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Ireland’s Foreign-Owned Technology Sector: Evolving Towards Sustainability?

PATRICK COLLINS AND SEAMUS GRIMES

ABSTRACT For some, Ireland’s pursuit of an exogenous-led development model has proved to be the cornerstone of recent economic success. Others point to recent high-profile closures and argue that foreign-owned operations are attracted to Ireland solely because of the advantageous tax breaks and lucrative grants scheme offered by the Irish government. We pay tribute to both arguments by pushing the level of enquiry beyond that of supply and backward linkages to try and gauge the actual performance of affiliates themselves. This brings some interesting facets of the Irish foreign direct investment scene to light. We highlight complexity of process, attainment of broader investment remits, and the emergence of a managerial class as integral to the ability of affiliates to adapt to and exploit organisational change. By examining 10 case studies and making use of media searches and company interviews, we highlight evidence of Ireland’s largest technology transnational corporation affiliates showing positive performance advances. With these movements come, what we term, increased nodal significance of Irish operations within the global production network of their corporations. We argue against policy and theories that see these movements as linear and provide evidence of how some Irish operations have leveraged control and gained significant regional and global remits that have resulted in their growing significance, both in the corporation and in the country in which they are based. In the same line we argue that embeddedness in terms of supply linkages does not fit the Irish case and instead employ the term “network anchoring” of affiliates as they increase their nodal weighting through increased mandates.

Introduction

The virtuous coincidence of technological advance, globalisation, and organisational change has been the cornerstone of economic growth over the past two decades (Malecki and Moriset 2008). These concurrent changes have had serious ramifications for growth and change.
some key concepts in the field of economic geography and beyond. As transnational corporations (TNCs) increase their spatial reach by exploiting new technologies, the geography of value creation has become more complex. We highlight the movement away from Harvey’s (1982) “spatial fix” ideal towards recognition of the deterritorialisation of production and with it, “embeddedness” (Hess 2004). We focus instead on network embeddedness, which places greater emphasis on intra- and extra-firm relations and in particular, intra-corporate evolution. We therefore track the evolution of TNC affiliates by investigating their impacts, not on their local territory but on their nodal stature within the production networks of their corporations, or what we refer to as network anchoring. Our central argument is explicated by tracing the leveraging of control by affiliates within the corporation.

The regionalisation of global markets (Rugman 2000) together with corporate organisational transformations (Coe et al. 2004) has facilitated greatly the attraction of foreign investment. Ireland has been very effective in attracting affiliates of global technology operations to set up and run operations from a small island on the periphery of Europe (Barry 2004). For cost reasons, many non-European technology operations have chosen Ireland as an entry point to serve the common market. Being the first affiliate in a region, and in some cases the first outside the home country, lends more weight behind the bidding for new contracts or remits from the headquarters. Additional considerations are the trust built up over time and the importance of being the initial anchor in Europe. This paper seeks to identify some of the important factors that have aided subsidiary evolution in Ireland and have contributed to their ability to compete with sister affiliates elsewhere.

The positive business environment fostered by many key institutions in Ireland alongside a young workforce are integral to Irish affiliates’ ability to leverage control through complex processes. The emphasis placed on development and learning opportunities in many operations, along with the absence of demarcation practices, has resulted in some Irish employees rising in the ranks of management both in Ireland and beyond. The Industrial Development Agency (IDA Ireland) has played a major role in facilitating the evolution of the foreign-owned technology sector.

After the restructuring of Ireland’s development agencies in the early 1990s, IDA Ireland placed greater emphasis on developing TNC subsidiaries and worked closely with their management to support efforts to win mandates in higher value-added activities such as advanced manufacturing, research and development (R&D), supply chain management (SCM), and shared services (Barry 2007; Begley, Delaney, and O’Gorman 2005). The agency identified the key priority for future development as: “The expansion of existing clients . . . is important because their contribution is something we expect to grow in the future. This is happening not only because it is a logical consequence of the critical mass we have now built up in several sectors, it is also now a key focus of policy” (IDA 2005:ii).

In recognition of organisational transformation, the opening up of the global economy and the analogous rise of competitor countries in Asia and Eastern Europe, the recent
review of industrial policy *Ahead of the Curve* identified the performance of Irish-based subsidiaries within the context of their corporations as a major focus of policy development (Forfás 2004). This paper traces the evolution of Ireland’s foreign-owned technology sector by examining in detail the top 10 technology TNC affiliates in Ireland (in employment and revenue terms). We will emphasise in particular the “network embeddedness” of operations in Ireland within the global corporation. While embeddedness has been the subject of considerable debate among economic geographers recently (see Henderson et al. 2002; Hess 2004; Jones 2008; White 2004), this paper seeks to differentiate network embeddedness from the more traditional understanding of territorial embeddedness by examining the extent to which Irish affiliates succeed in competing with sister affiliates for increased global significance/recognition/mandates.

To do this, we attempt to demonstrate the evolution of Irish affiliates through their attainment of further rounds of investment by their corporations. This is achieved by making use of three analytical themes to enable us to focus on the evolution of the top 10 subsidiaries in Ireland: nodal significance; internal competition, and institutional support. These themes and how they relate to recent literature are outlined in the following section. The third section is concerned with the methodological issues. The paper progresses by providing contextual background of the foreign-owned technology sector before considering the evidence in relation to the three analytical themes; the final section examines the key conclusions.

### Affiliate Development

Evaluations of exogenous-led development models are inextricably bound to the broader debate on globalisation. In the globalised world of economic activity, critics cite sustainability and denudation of endogenous resources as the main pitfalls of the pursuit of such policies, while positive evaluations espouse the benefits of spillovers and increasing embeddedness of inward investment in the local economy. Indeed, the Irish case is often cited by financial institutions as one of the benefactors of the globalisation of production alongside organisational changes in the management of global operations (Krugman 1997).

Recent work in the area has begun to highlight the complexities involved in considering internationalisation, and more specifically, the embedding of multinational affiliates in local economies. The focus here has been on issues of subsidiary evolution and the importance of entrepreneurship within host country operations (Birkinshaw 1997; Birkinshaw and Hood 1998; Dunning 1995; Grimes and White 2005; O’Riain 2004; Rugman 2000; Sturgeon 2003; Taggart 1998; Zanfei 2005). This work recognises the increasing complexity brought about by technical determinants (such as decreasing product life cycle and demand diversity) that have forced many corporations to change the structure of their value-added activities (Malecki and Moriset 2008). The work of Phelps and Fuller muddies this dualistic picture (positive versus negative effects) by citing examples of TNC affiliates in semi-peripheral regions engaging more with the
The term embeddedness has been subject to recent debate in the area of economic geography and beyond. The most exciting work regarding this inherently geographical concept is that which has begun to question its territorial nature (see Hess 2004; Jones 2008; Yeung 2007). Questions are posed regarding the explanatory framework for understanding the spatial form of economic activity in an increasingly globalised world, while the role of TNCs is highly relevant in questioning the limitations of the embeddedness idea (Jones 2008; Phelps and Raines 2003).

In what follows, we seek to understand the organisational dimension of changing models that TNCs themselves are developing in order to deal with the increasingly complex challenges associated with working in internationalised markets. The role played by territory in this is also subject to question. Beyond the fact that territory is in danger of becoming an explanatory factor, it also contradicts recent work concerning notions of relational and topological space. The argument runs that territory alone does not produce spatial differences between non-economic influences but rather the social practices enacted across and through them. In this sense, places can be seen as social constructs that are themselves potentially “translocal” (Hess 2004; Jones 2008).

