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Inward Investment, Firm Embeddedness and Place:  
An Assessment of Ireland's Multinational Software Sector

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## **Abstract**

This paper examines the embeddedness of multinational software firms located in the Republic of Ireland. Over the past fifteen years, Ireland has emerged as a software center of growing importance. Many leading US companies now use Ireland as platform for which to service the European market, in turn making Ireland the world's leading software exporter. As a result, the extent that software multinationals become embedded within Ireland will affect future economic development. Although subject to several interpretations, the conceptualization of embeddedness offered in this paper incorporates traditional concerns with local linkages between MNCs and host regions as well as issues of growing interest such as affiliate evolution and expansion. In addition, it considers the wider business environment's influence on firm embeddedness. The findings are based on published data and corporate and government interviews conducted during field research in Ireland. Overall the paper finds that over time software multinationals are becoming somewhat more embedded within Ireland, but several issues related to the negative externalities of Dublin's rapid growth hinder future development.

**Key Words:** Software, Embeddedness, Republic of Ireland, Foreign Direct Investment

## Introduction

By establishing foreign direct investment (FDI) as a key aspect of its regional development strategy, many places attempt to harness the positive development impacts of economic globalization. This strategy rests on the belief that Multinational Corporations (MNCs) provide quality jobs, superior skills and technology, and opportunities for local linkages and exports (Dunning, 1993; Young *et al.*, 1994a; Dicken, 1998; UNCTAD, 1999; Hood and Young, 2000). While FDI-led development policies are not new, they are perceived as taking on a greater significance as more recent waves of investment are seen as being of higher quality in terms of affiliate autonomy and local sourcing (Amin *et al.*, 1994). As a result, the extent to which inward investors become ‘embedded’ within host economies has achieved greater relevance (Young *et al.*, 1994; Phelps, 2000). In this context, embeddedness generally refers to the nature and extent of connections between inward investors and host economies. These issues are of particular concern to the Republic of Ireland<sup>2</sup>, which for over forty years pursued an FDI-led development strategy.

For much of Ireland’s recent economic history, FDI was associated with rural branch plants and as a symbol of Ireland’s dependent position in the world economy (O’Hearn, 1998, 2000; Shirlow 1995). More recently however, FDI is credited as a key catalyst behind the reversal of Ireland’s economic fortunes (Breathnach, 1998; Sweeney, 1998). Like many places, Ireland targets those sectors perceived to create the greatest opportunities for value creation, such as computers and pharmaceuticals (Young *et al.*, 1994b). Most recently however, greater emphasis has been placed on attracting firms involved in internationally-traded services, and as a result these

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<sup>2</sup> Hereafter referred to as Ireland.

activities are assuming an increasingly prominent place of Ireland's inward investment profile (Grimes, 2003).

While Ireland attracts service activities like teleservices (Breathnach, 2000), financial services (Murphy 1998) and shared services, software remains the most prominent internationally-traded service, as well as the one perceived as possessing greatest potential to contribute to Ireland's continued economic development. Although still considered a higher quality form of investment than past investment, software FDI is seen as weakly embedded and consisting of relatively low value-added activities such as software manufacturing and localization (Coe, 1997; O'Riain, 1997, 2000). This paper argues that while these activities are still the dominant activities, software multinationals are nevertheless becoming increasingly embedded within the Irish economy. In addition, this paper discusses several issues related to Ireland's environment of rapid growth influencing the continued development of these activities.

This paper is organized as follows. The next section discusses the concept of firm embeddedness and presents a conceptualization that not only considers issues related to local linkages and firm evolution, but also the influence of the local conditionalities of place. After providing some background about the adopted methodology, the subsequent section gives a brief overview of the Irish software industry. Next the industry is assessed through the lens of two different types of firm embeddedness, as well as within the context of Ireland's environment of rapid growth. Finally, several conclusions are offered relating to the future development of the software industry in Ireland and the policies geared to support the industry.

