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Third Stream Activities: Company Formation – Issues, Challenges and Implications



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INTRODUCTION

The increased emphasis on innovation and technology transfer as the key drivers of a globally competitive economy has led to more direct attention being paid to the role of Higher Education Institutions (HEIs) within this field of activity (Fassin, 2000: 31; Forfás, 2004). This is best captured in the concept of a triple helix system, which recognises that the future location of research and technology transfer reside in a triple helix of university–industry–government relations (Etzkowitz and Leydesdorff, 2000; Leydesdorff, 2000). The perception of HEIs as merely institutions of higher learning is therefore gradually giving way to the view that HEIs are important engines of economic growth and development (Chrisman et al., 1995).

Recent developments in HEI–industry collaboration and technology transfer mechanisms have been driven by a number of factors, including scientific breakthroughs, developments in ICT (information

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and communications technology) and appreciation of the complex nature of innovation, as well as recognition of the value of cooperation (Carayannis and Alexander, 1999; Lundvall, 2002). In an Irish context, competitive threats from new EU accession states, coupled with requirements to sustain success, have added urgency to this project. Thus, while in the past HEIs have focused on two streams of activities, namely research and teaching, third stream activities (e.g. incubation units, company formation, mentoring and technology transfer) are now forming an integral part of Irish HEIs' missions and objectives (see Table 1). Efforts to develop and promote third stream activities typically focus on attempting to replicate the success of the United States, where the Bayh–Dole Act served as a catalyst to encourage commercialisation activities among universities. In the United Kingdom the Lambert Report (2003) noted the necessity of universities 'casting off their ivory tower image' if this goal is to be achieved.

Table 1: HEI–Industry Collaboration/Technology Transfer Mechanisms

Commercialisation/ Transfer Mechanism	Description
Sponsored research	The most frequent form of research relationship, which involves companies directly funding university research
Collaborative research	University–industry research partnerships that can be encouraged through partial government funding
Technology licensing	Licensing of university patents to companies for commercialisation
Start-up companies	Companies that obtain licensing agreements to access university technologies
Spin-offs	Companies that include among its founding members a person affiliated with the university
Exchange of research materials	Used to expedite the performance of research, accomplished through material transfer agreements

COMPANY FORMATION: ISSUES AND IMPLICATIONS

Start-ups and spin-offs are the most cited form of technology transfer from HEIs as they are the direct manifestation of such activity and provide a sound basis for measuring the direct impact of technology transfer activities (e.g. numbers employed, revenues, value of equity). Although the terms are often used interchangeably, it is useful to distinguish between the two mechanisms of company formation available to HEIs. A spin-off is a company that includes among its founding members a person affiliated with the university, while a start-up firm is one that is not founded by a staff member of the HEI but is developing technology originating at the HEI (e.g. licensed technology) (Graff et al., 2001). Internationally, the United States leads the way in third stream activities, particularly in relation to company formation in the form of the number of start-up and spin-off companies created. In the United States it is estimated that roughly 12 per cent of university-assigned inventions are transferred to the private sector through the founding of new organisations (AUTM, 2003). The US data from the AUTM survey (2003) indicates that 450 new companies based on academic discovery were formed in the fiscal year 2002. Some 83.1 per cent of new companies were located at the state province of the academic institution where the technology was created. Since 1980 a total of 4,320 new companies have been formed based on a license from an academic institution with 2,741 (63 per cent) of these start-ups still operating as of the end of the fiscal year 2002. Academic institutions in the United States typically have an equity interest in 70 per cent of their start-ups. In terms of OECD (2003) data a survey of technology transfer offices found that the average number of new spin-offs or start-ups reported per institution was under one a year. This figure is in contrast to the United States where the average is two, a figure which has remained stable since the end of the 1990s (AUTM, 2003). This empirical data serves to highlight the fact that relatively few companies are formed as a result of a HEI invention. The attention that such activities attract from the media often suggests otherwise.