The role played by TNCs in pushing global interconnectedness then sees territory as a part of spatiality more broadly. The global production networks (GPNs) literature applies a relational concept of space and place (Dicken and Malmberg 2001), in which GPNs are seen as dynamic topologies of practice that link different places and territories (cf. Amin 2002; Hess 2004). Notions of translocal network building reflect the multiscalarity of networks as well as their change over time. Contributing to the “archipelago economy,” described by Jessop (2001), where a number of places and localities are linked across space by relations of embedded actors and changing shape and scope over time (Hess 2004:169). The term “extraterritorial” is also invoked in the literature in explicating the role of the state in the era of economic globalisation and shifting scales. The work of O’Riain (2004) and Phelps (2007) demonstrate the importance of TNCs and how their interests have been served by extraterritorialisation in the case of Ireland.

Through this paper, we intend to provide a greater degree of clarity by scaling down the metanarratives of global organisational change in the context-specific case studies. By doing this, we will follow on from the work of Phelps et al. (2003), Henderson et al. (2002), and White (2004) by questioning the relationship between affiliate embeddedness and performance. In a move away from the “spatial fix” (Harvey 1982) ideal, we therefore recognise the need to “detrimentalise” the embeddedness concept. Territorial embeddedness has been over-reliant on indicators such as supplier linkages (and through it indirect employment) and inter-firm relations (White 2004; Turok 1993). For this reason, network embeddedness, which places greater emphasis on intra- and extra-firm relations and in particular intra-corporate evolution, is more applicable.

This notion too is subject to faults. Too often, networks are scrutinised through conventional scalar categories and an offshoot of this is that physical distances between the
nodes in a network are not correlated in any significant manner (Amin 2002; Jones 2008). We attempt to gauge the levels of connectivity within these networks by examining more social characteristics within nodes of Irish affiliates. This will enable us to evaluate their nodal stature within their corporation’s production network (Dicken et al. 2001).

Our work can then be seen as an attempt to track the evolution of TNC affiliates by investigating their impacts not on their local territory but on their nodal stature within the production networks of their corporations or what we refer to as network anchoring. Internal and external forces are at play here. Complex organisational changes including outsourcing and off-shoring associated with deverticalisation have also grown in importance, resulting in a changing geography of production networks and supply chain activities. This has obvious ramifications at the affiliate level, where competitive operations use their local contexts to attract further investment from headquarters in a bid to remain competitive entities within the organisation. We attempt to cast light on these processes by focusing on three key areas of importance (see Figure 1): nodal significance, internal competition, and institutional support. Each of these pillars of subsidiary evolution has separate influences from within and without the affiliate itself. The outcomes differ respectively with external influences feeding directly into the internal outcome. Network anchoring is recognised as the key outcome brought about through affiliates leveraging control and remaining connected to the customer. It is, however, reliant on external outcomes, decision making at the superior corporate level, and the furtive environment created by supporting institutions.

In an attempt to counteract the shortcomings of the network embeddedness paradigm, we attempt to gauge the strengthening of interrelationships between case study operations

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<th>Nodal Significance</th>
<th>Influence</th>
<th>Process</th>
<th>Outcome</th>
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<tr>
<td></td>
<td>External – Corporate Led</td>
<td>Nodal stature bestowed by affiliate’s superior node. (Economic)</td>
<td>Network Embedding</td>
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<tr>
<td>Internal Competition</td>
<td>Internal – Affiliate Led</td>
<td>Process of competing raises the relative weighting of affiliate and contributes to nodal significance. (Social)</td>
<td>Network Anchoring</td>
</tr>
<tr>
<td>Institutional Support</td>
<td>External – Policy Led</td>
<td>Grounding the global in the local. Policies and institutions enabling internal competition and thereby nodal significance. (Spatial)</td>
<td>Network Enabling</td>
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**Figure 1. Evolving Affiliates.**
and the primary nodes (usually headquarters) in their networks. This we term the process of increasing *nodal significance*. Recent work in the area of international business has attempted to define the evolution of TNCs as more consistent with home-based augmenting (Dunning 1995; Zanfei 2005). As opposed to earlier perceived practices of exploitation, newer strategies reflect the need to complement existing knowledge with locally available assets, a trend that comes part of the way to better defining embeddedness in the current climate. Augmentation over exploitation reflects the importance of the local in the global and of host localities over home/HQ locations, thus implying a strengthening of the nodes in a global network of production over an emphasis on the primary/home node.

The move away from conventional internalisation theory of TNCs over the past two decades is well reflected in the literature. Theorists such as Dunning (1993), Florida (1997), and Rugman and Verbeke (2001) provide evidence of subsidiaries reaping the benefits of “host” countries’ knowledge systems in their performance of unique value-creating activities within the corporation. These practices reflect a broader organisational shift on behalf of TNCs in their move away from the hierarchical and centralised structures that dominated in the 1960s and 1970s. The importance of the local in the global and network over hierarchy is reflected in the many weaknesses identified in conventional internalisation theory. Chief among these is the lack of attention paid to the adaptation and codification problems involved in the diffusion of innovations within corporations. Capability creation was largely ignored, as was the role played by managers and general entrepreneurship in affiliate operations (see O’Riain 2004; Rugman 2000).

Related to this, and in many ways a precursor to nodal significance, is *internal competition*. We consider this as the process whereby the affiliate recognises its interest in competing with other affiliates within the corporation towards the end of anchoring themselves more firmly within the corporation’s network. Prechal and Boies (1998) recognised the change in subsidiary form from multi-divisional to multilayered and the analogous increased complexity in working patterns. The changing dynamics of organisations that stretch further across the globe in an effort to decrease costs has real implications for already established subsidiaries. As manufacturing moves to newer low-cost locations, there are obvious ramifications for those already responsible for that remit. The analogy of a treadmill effect is oversimplification; however, the response of affiliates to competitive realities has a bearing on their sustainability (see Garcia-Pont, Ignacio Canales, and Noboa 2007).

Competition between affiliates is as real as that in the market place. Sustainability of operations is reliant on attaining and retaining mandates of importance to the corporation. While the ability to do so relies to some extent on cost factors, of significant importance also are the areas of trust, voice, and loyalty (Hirschman 1970). We use the term network anchoring to describe the calculated approach to insuring an affiliate’s longevity. In the course of this work, we have highlighted two main development paths chosen by affiliates in an attempt to anchor themselves, one is control over the supply chain, and the second is insuring connectedness with the customer.
Related to both are the local factors on which affiliates rely to both sell themselves and compete within their network. We use the heading institutional support to ground the global experience in the local. The term institutional was central to the work of Polanyi, especially the “institutionalisation” of economic processes or the “societal” embeddedness of functionally differentiated institutional orders (Jessop 2001:223). The work of Amin and Thrift in the 1990s related to the social and cultural factors underlining the success of regions. Positive correlations were highlighted between a region’s economic success and the “thickness” of their institutions. The literature on embeddedness stresses the central role of concrete personal relations and networks of relations to generate trust (Amin and Thrift 1994; Staber 1996).

More recently, Coe et al. (2004) highlight dynamic “strategic coupling” of global production and regional assets and the key role played by institutions in bringing the two together across varying scales. They stress that developing the local is dependent on a coupling mechanism that facilitates processes of value attraction, addition, and creation (pp. 480–481). In the context of much of the literature on foreign direct investment (FDI) and TNC development, there is a failure to get the balance right between global and local forces. In an attempt to combat this, we employ a multi-scalar perspective to enable us to contextualise local TNC subsidiaries within global production networks.