## **Elements of Firm Embeddedness: Consequences for Development**

While economic geographers continue studying the inherent territoriality and spatial structure of economic activity, contemporary research now places greater emphasis on social, political, cultural and institutional factors (Dicken, 2000). By highlighting the social and cultural practices influencing firm strategies and negotiating practices (both internal and external to the firm), these approaches claim to offer greater understanding than approaches that focus solely on economic imperatives such as market forces and competition (Yeung, 2000). Associated with this ‘cultural turn’ in economic geography are a number of concepts designed to further understanding of these softer aspects of economic behavior. Many of these concepts like untraded interdependencies, institutional thickness, learning regions, and associational economies are somewhat overlapping and often emphasize the importance of knowledge and learning for creating regional competitive advantage (Storper, 1997; Amin and Thrift, 1994; Florida, 1995; Morgan, 1997; Cooke and Morgan, 1998). Nonetheless, a significant body of empirically grounded research has not accompanied the proliferation of theoretical concepts (Mackinnon *et al.*, 2002). With some notable exceptions (e.g. Henry and Pinch, 2000), few studies actually operationalize and test empirically the validity of many of these concepts. To some critics, the cultural turn in economic geography creates several ‘fuzzy’ concepts that (Markusen, 1999) over socialize the economic, and potentially dilute the contribution this research can make to the continued economic development of real places (Martin, 2001).

The concept of embeddedness qualifies as a fuzzy concept (Oinas, 1997). Embeddedness has different meanings in different contexts, and consequently no singular approach captures fully the complexity of the term. For example,

embeddedness is used to examine the ties among different social institutions (Evans, 1995), sets of social practices and arrangements (Granovetter, 1985; Zukin and Dimaggio, 1990; Crewe, 1996), or as an indicator of regional economic development (Turok, 1993; Dicken *et al.*, 1994). This paper focuses specifically on the notion of firm embeddedness, and therefore concerns itself primarily with the nature and quality of connections between inward investors and localities, and the manner in which inward investment creates opportunities for local economic development. In spite of its importance for spurring economic growth and capturing global opportunities (Henderson *et al.*, 2002), there are relatively few attempts to clearly conceptualize and operationalize firm embeddedness. Phelps *et al.*, (2003) provide an exception, seeking to operationalize embeddedness by examining factors such as affiliate status, R&D activity, local purchases, skills and training demands and repeat investment. These indicators consider both traditional concerns for the character of local linkages (Turok, 1993; Phelps, 1993), as well as more recent concerns with affiliate evolution and the skills requirement of inward investment (Amin *et al.*, 1994; Phelps and Fuller, 2000). These various indicators illustrate the different elements or geometry of firm embeddedness. Henderson *et al.*, (2002) offer another conceptualization of embeddedness as part of their larger attempt to understand global production networks. They too attempt to demonstrate the different dimensions of firm embeddedness. Specifically, these authors identify two distinct forms of firm embeddedness—territorial and network.

Territorial embeddedness relates to the manner in which firms become anchored in particular places. Supplier linkages are the most common indicators of territorial embeddedness. Through linkages, firms create indirect employment and support the development of a local supplier base, which in turn leads to further

investment (Kennedy, 1991; Turok, 1993; Phelps, 1993). These inter-firm relations benefit both local firms and MNCs. Linking up to global networks allows local firms to access the technological knowledge and extensive resources of MNCs. By linking downwards into local networks, MNCs often gain access to sources of unique, tacit knowledge and thereby enhance their innovative capacity (Lyons, 2000; Zanfei, 2000).

