertise • Indemnity • Capacity to market test • Capacity for concept development	• Autonomy and Control • Management and Internal Expertise • Financial Support and accounting practices • Networks and access to external expertise • Selection procedures • Accountability	• Training • Teaching • Coaching • Mentoring • Counselling • Networking • Group mutual assistance

Source: Sheen and Broadfoot (2002)

Although a variety of incubation approaches have emerged the 'basic' incubation model and related practices include a selection process, subsidised space, shared services, mentoring and education, networking and venture capital (Etzkowitz, 2002).

2.2 Measures of Effectiveness and Sustainability

There is on-going interest in how to evaluate the performance of incubators and also compare performance across them. Bergek & Norrman (2008) point to the absence of a clear and common definition regarding performance measures and criteria as being one of the factors contributing to the lack of agreement as to whether incubators are an "effective business development tool" (21). In their review of incubator best practices they highlight some of the key outcome measure (such as the number of new firms supported, the number of jobs created and the length of time which firms survive) as some of the frequently used criteria. They suggest, however, that such measures do not take into account how incubator activities are organised and managed.

According to Lalkaka (2000), *effectiveness* can be measured in different ways depending on the main objective of the incubator. It can include (i) employment generated per unit of

money invested; (ii) growth in net worth of firms created/incubated; (iii) number of cases of commercialising research, patents or other kinds of intellectual property; (iv) engagement of specific target groups (e.g., rural communities, youth, or women); (v) angel/seed venture capital mobilised; or (vi) success in expansion of the incubator. Similarly, *sustainability* may be dependent on (i) revenue surplus for the incubator; (ii) recovery of services costs; (iii) nature and extent of university-business link/interactions; (iv) satisfaction of tenant (incubatee)/student; (v) satisfaction of stakeholders other than the incubate (e.g., HE administration, researchers, angels, mentors; (vi) cultural change towards commercialisation and (vii) enhanced entrepreneurial skills and self-efficacy.

Efficacy and sustainability of the incubation activity in the context of HE institutions is usually linked to successful commercialisation of institution's technologies, design and/or business models through enterprise creation (as against licensing to outsiders). It is also seen as a function of the effectiveness of support to other start-ups, if the incubation activity is open to outsiders. Extending the idea of stakeholder satisfaction, as flagged in Lalkaka (2000), one can also consider effective exploitation of learning opportunities created by the incubation activity for teaching and research. In other words, the extent to which incubation activity can support the creation of innovative courses, participation of students in 'live' projects with start-ups supported by the incubator and leveraging incubation activity to foster research in the areas of innovation and entrepreneurship. In contexts that represent relatively weak institutional structures supporting new ventures, the incubator's contribution to building the entrepreneurial eco-system can also be seen as an important part of its impact.

Much of the more recent research has focused on issues related to the experience of incubator clients and how their viability is enhanced through the support which they receive with little discussion of how viable incubators are if they were to be evaluated on their ability of generate funds to be self-supporting. As HEIs have diverse motivations for engaging in incubation there is little discussion of how viability and sustainability are framed in determining whether the incubator remains open for business.

2.3 Method of enquiry and issues for investigation

The review of the literature informed thinking about issues relevant to the development and support of incubation in today's HEIs. Which dimension should receive more attention in an HEI? To what extent are these institutional choices real? One can argue that learning opportunities are a function of the *nature* of HE institution. For example, a large university encompassing diverse disciplines may be able to create more learning opportunities both for students and faculty than HEIs that specialise in specific disciplinary areas. And within

specialised institution, such opportunities may vary depending on whether the institution focuses on technology, management, design, social sciences, media etc. It is possible that institutional demands on financial sustainability may constrain the activity profile and, therefore, the choice of impact and/or sustainability dimensions the incubator may decide to focus on. Given this, should attention differ by type of incubators and its location, i.e., what kind of HEI it is located in?

At a broader level, given the fact that most incubators in HEIs (at least in the developing economies) face challenges when it comes to financial self-sustainability what should be the focus as the key dimension of sustainability of incubation activities in such institutions? Our case studies suggest that financial sustainability of the incubation activities (revenue streams) need to be explicitly combined with organisational sustainability. Organizational sustainability in turn might mean attracting and retaining good people for incubation activities along with organisational acceptance of incubation as a useful activity within the HEI. Revenue streams and extent of commercialisation through incubation of technology/design developed within the HEIs would be critical for enhancing perceptions of utility in such institutions. For HEIs which do not develop technologies for commercialisation, learning opportunities and revenue streams may enhance the perceived usefulness of incubation activity; the latter ensuring that this activity is not resulting in significant financial drain from the HEI.

Efficacy and sustainability of incubators are dependent on a variety of factors. In practice efficacy and sustainability are intricately linked. If the incubation process is efficacious, financial and organisational sustainability of the incubation activity becomes easier. Conversely, if initial commitments ensure organisational buy-in and financial support, efficacy of the incubation process is facilitated.