**Methodology**

In line with Yeung (2007) and Markusen (1994), we focus on the firm as a geographical phenomenon. The following section looks at the global operations of each of the top 10 affiliates in Ireland. Annual reports, business databases (Datamonitor, Business Source Premier), and media searches provided a clear view of the activities of these global operations. Within Ireland, we make use of 5-year data sourced from the annual publication of the *Irish Times, The Top 1,000 Companies*. We focus in particular on the foreign-owned technology sector in Ireland: it became synonymous with economic success in the 1990s; reflected the turnaround of FDI and the economy in general in Ireland after 2002; and more recently has seen a fall off in investment gains (see Collins 2007; Grimes 2006). Choosing the top 10 affiliates provides coverage, depth, and universal brands, while the enormity of their annual contribution to Irish gross domestic product (GDP) makes them worthy of investigation in their own right.

We define the foreign-owned technology sector in Ireland as non-indigenous firms actively engaged in the production and/or servicing of both hardware and software products (including telecommunications and media). While our definition does not include other high-technology sectors such as medical devices and pharmaceuticals (of which there are significant presences in Ireland), the technology sector as we define it has historical and contemporary fiscal significance in the Irish economy.

Prior to interviewing, a database of all actors in the technology sector was compiled. Starting initially with contact details and names of representatives, the database was added to through media and website searches. Dynamic figures on turnover and employment gave us a better understanding of the relative weight of certain operations and helped us target
a subset for interview. Attempts made to subcategorise the population were impeded by both a lack of comprehensive knowledge as well as the sheer diversity of activities carried out by operations described as “technology” firms. Through interviewing an initial set of relatively diverse technology companies, a better understanding of the sector was gained. This was then fed back into our original database, which began to take a clearer shape in terms of firms with common and diverse sets of activities. Thirty interviews as well as secondary resources form the backbone of this qualitative investigation. Interviews lasted from 45 minutes to an hour and a half and took place on site with high-level management.

We also developed a meta-evaluation of Irish policy through interviewing policy makers. Members of the IDA, Enterprise Ireland (EI), American Chamber of Commerce (ACC), and the Irish Business and Employers Confederation (IBEC), along with other policy makers, were interviewed. One of our main aims here is to assess the knowledge at the policy level of the threats and opportunities faced by technology companies based in Ireland from organisational transformation and the rise of global networks of production.

Context: A Globalised Ireland

Ireland’s pursuit of an exogenous-led development model over the past 50 years has placed the nature of inward investment high on the political agenda. Key among the concerns of critics of Ireland’s FDI stance are issues of sustainability and the negative effect on the indigenous sector (see Allen 2000; Kirby 2002; O’Gráda 2002; O’Hearn 2002). While having some misgivings, those who see the merit of globalisation in the Irish context cite the benefits of spillovers and the increasing embeddedness of affiliates carrying out work in Ireland (Hewitt-Dundas et al. 2005; O’Riain 2004; Sweeney 2000).

While concerns exist regarding the sustainability of the Irish model when we look back over the past 15 years, it is hard to downplay the importance of FDI to the Irish economy. Figures for the 1990s show that year-on-year employment in foreign-owned operations increased an average of 8 percent, and after the downturn in the global economy in 2000, employment figures rebounded before recently stabilizing. An integral part of that rebound has been the reorientation of the FDI sector. For the information and communication technology (ICT) sector in particular, this is marked by a shift from manufacturing to services. Also of note in the Irish recovery are the pharmaceutical/healthcare and financial services sectors. Seemingly escaping the turmoil of 2000, their respective shares of the total numbers employed in foreign industry increased from 12.6 percent in 2000 to 15.4 percent in 2004 for pharmaceutical/healthcare and 29.6 percent to 34.7 percent for financial services (Forfás 2005).

A pro-business environment has been a key policy for many successive governments and their agencies and has lead directly to Ireland’s high ranking as an attractive location for FDI (AT Kearney 2007; UNCTAD 2005). According to Figure 2, the stock of FDI in Ireland was equivalent to 106 percent of the GDP in 2005, which placed it on top of Organisation for Economic Co-operation and Development (OECD) listings, far ahead of second-placed The Netherlands with 74 percent of GDP. In a European context, Ireland has
consistently performed well, netting 3.77 percent of FDI inflows into the European Union (EU) in 2000, rising to over 7 percent in 2005, extraordinary percentages in relation to the population figure of 1 percent (United Nations 2006). A less positive spin can be put on these figures, reflecting as they do Ireland’s dependence on importing technology. Ireland’s recent slippage is also of note here. The country’s much lauded ranking as an attractive location for inward investment has fallen dramatically in recent years (see AT Kearney 2007).

The Irish stance towards exogenous-led development has its roots in the Whitaker Report (Whitaker 1958). Since then, subsequent documents have maintained the policy thrust towards foreign investment. One such example was the 1982 Telesis Report that took a shrewd approach to extending the Irish FDI model along explicitly high technology lines (see Table 1). O’Riain (2004) also highlights the central place of industrial development agencies in the attraction of global technology leaders and the creation of Ireland as an entrepôt region and highlights the power of the IDA within the national state system.
through its role as “hunter and gatherer” of FDI (see Collins 2007). The role of the IDA and other (ACC, IBEC, EI, and a host of local industry bodies) agencies has created a supportive and dynamic environment for investors in Ireland. Astute awareness of international trends as well as a keen sense of the competitiveness of “Ireland Inc.” has put these agencies at the centre of the Irish success story.

For reasons already alluded to, we use the technology industry as a barometer of Ireland’s economic success. Within the industry, the software sector provides a robust template. In his work on the sector, O’Riain (1999) talks of an Ireland of “two globalisations” that saw the foreign-owned sector explode alongside significant growth in the indigenous. However, some simple statistics demonstrate the wide chasm that exists between the two (see also Coe 1997). For example, in 2005, TNCs accounted for 92 percent of the €24 billion revenue and 95 percent of the €23.5 billion worth of exports for the software industry as a whole (National Software Directorate 2007). This has led some commentators to conclude that TNC involvement in Ireland is due solely to the competitive tax advantages offered by the Irish government2 (see O’Hearn 2002).

While not discounting this latter argument, we recognise the need for a focus on foreign firms firstly because of their impact on the Irish economy and secondly, as is the focus here, their relative evolution as affiliates of some of the world’s largest TNCs. Table 1 can be considered as evidence of Irish policy success. Half of Ireland’s top 10 foreign-owned technology companies with the largest shares of employees are ranked in the world’s 50 wealthiest corporations. A further three are listed among the Fortune 500, while all are among the world’s 1,000 wealthiest companies.