Typical reviews of best practice in this area (e.g. Allan, 2001; Howells and MacKinlay, 1999; Scott et al., 2001) identify a number of mechanisms which facilitate and encourage technology transfer

through company formation. These include having clear guidelines and policies, transparency in decision-making concerning exploitation and commercialisation activity, and good information and contact provision to academic personnel regarding intellectual property and commercialisation procedures. Central to successful efforts is the careful management of expectations, active promotion of commercialisation activities and a clear consensus around the nature of equity holdings and royalties. Efforts at company formation, however, do not come without significant institutional and cultural challenges. Commercialisation of centres for science, engineering and technology (CSETs) funded by the Science Foundation Ireland (SFI), via company formations, will be used as a barometer for success in an Irish context, given different academic and industrial partnership mixes.

CHALLENGES

In locating company formation issues in the context of macro-related trends, a number of challenges and concerns can be identified. The Irish research system carries a legacy from years of under-resourcing which has resulted in high levels of fragmentation, low levels of collaboration and a lack of critical mass. Ireland's research and development (R&D) performance has been poor to date. In terms of the Lisbon target set by the European Union of an R&D spend of 3 per cent of GDP by 2010, Ireland had only achieved 1.12 per cent by 2003. At a more micro level a critical impasse in terms of company formation stems from the lack of awareness or commercialisation experience among academics (Forfás, 2004). King's (2005) study of 1,000 research academics, for example, found that less than half had ever been involved in collaborative research with industry, while 70 per cent of the respondents had never been involved in any commercialisation activity resulting from academic research. Clearly, Ireland has a lot of catching up to do in order to emulate the success of the United States in company formation. For HEIs this is best achieved by putting in place support and incentive systems while balancing these activities with prudent governance structures. Siegel's research conclusions are instructive: 'the propensity of faculty members to disclose inventions, and thus increase the supply of technologies

available for commercialisation will be related to promotion and tenure policies and the university's royalty and equity distribution formula' (Siegel et al., 2003: 44).

IMPLICATIONS FOR HEIs AND THEIR LEADERS

The question Irish HEIs are now facing is not *whether* they should improve, develop and maximise the effectiveness of third stream activities but rather *how*? Successful strategic management of third stream activities will involve negotiating a number of tensions (Cunningham and Harney, 2006: 18), which include the following issues:

(1) *Risk versus Reward*: the primary objective of publicly funded HEIs is the development of public goods and the protection of its intellectual property. HEIs have to balance this goal with an increasing requirement to commercially exploit their research output. Successful HEIs in the twenty-first century will be those that continue to excel in teaching and research, while at the same time developing complimentary third stream activities to exploit research for the public good. It is in this context that questions of coordination, adherence to university regulations and recognition in terms of success of institutional resources, or of a financial return to the institution, become issues of great sensitivity (Shattock, 2001). This has been particularly the case in relation to company formation activities, which can be viewed as a double-edged sword; acting as potentially the most lucrative and beneficial transfer technology mechanism, while at the same time often requiring the most investment and attendant risks, thereby potentially leaving HEIs most exposed. This tension can be managed by putting in place solid governance structures and transparent policies that ensure an appropriate balance in third stream activities.

(2) *Individual Research Efforts versus Funded Priority Areas*: at the heart of HEIs is academic freedom, particularly in relation to research efforts. Academics have the freedom to participate in nationally and internationally funded projects. HEIs leaders have to ensure an adequate balance between ensuring support for the commercialisation of priority funded public research while simultaneously encouraging and supporting research which does not fall

within the remit of stated institutional research priority areas or is not in receipt of national or international publicly funded research. HEIs can manage this tension by ensuring that academics become involved in commercialisation or in specific research areas purely based on their voluntary desire to do so. Critically, HEI leaders should also bear in mind that technology transfer occurs through multiple channels, may be more appropriate to specific fields, and is only one of a range of third stream activities conducted by HEIs. Consequently, HEI leaders have to think strategically about this tension and how it is best managed at an institutional level.