To explore some of these issues we undertook case studies of six incubators in HEIs, three each in India and the UK. We gathered evidence using a qualitative, case-based approach, with data collected via in-depth interviews with key HEI actors and some beneficiaries of incubation support. The institutions which were the focus of study were as follows: In the UK, (i) The University of Edinburgh; (ii) University of Oxford; and (iii) University of Manchester. In Indian we conducted research in the following institutions: i) Indian Institute of Technology, Kharagpur (IIT-K); (ii) Indian Institute of Technology, Bombay (IIT-B); and Indian Institute of Management, Ahmedabad (IIM-A). In the following section we discuss these cases through different lenses.

3. Six Cases of Incubation Activity in HE Institutions

The diversity among UK and Indian HE institutions is high but comparisons bring out some useful insights. All UK incubators were located in large multi-disciplinary research-oriented universities with significant in-house science and technology outputs that can potentially be commercialised. Besides, good business and design/engineering schools exist in all three universities where these incubators are located - the University of Edinburgh; University of Oxford; and University of Manchester. Of the three Indian cases, two are located in high-end engineering/ technology institutions and the third at a high-end management school. Both engineering schools have reasonably high research orientation and have their own business schools. One of them, (Indian Institute of Technology, Bombay) has a good design school as well. Research was undertaken exploring each of the three Indian institutions - the Indian Institute of Technology, Kharagpur (IIT-K); the Indian Institute of Technology, Bombay (IIT-B); and the Indian Institute of Management, Ahmedabad (IIM-A).

3.1 Dimensions of Efficacy and Sustainability: A Tentative Comparison of the UK and Indian Cases

While the institutions covered are very diverse and somewhat difficult to compare, on the basis of our discussion in the last section, we focus our attention on the following dimensions of efficacy and sustainability:

i. Incubation process and outcomes;
ii. Links with the entrepreneurial eco-system;
iii. Financing structure of incubators and of incubatees;
iv. Integration of incubation activities with other academic activities of the HE institution; and incentives at the HE institution and at the incubator.

It needs to be mentioned at the outset that some of these comparisons are based on impressions of the authors as data on a variety of issues is difficult to collect.

3.1.1 Incubation Process and Outcomes

In all except one incubator under study, access is largely restricted to faculty, students and alumni of the HEI in question. In that respect, incubation in all these HEIs is a mechanism to commercialise technologies developed within the institution and/or support persons 'internal' start-ups. Only the Center for Innovation, Incubation and Entrepreneurship (CIIE) at IIMA is effectively open to outsiders. Unlike other institutions, CIIE also undertakes programme-based selection of incubatees wherein different kinds of sector specific and other programmes are organised to select incubatees. This is presumably because the incubator is mandated to focus on innovation-driven enterprises but is located in a management institution.

Broadly, key aspects of the incubatee selection process seem similar; all incubators evaluated technical feasibility, market potential and team composition to identify start-ups for investment and support. However, actual implementation of these criteria may not be as rigorous and systematic across institutions. Start-ups that are supported are innovation/technology-driven in all cases; CIIE also has a focus on innovative combinations of existing technologies. UK incubators seem to be more active in identifying potential technologies developed within the institutions. They have better systems and better business development persons that undertake active scouting in all the labs in the HEIs. Such systems are weak in the Indian technology institutions. UK incubators talked less about team issues, although Edinburgh introduces experienced individuals in developing companies that are under incubation. Remote incubation is not the norm in five of the six incubators, with CIIE as the only exception. This is essentially because monitoring of start-ups is difficult when they are not located in physical proximity. CIIE wishes to achieve scale through remote incubation so that more revenue can be generated and the capabilities of staff can be better utilised.

All incubators provide mentoring but the quality varies and the intensity of involvement of mentors also differs greatly across HEIs. In the UK there seem to be a 'real estate' type of involvement and in some cases relatively little hands-on support is provided. It is possible that the felt need for mentorship is higher in India due to the inadequacies of the entrepreneurial eco-system.

Financing through seed and other funds is almost a rule in the Indian cases but not in the UK institutions. One can argue that existence of seed funds in the Indian HEIs is probably due to the higher market failures in the Indian capital market for new venture investments. The UK institutions do connect their start-ups to the angel investors through various mechanisms. While seed funding in UK is largely equity-based and undertaken through angels, Indian institutions mainly depend on seed funds operated by the incubators themselves and combine debt and equity in India. In most cases these seed funds are created through grants given by the government.

By and large, the expertise available in the UK incubators is better and more appropriate for the needs of the start-ups. Most people who work in these incubators have significant industry and/or entrepreneurial experience. This may partly be a function of that the fact that UK HEIs are able to pay competitive salaries, being financially better endowed. As a

consequence, the quality of in-house mentoring is better in UK HEIs as compared to Indian ones.