### Table 1. The Global Operations of the Top 10 Irish Employers.

<table>
<thead>
<tr>
<th>Turnover $ billion 2005 (% increase)</th>
<th>Employees (2005)</th>
<th>Turnover per employee</th>
<th>Spatial division of turnover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell 56 (13.6)</td>
<td>65,200</td>
<td>857,484</td>
<td>EMEA 23%</td>
</tr>
<tr>
<td>Microsoft 44.3 (11.3)</td>
<td>71,172</td>
<td>622,453</td>
<td>Non–U.S. 33%</td>
</tr>
<tr>
<td>Intel 34.2 (13.5)</td>
<td>85,000</td>
<td>402,352</td>
<td>EU 22.7%</td>
</tr>
<tr>
<td>IBM 91.1 (5.4)</td>
<td>329,373</td>
<td>276,588</td>
<td>EU 21%</td>
</tr>
<tr>
<td>EMC 9.6 (17.4)</td>
<td>26,500</td>
<td>362,264</td>
<td>EMEA 28.4%</td>
</tr>
<tr>
<td>Oracle 14.3 (21.9)</td>
<td>56,133</td>
<td>254,752</td>
<td>EMEA 32.7%</td>
</tr>
<tr>
<td>Apple 13.9 (68.3)</td>
<td>14,800</td>
<td>939,189</td>
<td>EU 22.1%</td>
</tr>
<tr>
<td>Analog Devices 2.5 (7.7)</td>
<td>9,800</td>
<td>255,102</td>
<td>EU 22.3%</td>
</tr>
<tr>
<td>Hewlett Packard 91.6 (5.7)</td>
<td>156,000</td>
<td>587,179</td>
<td>Non-U.S. 64.8%</td>
</tr>
<tr>
<td>Xilinx 1.7 (9.7)</td>
<td>3,300</td>
<td>515,151</td>
<td>EU 20.4%</td>
</tr>
</tbody>
</table>

Sources: Various company annual reports, Datamonitor, Business Source Premier.

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2. For the purposes of this paper, “TNC” refers to a foreign-owned firm with operations in Ireland, and “affiliates” refers to the employees working for these firms in Ireland.
Additionally, the revenue figures for these operations are staggering. Cumulatively, the top 10 technology companies with Irish-based operations accrued in the region of $390 billion in revenues in 2005. The two accounting for the largest share were IBM and Hewlett-Packard (HP), respective giants in the technology industry and beyond. From Table 1, we also note the increase of turnover during the previous year (2004). An average increase of 17.4 percent across the 10 companies depicts a healthy industry overall, with positive ramifications for their Irish affiliates.

Both firms also dominate employment figures, with a combination of close to half a million employees globally. Revenue per employee also helps cast the industry in a very positive light. On average, employees in these companies equate to half a million dollars in revenue. Microsoft is the most U.S. oriented of the companies with regard to the spatial division of company turnover. This reflects the importance of geographic markets to individual firms. The importance of the EU or Europe/Middle East/Africa (EMEA) market to these global operations has direct ramifications for Irish operations as we will see later.

What connects these operations other than their presence in Ireland is their shared market spaces. All are collaborating and competing in the same market space at the global scale (think Dell, Microsoft, and Intel in comprising most word documents). For instance, those in the hardware sector, Dell, Intel, HP, IBM, and EMC all are in direct competition over certain segments of their market. Yet in 2005, EMC attained an original equipment manufacturer deal culminating in Intel reselling EMC’s disk array. The same year saw Intel processors first appear in Apple machines. A year earlier, EMC formed a strategic alliance with Fujitsu Siemens, a move away from their traditional custom with IBM and HP (memory storage products). The dominance of IBM in the market is reflected by its involvement with most of the technology companies featured here (sells first Intel processors in 1979, teams up with Microsoft and EMC in 1985, and Xilinx in 2001).

Interconnections between these large technology corporations at the global scale are not, however, replicated at the local scale. In the case of Ireland, this is due mainly to the concerted export orientation of operations located there. For example, Dell’s Irish operation uses Intel processors shipped from the Philippines, not from the Intel plant located less than 150 miles away. The nature of these networks of global production is such that the more traditional approach towards local linkages is less relevant. Embeddedness in terms of linkages at the local level matter little to such global concerns. That is not to say that these affiliates do not have a shared interest at the local level. Most have the same concerns regarding costs, quality of labour, and a supportive business environment. For many affiliates in Ireland, intra-corporate competition is as strong an incentive as competition in the traditional sense.

Related to this, we focus on the significance of Ireland’s cost-base shift. As a direct consequence of the rise of competitor locations in Eastern Europe and Asia, Ireland has moved away from manufacturing towards services. This shift has seen Irish services exports increase by over 160 percent in the 5 years to 2005 (corresponding figures for products is 6 percent) (Forfás 2007). This growth has been led by sales of software, financial services,
and other business services (Economist Intelligence Unit 2007). More specifically, computer hardware exports fell from €37.6 billion in 2001 to €23.4 billion in 2003. Exports of computer services amounted to €12.7 billion in 2003, an increase of 15 percent from the previous year, and services in 2003 accounted for only €2 billion less than that of merchandise trade (Forfás 2004). Much then depends on the interpretation of these trends. They can be read as either evidence of competitive reactions to global change or as verification of a treadmill effect, with the inevitable end point being a loss of attractiveness as a location for FDI.

We argue that Ireland’s increasing cost base is only one of the reasons for this shift and highlight examples of “first movers” in the case of many affiliates seeking to concentrate on areas of higher value. We attempt to identify a process of embedding whereby conscious efforts on behalf of affiliate management have seen Irish operations gain relative weighting within their corporation’s global network, in essence a process of network anchoring.

It must be stated that our extensive empirical work does not cover the full spectrum of FDI in the Irish technology sector or beyond. We can cite examples of the positive evolution of technology affiliates in Ireland, but these examples do not account for the recent spate of closures of foreign-owned plants in Ireland. All sectors have been hit by Ireland’s changing cost base and the recent closure of a Motorola plant in Co. Cork shows that the technology sector is not exempt. Such closures and the obvious social ramifications in terms of job losses, which helps keep FDI high on the political agenda in Ireland. Anecdotal evidence from interviews with key policy actors makes it obvious that there is also a perceptible shift ongoing regarding the place of FDI in the Irish economy. Recent policy documents from all state bodies have cited the importance of indigenous growth for the future sustainability of the Irish economy. While we do not make an argument against this position, we recognise the need to highlight (for policy purposes and beyond) the importance of understanding what has been one of the primary growth engines in the recent economic turnaround.

Network Anchoring: Evidence from the Top 10 Technology Affiliates in Ireland

Ireland has been particularly successful in attracting significant investments from major technology companies (Barry 2007). Table 2, which is derived from The Top 1,000 Companies, goes some way towards explaining the rationale for promoting an exogenous-led development model in Ireland over the past 30 years and indicates the significance of these investments in terms of employment and turnover (Irish Times 2007). This database ranks companies according to turnover and Table 2 shows that all of the 10 are found among the top 60 companies (both foreign and indigenous) operating in Ireland, with Dell, Microsoft, Intel, and IBM all ranking in the top 10 (2, 3, 8, and 9, respectively). EMC Ireland, Oracle, and Apple rank in the top 20 firms, followed by Analog Devices and HP with all nine of these companies attaining a turnover in excess of €1 billion in 2004/2005.
### Table 2. Top 10 Technology Affiliates Operating in Ireland 2005.