Whereas territorial embeddedness emphasizes local inter-firm relations, network embeddedness examines the roles played by intra- and extra-firm relations. In regard to the former, this element of firm embeddedness considers the growing interest in intra-corporate competition and affiliate evolution in both the business studies literature (Birkinshaw and Fry, 1997; Birkinshaw, 1998; Molloy and Delany, 1998; Hood and Taggart, 1999), and the geographic literature (Amin *et al.*, 1994; Phelps and Fuller, 2000). Firm embeddedness is not simply determined by local factors, but also non-local factors such as inter-affiliate competition and internal posturing within companies that further influence firm strategy. Institutional perspectives further inform examinations of network embeddedness (Martin, 2000). Local institutions such as regional development agencies or universities are geared to deepen firm embeddedness by supporting locally based affiliates in their drive to upgrade and develop their internal capacity (Young and Hood, 1994; Peck and Burdis, 1996; Phelps *et al.*, 1998). Network embeddedness therefore accounts for the stability and importance of firm relations in the wider corporate and institutional networks in which firms are situated, and not just locally-based inter-firm relations (Henderson *et al.*, 2002).

While these different forms of embeddedness incorporate many of the inter-, intra- and extra-firm relations so important for understanding the relationship between

mobile capital and territorial economies (Yeung, 1994), this paper adds another dimension by examining how the local conditionalities of place influence firm embeddedness. Overemphasizing the institutional environment in which firms are located often marginalizes the local conditions in which real people live and work (Lovering, 1999). The importance of local conditions is starting to receive greater attention. For instance, several authors note that the implementation of a 'cluster-led' development strategy often increases the risk of localized inflation and overheating (Martin and Sunley, 2003). The growth of industrial concentrations therefore often puts pressure on both commercial and private property, tightens the labor market and creates congestion (DETR, 2000). In an examination of Singapore's commercial property market, Haila (1994) demonstrates how the negative externalities of economic growth inhibit further investment by raising costs and diminishing quality of life. While this has obvious consequences for cost-driven activities, quality of life issues influence significantly, the attraction of knowledge workers in high tech activities and advanced services (Sassen, 1991; Mugerauer, 2000, Yeung *et al.*, 2001).

## **Methodology**

This study utilizes a case study methodology. Case studies provide a proven method for social science research in general (Yin, 1993), and more specifically corporate case studies are effective methods for conducting research in economic geography (Schoenberger, 1991, Markusen, 1994). Rather than selecting between 'close dialogue' or 'stylized facts' (Clark, 1998), case studies require a methodological pluralism thereby incorporating both quantitative and qualitative research instead of privileging one over the other. In this study, published data about firms in Ireland provide breadth to the study by identifying broad trends and patterns.

Conversely, corporate interviews add depth to the study. Interviews then both complement and enhance analysis derived from quantitative data (Schoenberger, 1991).

The data were collected during dissertation field research undertaken in Ireland (White, 2002). The published data for this paper came primarily from state agencies like IDA Ireland and the National Software Directorate. These data provided information on characteristics like firm size, origins and location, and the basic nature of firm activities. These sources also offered aggregate data for such things as revenue, employment growth and exports. Newspaper articles from *The Irish Times* further supplied current information on firm expansions, lay-offs and closures. The bulk of the data, however, is derived from twenty semi-structured interviews occurring during 2000 and 2001. Firm interviews included both large software multinationals and several prominent localization vendors. Interviews were also conducted with government agencies such as IDA Ireland, as well as industry associations like the Irish Software Association and academic bodies like the Localization Research Centre. Combined these data present a picture of the various ways in which software multinationals are embedded within Ireland. In so doing, this research builds on research undertaken several years earlier (Coe, 1997, O'Riain, 1997) and offers a more longitudinal understanding of the industry, often missing in other studies (Mackinnon *et al.*, 2002).