(3) *Scholastic Endeavours versus Academic Entrepreneurship*: the concept of ‘academic entrepreneurship’ has emerged to capture the trend for individual researchers to become increasingly involved with the commercialisation of their research results, through licensing a patent or by the creation of a spin-off company. Traditionally HEIs’ missions have focused on teaching and research excellence and HEIs’ promotional structures reflect this perspective. With increased emphasis on commercialising research within HEIs and from funding agencies nationally and internationally, HEI leaders will face the task of reflecting these changes in an equitable manner, in terms of promotion systems and resource allocation. HEIs will thus have to organise themselves in a way that will allow them to exploit academic entrepreneurship in the most effective manner (Lambert, 2003: 6).

(4) *Local Initiatives versus Regional/National Collaboration*: currently all HEIs in Ireland act relatively independently in managing their technology transfer activities (Forfás, 2004). The reality facing all Irish HEIs, however, is that they will not be in a position to provide all the services required for university–industry collaboration. Given their potential deficiencies in expertise, particularly in aspects of commercialisation and knowledge of the patent process, HEIs will be under increasing pressure to develop more cooperative regional or national mechanisms. The European Union in particular, emphasises the value of collaborative efforts in providing economies of scale and expertise. HEI leaders will therefore have to develop clear policies and procedures in relation to their participation and activities in a meso-level structure, while at the same time ensuring they maintain a close relationship with researchers on the ground in their own institutions.

In order to recognise and deal with these tensions Brint (2005) suggests that the role of the university needs to be reconceptualised. Arguably, an outdated model of the characteristics of universities stressing the individual, researcher, single disciplines, national rankings and mere cumulative progress in fields of formal knowledge will not serve us as well in an innovation-based era. Instead, Brint advocates new university models encompassing interdisciplinary groups and large-scale economic and political support networks, where the underlying dynamic is constant innovation in economy and society. The precise dichotomy between the 'established' and 'new' university model may be one of conceptual elegance but it does help foster debate as to the nature and role of HEIs in our evolving economic landscape.

In the United States, the AUTM has stated that the mission of technology transfer has permeated all parts of academia: 'even the smallest colleges and universities are creating the infrastructure to translate the fruits of their research into products that serve the public good' (2003: 7). The paradigm shift to a more entrepreneurial university therefore appears to be a real one. This is not only the case in the United States, but also in Ireland and rest of Europe, where new arrangements have to be negotiated so that information can flow smoothly from a lab in the university to a company (Etzkowitz and Leydesdorff, 2000). Passive approaches of fortuitous technology transfer which serve to reinforce the 'ivory tower imagery' need to be replaced by more proactive strategies and approaches. In an Irish context this requirement was highlighted by the Enterprise Strategy Group: 'close to market and applied research capabilities must also be promoted, to facilitate greater synergy between those who generate knowledge and those who transform it into saleable products and services' (2004: xvi).

Finally, insights into this area and the dynamics of company formation can only be obtained by research of the type promoted by this special issue of the *Irish Journal of Management*. Further studies are required to address specific issues relevant to technology licensing and spin-outs and their respective required support infrastructure. Research studies should also address requirements such as the abolition of stamp duty on technology licensing and the implementation of the new EU Technology Transfer Regulation

240/96 (Forfás, 2004: 35). Insightful contributions can also be gained through comparative work, particularly those that compare the Irish case with smaller European countries that, like Ireland, aspire to being knowledge-based (e.g. Denmark, Finland, Sweden and Austria). It is only through these efforts and the dissemination of their findings that the promise of third stream activities can be fully understood and realised. For Irish entrepreneurship the rhetoric of the development of third stream activities must begin to match the reality of becoming a knowledge-based economy. This will be vital if Ireland is to sustain the momentum of its remarkable and much admired economic transformation into the next decade of the twenty-first century (Green, 2006).

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