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<thead>
<tr>
<th>Activity</th>
<th>Date established&lt;sup&gt;a&lt;/sup&gt;</th>
<th>€ million turnover 2005 (% of global turnover)</th>
<th>Employment 2005 (% of global employment)</th>
<th>Turnover/employee (€ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell</td>
<td>1990 (1,0)</td>
<td>8,300 (14.3)</td>
<td>4,300 (5.4)</td>
<td>1.93</td>
</tr>
<tr>
<td>Microsoft</td>
<td>1985 (1,0)</td>
<td>8,112 (20.4)</td>
<td>1,090 (1.8)</td>
<td>7.44</td>
</tr>
<tr>
<td>Intel</td>
<td>1989 (0,1)</td>
<td>3,500 (11.6)</td>
<td>3,200 (4)</td>
<td>1.09</td>
</tr>
<tr>
<td>IBM</td>
<td>1956 (0,0)</td>
<td>2,500 (2.6)</td>
<td>3,700 (0.7)</td>
<td>0.68</td>
</tr>
<tr>
<td>EMC</td>
<td>1987 (1,1)</td>
<td>2,400 (30)</td>
<td>1,400 (7)</td>
<td>1.71</td>
</tr>
<tr>
<td>Oracle</td>
<td>1997 (1.0)</td>
<td>2,034 (20)</td>
<td>1,067 (2.3)</td>
<td>1.91</td>
</tr>
<tr>
<td>Apple</td>
<td>1980 (1,1)</td>
<td>1,975 (11.7)</td>
<td>1,500 (6.5)</td>
<td>1.32</td>
</tr>
<tr>
<td>Analog Devices</td>
<td>1977 (0,1)</td>
<td>1,580 (70)</td>
<td>1,300 (16.8)</td>
<td>1.22</td>
</tr>
<tr>
<td>Hewlett Packard</td>
<td>1971 (0,0)</td>
<td>1,460 (1.7)</td>
<td>1,660 (1.4)</td>
<td>0.86</td>
</tr>
<tr>
<td>Xilinx</td>
<td>1995 (0,0)</td>
<td>774 (9.5)</td>
<td>500 (14.8)</td>
<td>1.55</td>
</tr>
</tbody>
</table>

<sup>a</sup> In brackets we have added two values, 0 representing no, 1 representing yes. The first value reflects whether the Irish affiliate was established within 10 years of the corporation forming, and the second value reflects whether or not the Irish operation was the first outpost in the EU.

Overall, total employment of the top 10 technology firms equates to about 55 percent of the ICT sector and almost a quarter of total employment in IDA supported (foreign-owned) enterprises. The main employers are Dell, Intel, and IBM, each with over 3,000 employees. All are major employers with production staff making up a significant percentage of these numbers.

The figures for turnover listed previously need to be treated with some caution. Issues such as double counting of profits and transfer pricing have been alluded to already and formed part of the critique of Ireland’s FDI-oriented policy by many in the past (O’Gráda 2002; O’Hearn 2002). While the low tax rate has been an ongoing source of friction between Dublin and Brussels, it has recently caught the attention of American revenue authorities. Microsoft was highlighted as one of the main companies exploiting the low Irish corporation tax rates in a questionable manner. In 2004, an Irish subsidiary of Microsoft, Flat Island Company Ltd., made a profit of $802.4 million but paid no tax. This is an interesting turn in the tax debate. The government rationale was to create an incentive to encourage affiliates of TNCs to move up the value chain towards R&D. However, recent accounts show that operations like Flat Island are name-only operations that can make massive earnings from the licensing of intellectual property for use in Europe and beyond in order to avoid paying the higher rate of tax in their home country (usually the U.S.) (Beesley 2005; Kenna 2005; Lillington 2005).

Taking the revenue figures at face value and considering Irish GDP in 2004/2005 at €142,927 million, we can see why TNC growth is sometimes heralded as the cornerstone of the Irish economy. The combined revenue figures of the top 10 companies was close to €32 billion, which equated to 21 percent of Irish GDP, while Dell alone accounted for 5.6 percent of the GDP in 2005. The fact that many of these affiliates have relatively few high value-added activities inspires more sceptical commentators to suspect the presence of transfer-price accounting.

However, looking at the performance of these companies over the past couple of years provides some heartening news for industry bodies and policy makers alike. The top 10 companies have achieved a 15.3 percent increase in revenue since 2003. The most significant growth has come from the top four companies, most especially Intel’s Kildare affiliate. Overall employment also increased by 5 percent over the 2 years. Apart from the relatively significant (in volume terms) direct expenditure by these companies into the local economy in terms of wages, goods, and services, the global nature of much of their procurement presents difficulties for the creation of a coherent industrial policy. In recognizing the reality of global procurement, IDA Ireland have moved on from the traditional policy of local linkages and acknowledge the need for subsidiaries in Ireland to leverage the competitiveness of lower cost regions. In what follows, we will focus on network anchoring as an indicator of the sustainability of these Irish affiliates. We do this by focusing on three areas already highlighted in the literature as fundamental tenets of network embedding: nodal significance, internal competition, and institutional support.

**Nodal significance.** Table 2 also depicts the main activities of the affiliates and the relative weight of each in terms of their employment and turnover shares. To broadly
categorise the operations we can say that Microsoft, Oracle, IBM (part of), and HP (part of) are dedicated software affiliates while the remainder are more focused on hardware. Figure 3 further categorises the main activities of these operations.

With an average turnover share equating to one-fifth of global turnover, the significance of the Irish affiliates is noted. Skewing the average considerably is Analog Devices with 70 percent of their $2.5 billion revenue being accounted for by their Limerick operation. With nearly 17 percent of the corporation’s global workforce, the Limerick affiliate has grown in significance within the corporation’s global production network. Other significant nodes in their respective networks, according to this measure, are EMC, Oracle, Microsoft, and Xilinx, which account for large shares of the corporation’s total turnover.

The experiences of each of the 10 affiliates in Ireland are diverse with most of them beginning as branch plant manufacturing operations and with little to differentiate them from more traditional, non-technology operations. Ireland’s significantly lower corporation tax regime in a European context was an important incentive, for these companies to report much of their European transactions through Ireland: “The attraction to do our product fleet and the logistics and planning through our Irish operation was motivated by the tax regime here” (Interview 018 2005). In a large part, this practice can account for a significant part of Irish operations’ relative revenue weighting within their corporations (Barry 2007).

Yet, this interpretation can belie the dynamism that is evident in these operations, suggesting that nodal significance needs to be measured by more than simple accounting.
An important dimension of their growing significance within their corporate networks has been their evolution from being mere branch plant manufacturing operations to incorporating a significant range of internationally traded services functions (Grimes 2006; Grimes and White 2005). This expansion and upgrading of operations is reflected in the following example: “We started out here as the European manufacturing operation, but it has evolved a lot since then. There is an increasing number of people here outside the core manufacturing. For example we have our European Command Operation here, our European Applications (Solutions) Centre—the top end of which is where corporate customers, looking for very high end enterprise solutions and they come here to test-drive and simulate it. The command centre is really a centre of excellence that coordinates support centres all over Europe. We have our Business Process Improvements operations here; we have a global remit over that.” (Interview 011 2005).

An important dimension of this type of evolution has been the increasing customer-centric nature of new functions based in Ireland. Two significant trends can be identified in the evolutionary path of subsidiaries: one has been a shift from manufacturing to product fleet and logistics and control of the supply chain, and the second has been the increasing significance of servicing customers within the EMEA region.

Subsidiaries based in a relatively peripheral location like Ireland are constantly under pressure to increase the significance of their role within the corporation in terms of performance, productivity, and political influence. Table 2 shows the date of establishment in Ireland alongside the age of the corporation and the presence of other EU affiliates, which were established prior to the investment in Ireland. In the case of two companies, the Irish subsidiary was the first to be established in Europe and began within the first 10 years of the corporation’s existence, helping these subsidiaries to develop an early track record of performance within the corporation.

Although not all foreign affiliates in Ireland have had successful evolutionary records, those that have displayed similar advantages of being the first outposts of U.S. corporations in Europe and allowing them the opportunity of providing their headquarters with convincing evidence of competence and profitability.