In-house technology driven incubators, both in India and the UK, seem to be engaged at an earlier stage of the entrepreneurial life cycle. Often these incubators take in start-ups at the pre-prototype stage if the technology from a lab is found to be promising. In that sense, incubation in such HEIs is a variation of the Technology Licensing Office (TLO) model wherein in internal technologies are sought to be commercialised through the incubation route. Such an option is difficult for the incubator located in the management institution (CIIE) as it does not have access to technology infrastructure. Conceptually, therefore, CIIE can be seen as an 'accelerator' while the other five may be seen as 'incubators cum accelerator'.

3.1.2 Relationship with the Entrepreneurial Eco-system

Discussions with the incubator managers suggest that none of the incubators have access to the Bay Area-like entrepreneurial eco-system. UK incubators are reasonably well connected with their local eco-systems but the quality varies. For example, the incubator managers in Edinburgh mentioned lack of proximity to venture capitalists (VCs) as a constraint in Scotland which is only partly overcome by the active angel networks. Proximity to London was seen as critical for active participation of VCs. Among the Indian cases, none of the HEIs, except IIT-B seem to have a city advantage as it is located in the metropolis of Mumbai. But all three have significant advantages of institutional brand name and alumni clout which they are slowly learning to leverage to their advantage. Unlike the UK incubators' local eco-system which is reasonably vibrant, the Indian ones do not have that advantage (except IIT-B perhaps) and are trying to get linked to the national eco-system.

In situations where the entrepreneurial eco-system is weak and incubation activity gets constrained by this gap, who should contribute to eco-system building? Should the incubator get involved in that as well as at a broader level regional development can be seen as one of its objectives. Indeed, through nation-wide institutional competitions, all Indian HEIs contribute to the eco-system building activity. CIIE at IIMA, however, is much more active than the others. None of the six HEIs under study seems to have significant online resources.

Prima facie, given the nature of market failures, the role of government should have been higher in India than in the UK. Indeed, on the surface that seems to be the case as the Indian is government setting up incubators in HEIs and providing funding to create seed

funds etc. However, a closer look suggests that the government's role may be quite high in both countries, with very similar activity profiles except for the seed-funding to build and/or enhance the eco-system.

3.1.3 Financing Structure

All incubators are dependent on HE institution's funds and leverage government support. It is not entirely clear if the relative dependence on state funds is larger in one country than the other. Funds flow through a variety of programmes of the state in both nations. For example, the University of Edinburgh benefits from economic development funds and 'Innovation Funds' are available to all UK universities to support such activities. The Department of Science and Technology (DST), Government of India has supported all the three incubators under study in India. Availability of University funds seems to be more for the UK HEIs than the Indian ones. However, it is difficult to say this with certainty as HEIs in both institutions benefit from research (innovation) funds as well as incubation-specific funding. Interestingly, reliance on foundations and corporates is not very high in any of the incubators under study. Financing structure seems to be most diverse for CIIE at IIMA as it delivers a variety of programmes with corporate and other sponsorship and partly fund its expenses from the management fees of Venture Funds that it manages. In many ways, CIIE is moving towards an incubator cum VC model.

Overall, no incubator seems to be financially self-sustainable on the basis of its own revenue streams as rentals and mentoring fees (if any) are typically small and significant capital gains from exits from start-ups are few and far between, especially for the Indian cases where incubation is a relatively recent activity and yet to mature. This raises questions as to what financing options do incubators located in HEIs have? Is incentivising incubator staff useful and if so how might it best be done? Should incubators offer paid programmes around entrepreneurship (IIT, Kharagpur has initiated that recently), or should it undertake incubation related consulting (as is the case at Oxford)? Only the University of Manchester incubator is listed in the stock exchange; others are organised as companies/societies but are not listed.

As mentioned, seed funding is available in all cases but such funding is more common in the Indian cases than in those in the UK. Moreover, the UK HEIs tend tie up with Angels and/or VCs instead of operating their own seed funds. Only CIIE at IIMA is strategically trying to co-invest with Angels as much as possible. To the extent seeding is done in UK HEIs, mainly University funds are used while state funds are used for seeding in India. Moving forward, there is a question as to whether a public-private partnership fund like INFUSE (at CIIE) is a

good option? After the initial round of funding there is the issue as to how incubators can help ensure support for subsequent rounds of funding, especially in situations where market failures are high. Despite detailed discussions, it is not clear whether funding is adequate for UK HEI incubators, in other words, are market failures higher in India than in the UK?