### **Background on Software FDI in Ireland**

During the 1980s, the Irish government targeted software as an internationally-traded service with significant employment potential. Specifically, IDA Ireland targeted American companies requiring large workforces, and without

any other pre-existing European manufacturing or R&D operations (Coe, 1997). Moreover, they sought software companies whose products did not require spatial proximity to their customers, thereby negating the problems presented by Ireland's peripheral location. Initial successes included IBM in 1983, Lotus in 1984 and in spite of stiff competition from the Swiss canton of Neuchatel, Microsoft in 1985 (MacSharry and White, 2000). These initial investments served as an important catalyst for the emerging Irish software industry. Their presence stimulated growth among local printers and turnkey operations (Jacobson and O'Sullivan, 1994). The availability of these support services in turn became an added locational incentive. Most companies initially located in Ireland to undertake software manufacturing, which involves tasks like duplicating diskettes, burning CD-ROMs, packaging, kitting and shrink-wrapping. In the late 1980s, many companies expanded their operations to include software localization<sup>3</sup>. By adapting software for use in other countries and locations, localization allows firms to sell their software in a wider array of markets. These activities put Ireland on the global software map, helping to create an industry that between 1995 and 2000 grew at an annual rate of almost 20% (National Software Directorate, 2000).

Before proceeding several distinctions about the software industry in Ireland are required. Broadly speaking, Ireland has two software industries—one dominated by largely US multinationals and a smaller, more niche-oriented indigenous industry (O'Riain, 1997). Table 1 shows the prominence of US firms, while Table 2 illustrates the differences between the foreign and indigenous sectors. <<**Insert Table 1 and Table 2 around here**>> The industry now employs approximately 30,000 people,

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<sup>3</sup> Localization involves more than just translation, it also includes changing date and time formats or making color schemes appropriate to each country or culture. The idiosyncrasies of language dictate other changes. For example, translating English into German increases significantly the length of the text. Consequently, the size of dialog boxes must increase to accommodate the expanded text. This process requires a significant amount of engineering and testing—activities of varying sophistication.

split almost equally between indigenous companies and foreign multinationals. While comparable in employment, foreign firms are fewer in number and larger in size. Ireland is home to over 900 software companies and only 130 are foreign (National Software Directorate, 2000). Foreign firms generate greater revenue streams and are more export-oriented because large multinationals like Novell and Microsoft use Ireland as a base for selling packaged software into the European, Middle Eastern and African (EMEA) markets. Table 1 highlights this export focus. Exports account for virtually all revenue generated by foreign software multinationals. Throughout most of the 1990s, exports generated almost 99% of their revenue. With a wave of foreign mergers and acquisitions in the sub-supply base, this number declined to around 90 percent in recent years. Although several Irish firms, most notably Iona and Baltimore Technologies, have themselves become significant multinationals, most Irish software focus primarily on specialized niche markets and services and are relatively less export-oriented. As a result it is important to note that in most instances, they do not compete directly with the large multinationals (O'Malley and O'Gorman, 2001).

Software multinationals are concentrated overwhelmingly in Dublin. Figure 1 illustrates that almost 70 percent of software MNCs are located in County Dublin. <<Insert Figure 1 around here>> Given that Counties Meath, Kildare and Wicklow comprise part of the Greater Dublin Area, Dublin's dominance becomes even more apparent. Dublin contains the country's greatest concentration of graduates, universities and support industries making this concentration predictable. Within County Dublin most firms locate in Dublin 2 (City Centre). However industrial estates outside the city house the largest firms, in terms of employment. For example, recognizable names like Cisco, Oracle and Sun Microsystems operate out of East Point Business Park in Dublin 3. To the south of the city, almost all of Microsoft's

1700 employees work at one of three facilities in Sandyford and Leopardstown industrial estates. The remaining software firms are all located near other pools of skilled labor. As a result, software clusters are emerging around university towns like Cork, Limerick/Shannon and Galway. With the exception of Athlone, other regional centers like Ballina, Donegal or Kilkenny have yet to develop a critical mass of firms, mainly because the need for skilled laborers and a significant ICT infrastructure reinforces the industry's concentration in and around Dublin.

### **Territorial Embeddedness**

As noted above, territorial embeddedness relates to the manner in which firms functionally connect to the places in which they are located (Henderson *et al.*, 2002). Local linkages therefore provide a key indicator for examining this form of embeddedness. Software multinationals contributed to the formation of an extensive Irish supplier base, particularly following the arrival of Lotus and Microsoft in the mid-1980s. Linkages to this local supplier base however are focused primarily around activities such as localization and manufacturing, more so than software development and data processing. The propensity for software MNCs to outsource activities varies from firm to firm (Coe, 1997). Companies like Novell outsource most of their activities, with the Dublin office responsible for managing their vendor relationships. Conversely, Microsoft outsources relatively less, and this strategy of doing more work in-house partially contributes to the large size of their Dublin-based operations.