A culture of an ingraining of confidence is obvious in all affiliates in existence for more than 20 years: “as time goes by when you attend meetings in the U.S., for example, you may be longer-serving than other people there . . . it’s a bit of a shock when you discover that you have been longer with [the company] than many of the Americans present” (Interview 013 2006). Irish staff, then, not just Irish operations, are making considerable progress within the ranks of the company beyond their affiliate. From the same company: “We have people from here making vital contributions to the company . . . the VP for construction worldwide . . . the director of the Worldwide Innovation Group left from here this year.”

**Competing internally.** The place of FDI in the Irish economy is matched by its prevalence in the national media. Downsizing and firm closures are frequent news stories. Upgrading and firm expansions rarely receive similar attention. Decreasing cost competitiveness and the rise of competing (lower cost) countries are often cited. Irish jobs are not “lost,” but relocated to another (lower cost) affiliate in the same corporation. The process
of internal competition in this respect, then, refers to the continuous rivalry between affiliates competing in order to sustain their own operations (Gereffi 1996).

Figure 3 reflects this competition. The left-hand side of the graph shows the percentage of employees working in first-level activity, which is roughly equivalent to the percentage of the workforce involved in manufacturing. While it is obvious from the above graph that primary activity is of major importance to most (especially hardware) subsidiaries, this is a figure that has decreased markedly over the past 10 years. Pull and push mechanisms are at play here. Management are responding to the shifting cost structure in Ireland and its inability to compete for low value-added operations as the emphasis moves from profit to cost centres. Second-level activity refers to non-manufacturing work practices. These activities range from call centre support to supply chain management (the case of Dell is especially noted here) to finance/human resources (HR) remits. Second-level activities are seen as higher value-added activities requiring skilled personnel. Finally, third-level activities are referred to here involving research, design, and development, higher value-added work that involves highly trained research workers. Industrial policy documents across the world have begun to focus on the latter.

Many state publications point to the need to shift the emphasis away from lower-skilled activities towards functions that are more knowledge based. For affiliates, this involves actively competing with other affiliates for the attainment of higher value remits. The case of EMC provides an interesting example of this. EMC’s development over the consolidation period was typical of many Irish-based affiliates. By the mid-1990s, many technology companies began to recognise Ireland for its potential. However, 1997 sparked a change in the trajectory of many manufacturing operations: “The closure of Seagate in Clonmel in 1997 scared the living daylights out of a lot of people in TNCs . . . there was an unwritten decision around the time to do ‘other stuff’ and we realized that the days of manufacturing alone were over” (Interview May 2005). This proved to be a milestone in EMC Cork’s strategic development. Realisation of the affiliate’s place in the global production network of EMC plus the corporation’s success over the mid- to late 1990s coincided to make an ideal opportunity for EMC Cork to leverage powers to evolve beyond a manufacturing outlet. Such leveraging, as with all affiliates, is dependent on the overall success of the corporation: “Owing to the expansion in Europe, we knew that a customer support centre was the next big move for the corporation, and we decided that getting it was our way forward, we put our hands up and said ‘we can do this.’ And we got the customer support centre here for the whole EMEA region.”

The impacts of policy will be discussed in greater detail later, yet the policy rationale in relation to upgrading affiliates is obvious. Ireland has advocated the move towards services for two simple reasons: manufacturing is no longer sustainable in terms of costs, and the move away from manufacturing reflects an upgrading in terms of skills and productivity of the workforce. While these two facts are irrefutable, it is the simplistic linear logic of interpretation that leads us to question policy consensus. As already highlighted, we have evidence of two distinct (but not unconnected) paths that Irish affiliates have chosen in moving away from manufacturing. The EMC case is an example of following the customer
in their movement towards establishment and competing with other affiliates for remits and control. It is a similar case for another affiliate operating out of the west of Ireland and out of Dublin: “If you are not with the customer you are nowhere . . . what will keep this operation here into the future is knowing what the customer wants” (Interview 019 2005). “I mean the key is really knowing what your customer wants—and who they are. From there you can design your product. For us it takes two and a half years to go from conception to first product, so it is a guessing game . . . getting it right sustains us” (Interview 019a West of Ireland 2006).

These steps are symbolic of a move from establishment towards affiliate development in the pursuit of a higher-end non-basic remit. IBM also acted in advance; they foresaw the regionalisation of the corporation’s global market in the 1980s and sought support remits for the whole of Europe. This is evidence of diversification, a key trait of an entrepreneurial affiliate working in a heterarchical structure.

Views on competing with other affiliates are also case dependent. Recent media reports have focused on the spate of recent closures and downsizing, citing Ireland’s lack of competitiveness in the global economy. Yet, the increasing regionalisation of production and the analogous organisational change are not necessarily perceived as negative ramifications of the globalisation process for all affiliates, not least our 10 case study firms. In the case of those who move away from manufacturing by focusing on logistics and their place in the supply chain, the rise of competitor countries/locations is in some cases viewed as an opportunity: “In terms of where the new need for growth of investment/headcount might be, it will go with the market. That is not to say that it will stunt the growth of our hub here. Indeed if we do our job properly, it will actually mean more product development for us here. I think it is crucially important in a place like Ireland to look out and ask, how can I build this business on a global basis, and then put the resources where it is effective to work with customers and manage that and market it with the business leadership entity. So we shouldn’t fear it, it is a natural extension of where the market is going” (Interview 018 2005).

The anchoring of Xilinx and the diversification of Dell show a similar pattern of increasing complexity as both operations have moved away from their original remits. The shift of focus away from manufacturing at Dell’s operation in Limerick shows its advance in terms of complexity. The advanced nature of processing in Dell’s Limerick operation is demonstrated by its “world beating supply chain model.” The intricateness of the operation behies the basic skills of its operators. That said, the setting up of a European Command Operation and Applications Centre is part of the internal process of employing larger numbers of the workforce in activities beyond manufacturing while also demonstrating successful attainment of regional remits.

The general trend is a movement away from manufacturing towards services. This is the nature of the model that has evolved in Ireland. Yet such are the vagaries of it that a question lies over its sustainability. As manufacturing gives way to services and low value-added services give way to high value-added services, questions are beginning to be asked about how long Ireland can stay ahead of this movement. The constant organisational shifts
towards areas of lower costs means Irish operations are in need of constant reinvention. Additionally, questions linger over the “value” of the services that Irish operations have acquired. While macroeconomic statistics can be cited as evidence of a move towards a services economy in Ireland, “services” themselves range in breadth and “value add.” Figure 3 shows a dynamic picture of decreasing emphasis on manufacturing, yet the move has been primarily towards second-level services. So while many of these companies are used as exemplars of a movement towards higher value work, the reality is clouded by semantics. Significant parts of services operations accounting for large percentages of employees in these affiliates add little in real value. Operators move from large machines to telephones and data entry tasks. An example from one of our case study companies shows the retraining of the workforce involved little more than a short course in “cold calling” as workers were allegedly moved up the value chain from manufacturing to telesales.

Institutional support. However, employing the (sometimes over/incorrectly used) value chain analogy, our evidence shows Irish technology affiliates making some successful transitions. From what was essentially a manufacturing-dominated industry in the 1990s, Irish operations have moved more towards trading services internationally. Directors of affiliates recognise this as key to survival: “The days of simple manufacturing are gone in Ireland” (Interview 017 2006). Not only do individual operations see the importance of moving towards services but so do industry bodies and policy makers: “The business value proposition Ireland offers today to the increasingly mobile multinational customer is best described under the following three headings: World Class Innovation and Development; Superior Performance and Business Integration, Service and Support” (IDA 2005: iv).