3.1.4 Integration with research and teaching activities and incentives

Integration with institutional learning activities (teaching and research) is rather low in all incubators as participation of students and faculty minimal except as incubatees. Incubation activity can provide a lot of learning opportunities through courses and research but that potential is not exploited. UK incubators probably do not feel the need as other departments provide these courses and undertake research but opportunities do exist (individual faculty facilitate exploitation of these opportunities through projects). But the existence of diverse departments within the HEI may make exploitation of learning opportunities easier as intra-institutional collaboration is likely to be easier than inter-institutional collaboration, at least in theory. But existence of diverse departments within the institution may not result in collaborations to exploit these synergies. IIT-K could not exploit these apparent synergies and is building a separate programme in innovation and entrepreneurship, recruiting separate faculty, including in the areas of technology. The existing institutional structure in IIT-K could not exploit learning opportunities despite the presence of a Business School within the institution. Such integration is being slowly built up at CIIE (IIMA) through project and regular courses and some research, including links with other local institutions in the field of design and technology. In IIT-B some efforts in this direction are being made through short duration experimental courses but other departments in the institution are not synergistically linked.

It was not clear the extent to which the absence of links between the incubation activity and learning opportunities was due to the incentive structures for faculty and students. Incentives for faculty to license and set up enterprises are more mature within the UK systems but are only just evolving in India. There are no specific incentives in the UK to offer courses and undertake research that relates to the incubation activity on campus apart from the generic incentives to do research. The same is true of Indian HEIs. Does one need to undertake specific actions to highlight the benefits of such linkages to academic departments and individuals, and if so what might such activities look like and what should be the nature of this intervention? The answer to these questions may partly be dependent on the perceived importance of such linkages, not only for creating learning opportunities but also for organisational sustainability. Our discussions suggest that the incubators are not

explicitly thinking about it except at CIIE which happens to be the only incubator with no internal technology generation.

4. In Conclusion – Some questions to ponder

Through a summary of six incubators in India and UK, we have identified contrasting ways in which incubation was undertaken, exploring dimensions such as incubatee selection, technology focus, actual vs. virtual facilities, availability of mentoring/other services, provision of financial support and mechanisms for long-term funding of incubation activities. The relationship between business incubation activities and creation of learning opportunities around entrepreneurship at an institutional level are also explored.

Our preliminary findings raise questions regarding whether and if so how HEIs should be involved in the business of incubation. They also highlight the importance of joining-the-dots, fostering strong links with other areas of HEI activity linked to the commercialisation agenda, e.g. entrepreneurship education, to enhance efficacy and provide a more broadly-based and robust platform for underpinning sustainability.

To conclude, we raise a set of questions that were partly explored in this paper but remain to be addressed systematically in order to enhance the efficacy and sustainability of incubation related activities in HEIs. The key question is: Why should HE institutions set up incubators? Should the objective be restricted to the commercialisation of technologies developed in the institution to generate revenue for the HEI, an objective similar to that of a TLO? Or, should the purpose be broadened to create innovation driven enterprises for local development and for building the regional or national eco-system? Should the creation of learning opportunities on HEI campuses be an important objective of incubation activity? Having an incubator is very common these days in countries like India. Should all HEIs have such incubators without thinking through these questions? Is it for enhancing institutional reputation as everybody else is doing it!

If the idea is to encourage entrepreneurship, why not offer entrepreneurship courses, especially in institutions where technologies are not being developed? That is, focus on creation of entrepreneurs rather than enterprises. Since different types of HEIs have different needs, should they focus on different types of incubation activity? For example, should management schools, engineering schools and universities have different models of incubation? Should the selection mechanisms, stage of intervention, type of enterprises to be supported also vary across such HEIs? More broadly, should, ‘specialised 'educational

institutions focus on different strategies, structures, and relationships as compared to broad-based HEIs?

At another level, one may need to figure out if there are there economies of scale and scope in incubation activity? There may be diseconomies in supporting and monitoring larger numbers of start-ups which may also affect the breadth and depth of involvement affecting the effectiveness of start-up support. However, larger numbers may diversify risks and help in revenue generation and better utilisation of managerial resources available at the incubator. However, limited managerial band-width may reduce efficacy as well. To what extent scale and scope affect financial sustainability and the potential of learning opportunities that the incubation activities create?

Does 'location' of the incubator matter? How important is the city cluster specific entrepreneurial eco-system? How can this affect strategic options available for institutions and policy-makers? As mentioned IIT, Kharagpur in India has a city disadvantage vis-à-vis IIT, Bombay. Similarly, Edinburgh seems to have some disadvantage vis-à-vis Oxford given the latter's proximity to London. Should the State continuously support incubators as they are an important element of the National Innovation System? We have seen that even in a developed economy like UK, the State remains quite active. Should the nature of intervention be different in the two contexts represented in the HEIs of the two nations?

Further exploration of these questions can contribute to a more detailed understanding of the nature of HEI business incubation and contrasting models and their relative advantages in enhancing efficacy and sustainability of this activity.

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