The large software publishers outsource several key activities in order to prepare their packaged software projects for the EMEA markets. Virtually every firm outsources the actual translation work to native speakers of each language. This is done for both quality and volume purposes, as for example the greatest collection of,

and most skilled Danish speakers are found in Denmark. The software manual printing (SMP) industry represents another prominent segment of the sub-supply sector. It was one of the first industries to benefit from the growing demand from the increasing number of software MNCs, as the industry grew at an annual rate of 30 percent between 1987 and 1992 (Jacobson and O'Sullivan, 1994). Relationships between software publishers and SMP industry are generally dependent in nature, with printers under considerable price and quality pressures. The continued development and use of electronic software delivery (ESD) only heightens the pressure placed on this segment of the sub-supply sector. The long-term sustainability of the SMP industry remains questionable. For instance in July 2001, one of the largest SMPs—Smurfit Print, closed resulting in the loss of 118 jobs. The downturn in the high-tech sector and a reduced demand for printed materials from high-tech companies were cited as reasons (*The Irish Times*, 7/21/01).

Turnkey and fulfillment services represent another segment of the sub-supply sector benefiting from the presence of the large software publishers. As with other suppliers, several of these firms are multinationals investing in Ireland to tap into the demand created by the software industry's growth. In some instances, pre-existing relationships with other MNCs located in Ireland inspires other MNCs to invest. By way of example, the Canadian firm Saturn Fulfillment Services located in Dublin in 1994 to manufacture software products for the European market. Saturn's existing links with another Dublin-based Canadian company, Corel, motivated partly its decision to locate in Dublin. While Saturn worked with Corel in the North American market, this pre-existing relationship did not automatically translate into an effective relationship between the two firms.

...with Saturn, since they came from, I think it is safe to say a rather non-competitive environment, they had our business, but there were

definitely areas that could be improved both on their side and this side. ... Our perception was that the way we distribute products, the way we launch products was dissatisfactory to a lot of our distributors. ... What that meant is that we had to go into Saturn and work with them to change their whole manufacturing process (Corel, Research Interview, 5/19/00).

As a result of Corel's dissatisfaction with Saturn, the Dublin affiliate assumed control of this relationship from its Ottawa headquarters, and dedicated several people to specifically oversee and work with Saturn to change its production process. What emerged was a more collaborative relationship, but one that remained one-sided with inefficiencies eliminated through what O'Riain (1997) refers to as "Learning by monitoring". While this new arrangement resulted in an increased exchange of information and advice, ultimately the supplier was forced to change its production process to meet the needs of its powerful client.

With regards to these particular segments of the sub-supply sector, these findings support the findings of Coe (1997) and O'Riain (1997) that identify a dependent set of linkages. That said, other supply sectors continue growing and establishing more 'developmental' linkages (Turok, 1993) with the multinational software industry. This is particularly the situation with the provision of localization services, which now constitutes the most significant segment of the supplier base. Most software publishers originally outsourced their software localization activities to single language or boutique vendors, but the need for quicker delivery times and greater economies of scale led to consolidation within the vendor base. This consolidation provided a significant boost for the larger localization service providers in Dublin, many of which are also multinationals.

As in the SMP industry, the largest multinationals hold sway over the localization vendors. The relationship between the largest multinationals and their

localization vendors takes on a master-servant quality, but this servitude was much more apparent in years past. The work performed for large software MNCs occurred frequently on a contract-by-contract basis, with vendors under considerable price pressure. This pressure however varies and according to the managing director of one localization vendor, the key is the customer's experience.