The much referred to and often used model of Molloy and Delaney (1998) depicts subsidiary development in a linear trajectory towards the end goal of R&D innovation, where key steps in evolution are mechanically hierarchical. Performance is thereby envisaged as continuing along this trajectory towards the ultimate end point of R&D. Many theorists follow the same logic in terms of seeing R&D as the ultimate anchor and control leverage to be subcontracted to an affiliate, usually from corporate headquarters (Birkinshaw 1997).

This rather simplistic take on a complex evolutionary process transfers all too easily into the policy arena. It is a somewhat unsophisticated logic that has been expressed in numerous policy publications relating to the knowledge economy in Ireland and beyond. However, more recent Irish policy documents dedicated to the area of FDI have highlighted concern about the dependence on external innovation and the universal response of increasing investment in R&D. Ahead of the Curve (Forfás 2004), for instance, raises the question of sustainability of imported competencies in the area of R&D. Yet, much government policy in terms of tax incentives remains geared towards its attraction. Table 3 depicts both the R&D competencies and spatial remits of the top 10 affiliates.

Table 3 demonstrates the difference between R&D competencies and the leveraging of power in increasing an affiliate’s network embeddedness. While most affiliates show some
### Table 3. R&D Competencies and Regional Remits

<table>
<thead>
<tr>
<th>Company</th>
<th>R&amp;D competencies</th>
<th>Global/regional remit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell</td>
<td>Software and product development in centre for competency. applications centre, proof of concept.</td>
<td>EU manufacturing centre. EU command and applications centre (client reception). EMEA business process improvement (internal). European expert centre (services support, Bray).</td>
</tr>
<tr>
<td>Microsoft</td>
<td>1988 product development centre and testing engineering and core development work. 2005 opened European development centre—digital TV, media.</td>
<td>European operations centre (sales and customer support across the EMEA), European product development centre (EMEA localisation).</td>
</tr>
<tr>
<td>Intel</td>
<td>IT innovation centre global headquarters based in Ireland, education, health, and e-government.</td>
<td>Global remit on fab manufacturing.</td>
</tr>
<tr>
<td>IBM</td>
<td>Acquired Lotus development in 1995 and integrated the R&amp;D lab. 500 employed (1/7 of Irish workforce).</td>
<td>A networked operation. European remit for technical support employing 650 staff.</td>
</tr>
<tr>
<td>EMC</td>
<td>2005 acquired two software development companies.</td>
<td>Customer and technical support remit for EMEA. EU production node responsible for SCM.</td>
</tr>
<tr>
<td>Oracle</td>
<td>European Development Centre—engineering and certification. Flagship of 250 employed in the EDC, 135 are in Dublin.</td>
<td>European HQ. EMEA manufacturing and logistics. Finance and administration for EMEA. Translation worldwide.</td>
</tr>
<tr>
<td>Apple</td>
<td>1999 opened software testing and e-commerce divisions⁹.</td>
<td>European HQ. Sales and service support for EU.</td>
</tr>
<tr>
<td>Analog</td>
<td>In 1979, eight people involved in R&amp;D in Ireland, now 450 (1/4 of Irish workforce) with $55 million spent on product development in 2004.</td>
<td>European HQ acting as a hub node for EMEA SCM. Global responsibility for 11 different product lines.</td>
</tr>
<tr>
<td>HP</td>
<td>Software centre. Development of AlphaServer generating $400 million. Semantic web projects carried out with university.</td>
<td>EU software centre. Sales and support/services for EU.</td>
</tr>
<tr>
<td>Xilinx</td>
<td>2005 €7.6 million expansion of advanced R&amp;D, design, and operations centre in Dublin.</td>
<td>European HQ in 2001 with a €52 million expansion. Sales, services, support in Europe and EMEA. Only R&amp;D outside HQ.</td>
</tr>
</tbody>
</table>

⁹ Along with phone and internet sales, the company has a shared services centre and a small manufacturing unit in Cork. The company exited large-scale manufacturing in Cork in the late 1990s. There were fears the plant could close but instead it has “moved up the value chain.”

Source: Company reports, Datamonitor, company interviews.
competence in the areas of R&D, it belies their relative nodal significances. It is obvious that movement up the value chain for all operations is far from complete. The cases of Dell, Intel, EMC, and Apple in particular show the relative insignificance of this higher value activity. The sum of the second column in Table 3 makes for uneasy reading for the promoters of the Irish innovation economy.

Yet the approach of viewing R&D as the end goal has more entrenched problems. Serious questions are now being asked by industry members as to the sustainability of this approach: “What the government wants is obvious, but there is no way that we can expect everyone here to be working in labs carrying out experiments . . . even the social consequences of everyone working in R&D are disturbing” (Interview 014 2005). “If we were to follow that to the end, then there is no way that we could expect to employ a fraction of the people we have at present” (Interview 015 2005). The top-heavy nature of the development model is criticised both for the fact that it ignores “serious work still carried out in manufacturing,” as well as the weakness of the support mechanisms behind it: “In terms of R&D tax breaks, I think it is something like €1,800 per R&D job . . . relatively, it’s a joke . . . if I’m trying to sell something to a VP of research in the U.S., that wouldn’t even come into it” (Interview 020 2006). Finally, with regard to network embeddedness, anchoring an operation is dependent on becoming a locus of control within the corporate network. A policy focus dedicated towards R&D is seen by some to mitigate this: “What we want here in terms of creating sustainability is control. Sure it is nice to have an R&D remit, but if we didn’t have manufacturing here as well [and how that can feed off R&D] the R&D remit would count for nothing” (Interview 019a West of Ireland 2006). Obvious contradictions can therefore be seen in the Irish development model.

Efforts have been made to redefine the foreign-owned sector as one dedicated to innovation and research. However, government spending on R&D (half the OECD average) and education has some way to go before the critical research infrastructures are in place to accommodate world-leading research and development (OECD 2004). The evidence we have provided here shows some positive evolution of the FDI model in Ireland, with affiliates exploiting the country’s strengths: Ireland’s geographic position on the edge of the European Market, a flexible competent and increasingly diverse workforce, strategically oriented management with a cultural and relational view of the firm, and one of the world’s most favourable business environments. All of which culminate to give Irish operations: proximity to and connection with the customer, and strategic advantage in the control over product flow and distribution (through SCM and connection with the customer). With knowledge of the product and an able workforce, customer and technical support remits become much more attainable, thus enabling the process of anchoring through network embedding as depicted in Figure 1.

Some evidence of this can be seen in the final column of Table 3. From it we see how Irish operations are reaping the benefits through increased spatial remits. As is the nature of investments in Ireland (non-domestic in orientation), all operations had a spatial reach beyond national borders. Yet, it is the continual leveraging of control of regional and global operations that mark the Irish case. External influences in the form of institutional support
(network enabling) and decision making at higher nodes in the corporation (network embedding) have (in successful cases) complemented the internal processes of affiliates seeking to competitively acquire control within their production networks. This process of what we term Network Anchoring has seen 4 of our 10 case studies rise to the status of European headquarters. Taking advantage of the increasing regionalisation of global corporations has enabled some of our case study companies to progress; yet it must be stated, this experience has not been uniform. There are examples of Irish operations being downsized from major manufacturing nodes to sales outlets as a result of corporations consolidating at the regional level in Europe (see Collins 2007; Van Egaraat and Jacobson 2004). The rise of competitor regions with emerging markets have also seen Irish and other European operations move east, another example of shifting business and organisational patterns with dualistic impacts.