The newer clients have no legacy or history of being in a global market place, they just know they have to get it out there fast and as cheaply as possible so they tend to be more demanding and difficult to deal with (Lionbridge, Research Interview, 5/22/00).

As the industry matures, many larger software publishers attempt to establish longer-term and more collaborative partnerships with their vendors, rather than using short-term, arm's length transactions. These partnerships involve software MNCs making longer term commitments to their vendors and vice versa. The key to the partnership model is developing greater trust and communication between vendors and clients. Consequently, MNCs and vendors exchange both technical and business-related information. This information not only allows vendors to provide a certain level of quality, but knowing the MNC's business plan allows vendors to schedule their projects well in advance (Novell, Research Interview, 5/28/01). Moreover, sharing information about such things as future mergers and acquisitions may calm any vendor uncertainty.

The vendor partnership model does not completely alter the power relations between the vendors and the large software publishers. While it does not eliminate the master-servant relationship between MNCs and their vendors, it does reduce some of the price pressure placed on vendors (Oracle, Research Interview, 5/28/01).

Ultimately, the large MNCs want a consistency and predictability of service from their vendors. Vendor partnerships therefore rely on the development of a relationship of trust between the two parties. As these relationships evolve and develop over time,

the nature of the linkages between the large software publishers and their localization vendors therefore moves away from the dependent end of the Turok (1993) dichotomy and takes on a more developmental quality.

Just as these vendor partnerships are built on trust, distrust also inhibits the establishment and development of firm linkages. This is perhaps best illustrated by the influence of Microsoft in Dublin's multinational software sector. Microsoft's sheer size allows it to exert significant pressure on the localization industry. Feeling that there are enough other companies to interact with, some vendors elect not to do business with Microsoft. The perceived high level of dependency associated with doing business with Microsoft further creates distrust between vendors and their other customers. For example, one respondent indicated that while working at Lotus, the company policy was not to buy from any vendor doing business with Microsoft (Novell, Research Interview, 5/28/01). At the American MNC where she now works this position has softened, but the vendor's relationships with Microsoft bears scrutiny.

I am interested to know that they are managing the commitment they make to Microsoft. I think that none of our partners have anything more than a 25 percent commitment. It used to be 40 percent, and that was a concern but we were happy that they were managing it because Microsoft certainly didn't. They didn't care that they were eating 90 percent of the vendor, but we did (Novell, Research Interview, 5/28/01).

The presence of such a large firm, therefore, inhibits the development of greater trust between firms because it requires customers to establish a greater level of monitoring over their suppliers.

For its part, Microsoft claims to avoid situations where vendors become overly dependent on their business. Like many other large software publishers Microsoft seeks to establish long-term partnerships with numerous vendors, ensuring

their deadlines get met (Microsoft, Research Interview, 11/3/00). Moreover, vendors working with Microsoft downplay the notion that working with the software giant creates an unhealthy dependence on the company. One respondent, whose company supplied localization services to Microsoft, indicated that being forced into providing for one customer over another is more an indication of bad resource planning than the undue influence of one customer (Bowne Global, Research Interview, 5/29/01). In addition larger, more experienced companies like Microsoft with whom vendors have a long-term relationship, would be more forgiving of the odd infringement than would newer or smaller companies with whom the vendor had no relationship. The manner in which Microsoft works with vendors further blunts its influence. As indicated by the managing director of one of Dublin's largest localization services providers:

They [Microsoft] would be our largest customers worldwide although they represent only 12 percent of our business worldwide. But we find in Microsoft we deal with project units, say Office, or Windows or MSN or .Net division. So we actually deal with each of these as almost, not completely, independent companies (Berlitz GlobalNet, Research Interview, 5/23/01).

Therefore, the project-based nature of this work lessens vendor dependence on Microsoft.

The research presented here supports the findings of previous studies (Jacobson and O'Sullivan, 1994; Coe, 1997; O'Riain, 1997), by showing that in some sectors dependent linkages exist between suppliers and large software MNCs. That said it also shows that this is not true for all parts of the sub-supply sector, as over time linkages in areas such as localization services are becoming more collaborative in nature.