**Conclusion**

Such are the vagaries of a development model that is dependent on the process of globalisation that the term “sustainability” is in need of constant redefinition. In this work, we provide further evidence of the move away from conventional internalisation theory of TNCs (Phelps and Fuller 2000). Broader organisational shifts by TNCs have seen them move from hierarchical and centralised structures towards heterarchical and networked organisation on the global stage (Dunning 1993; Zanfei 2005).

In identifying three avenues for increasing network embeddedness (nodal significance, internal competition, and institutional support), we have noted how connection to the customer and control over the supply chain are akin to what Zanfei (2005) terms “augmentation” strategies that have complemented existing knowledge with locally available assets and practices. Following the evolution of subsidiaries literature (i.e., Birkinshaw 1997; Dunning 1995), we have seen the place of policy as a key enabler in the attraction of value. We would echo the findings of O’Riain (2004), who cites the importance of what he terms “intrapreneurialism” in these processes. Central to the process of network anchoring has been the performance of affiliate managers in the initial attraction and the continuing diversification of corporate investment. Hirschman’s (1970) issues of trust, voice, and loyalty come to the fore here. In the case of Ireland, managers have been shrewd in their approach towards their employers that ranges from taking advantage of cultural connections: “We know everyone on the board with Irish connections” to more subversive behaviour: “if my boss knew what I was doing!” (Interviews 020 and 025 April and June 2006).

Our work has relevance in innovation studies also. We highlight the disjuncture between the policy goal of linear succession towards R&D and the reality affiliate evolution that is non-linear. Leveraging control from organisational restructuring does not lend itself easily to innovation indices owing to its organic nature (Sui 2000). Many Irish operations have become aware of their place in the market and in their corporation and have been quick to seize opportunities for control and increased power, thus enabling them to anchor their operations more firmly (Coe et al. 2004; Hess 2004). Prudent managerial decisions at the
affiliate level have seen the outsourcing of work that used to be done in Ireland to Eastern Europe and Asia, but the key innovation has been to keep the power in Ireland, mainly through the management of global supply chains. As Ireland realises its advantage, Irish operations increase their nodal significance and with that find themselves more embedded in the corporate network of production and servicing.

We have extended the conditions deemed necessary by Zanfei (2000, 2005) to reap positive benefits from organisational change and applied it to the Irish technology sector. In considering the role of these subsidiaries, we recognise that a movement away from the internalisation perspective is necessary. The organisational shift away from a vertical and centralised structure towards a network/nodal one has been crucial. Internalisation theory suffers in many areas, not least in terms of how it ignores managerial entrepreneurialism, or as O’Riain (2004) terms it, “intrapreneurialism.” The trend of leveraging power in itself calls into question the existence of operations dependent on a single function, and it is the multifunctional approach of Irish subsidiaries that is most noted here. A point that has become obvious to the low-level servicing carried out in Ireland is the fact that much of this work, while low level in terms of value add, services-differentiated markets (language, customisation) makes the nature of Irish operations difficult to replicate in other regions, most notably Asia. This then can be seen as another facet of Ireland’s multifunctional competitiveness.

Conceiving Irish affiliates as multifunctional, therefore, casts doubt over the linear view of upgrading whereby one function is replaced by another. We see the development of affiliates as more sporadic and likely to follow one of two lines (or a combination of the two) in the case of the top 10 technology affiliates in Ireland: Customer Focussed or Supply Chain Control. Both are reliant on the successful history these operations had as manufacturing branch plants, yet neither deny the importance of manufacturing in their continued sustainability. This then raises interesting questions for the international business literature in general and spatial theories of the firm more specifically. While the nature of the work carried out in Irish subsidiaries has changed in the past decade, so too has the very nature of these subsidiaries as well as the nature of the firm itself. The move to services can be seen as a move up the value chain, but along side it, bigger issues such as regionalisation, demand diversity, and changing product cycles have brought huge changes in the nature of all firms. Production affiliates that change to service ones are no longer subject to the same issues vis-à-vis costs, educated workforce technology, etc. Similarly, with a global push along the same lines, neither is the corporation subject to the same constraints. This evolution, both internal and external, is not a simple case of linear progression; it is an organic one bringing new visions of the firm and affiliate as well as the nature of work.

The system of knowledge and business support and development fostered by Irish institutions has acted as a pull on TNCs, not only setting up but adding activities of value to their Irish operations. This rather unique environment in Ireland adds to what Rugman and Verbeke (2001) would term location-bound advantages of subsidiary operations in Ireland. Stickiness has come about through the coincidence of these factors, and as
increased regional functions in terms of EU-wide remits came to Irish affiliates, so too has a degree of autonomy never experienced in Ireland heretofore. Thus, we have seen evidence of Irish operations embarking on value-creating activities and undertaking global exploitation of the knowledge base under their control. As a result of increased performance, we have seen evidence of Irish operations increasing their embeddedness by anchoring themselves through power brokerage and increased nodal significance in the global production networks of their TNC as a whole.

The evolution of affiliates has been more non-linear, marked by their stretching out in terms of control over various facets of the production process. At the global level, push and pull factors have eroded Ireland’s past competitiveness as a profit centre. At the local level, concerted institutional efforts have seen it carve a niche in overseeing the outsourcing of activities previously carried out in Ireland to lower cost countries, while maintaining control in Ireland of key business functions and thereby bolstering the nodal significance of its operations. The positive performance metrics in our case studies are examples of network embedding though rising nodal significance alongside network enabling through institutional support, leading to the network anchoring of Irish affiliates, thus facilitating their ability to compete vis-à-vis other affiliates, and thereby ensuring greater sustainability in the future.

NOTES
1. While these figures are impressive, they do serve to emphasise the underlying dwarfing of indigenous industry by foreign-owned multinationals in Ireland.
2. Corporation Tax in Ireland was the least punitive in Europe at 12.5 percent for all operations. More recently, more attractive tax breaks have been offered to foreign-owned operations that engage in higher value-added activities such as R&D. The 2004 Finance Act introduced a tax credit of 20 percent in addition to a tax deduction at 10 percent, 12.5 percent for R&D expenditure in Ireland, with effect from 1 January 2004 (IDA website).
3. As we shall see, while the majority of those employed in these affiliates are production staff, the general trend has been towards diversity with an increasing number employed in non-manufacturing roles.
4. That said, in the context that we use them here, these figures provide some help in comparing the size (beyond employee numbers) of each of the firms. In their work on Irish-based multinationals, Ruane and Gorg (1997) use employment figures to gauge a firm’s size owing to the practice of inflating turnover in order to reap the benefits of the Irish tax system. In relation to methodology, we can either use the turnover per employee figure as shown in the third column as an index of productivity or more usefully as an index of the degree of transfer pricing. Assuming that almost every TNC is carrying out some degree of transfer pricing, but that some are double counting more than others, let us take the mean of 1.24 as an average rate of transferring prices, with those measuring turnover per employee significantly above that as major perpetrators of transfer pricing. To that end, we see Microsoft as a major perpetrator, or as an outfit with extremely productive employees, since from 2003 to 2005 its workforce shrunk by 610 workers, but its revenues increased by over €1 billion. Microsoft is followed (at a great distance) by EMC
and Dell; again all operations that employ the greater percentage of their workforce at the manufacturing level.

REFERENCES
IRELAND’S FOREIGN-OWNED TECHNOLOGY SECTOR