## Network Embeddedness

While the inter-firm linkages discussed in the previous section illustrate an important way in which MNCs become embedded in Ireland, supplier linkages are not the only indicator of embeddedness. In recent years the internal dynamics and competitive processes influencing the development of MNCs and their affiliates have drawn more attention from researchers (Amin *et al.*, 1994; Delany, 1998; Birkinshaw, 1998; Phelps and Fuller, 2000). Network embeddedness is largely the product of the structure and evolution of MNC affiliates (Henderson *et al.*, 2002) and the long-term future of this investment in Ireland. For instance, MNC affiliates that continuously leverage these relations to create opportunities for upgrading and expanding their operations, are less in danger of relocation and more firmly embedded in that particular locale (Malmberg, *et al.*, 1996).

The multinational software industry in Ireland displays the ability to assume a wider range of functions. Activities are no longer restricted to just manufacturing and localization, as many MNCs have added sales and marketing functions. As such, Irish-based affiliates are becoming European corporate hubs, and now occupy more important roles within their corporate hierarchies than previous rounds of inward investment. Nevertheless, previous research conclusions seem pessimistic that these operations are capable of assuming more sophisticated activities like software development. This skepticism is reflected in O’Riain’s (1997) statement that,

The prospects of those TNCs doing localization work moving into software development seem quite dim and the links between those few companies doing genuine software engineering and local software development firms are weak (p. 195).

Coe (1997) also notes that there are few indications that significant software development operations were being added to existing branches.

This research finds somewhat similar conclusions in that firms are more likely to add functions to their Dublin-based operations than evolve into software development operations. For instance, Novell added a shared services division in addition their software activities. Microsoft has consistently added new activities such as sales, marketing and web-hosting to its Dublin hub. Oracle located originally in Dublin to perform software localization and manufacturing, but has added subsequently an Internet sales division and shared services operation. Oracle currently employs approximately 1200 people in six different divisions (*The Irish Times*, 7/18/03). While many of these additional activities may not carry with them perceived importance of R&D and product development activities, they do enhance the corporate standing of Irish-based operations.

In addition to taking on corporate services activities, it should also be noted that the industry overall is displaying greater capacity to support more sophisticated development work. This is evident by the demand for third-level graduates within the software industry. In 2000, third-level graduates comprised 55 percent of the employment in the multinational software sector. However, third level graduates constituted 90 percent of the labor force for projects arriving in Ireland in the two years prior to 2000 (IDA Software, Research Interview, 5/19/00). As a result, it is safe to assume that the overall figure has and will continue to rise. Although new investors contribute greatly to the rising skill levels in the multinational sector, a number of multinational affiliates involved in software localization also display the capacity to continuously upgrade their activities over time.

The case study of Sun Microsystems' Dublin affiliate illustrates that even among firms doing localization work, the potential exists to move into higher value-added development work. Sun Microsystems first invested directly in Ireland with the

opening of its Strategic Software Development Centre in 1993. Initially investing in Ireland to perform software localization, the Dublin affiliate enjoyed considerable success in fulfilling its initial mandate. Being a ‘name’ company, Sun both attracts and retains some of the highest quality laborers, further contributing to the continued development of the affiliate’s internal capabilities. Due in part to this success, subsequent expansions involved moving into higher-value added development work. In October 1999, Sun announced an expansion of its workforce by nearly 50 percent to fill the new extension built at its East Point European Software Centre. This expansion required the hiring of 100 more software engineers (*The Irish Times*, 10/12/99). In August 2000, Sun Microsystems announced plans to add another 275 software engineering jobs (*The Irish Times*, 8/5/00). Dublin is already Sun’s largest engineering centre outside of the United States. In 2001, approximately 25 percent of the Dublin affiliates workforce was devoted to R&D, but by 2002 this number reached 50 percent (Sun Microsystems, Research Interview, 2/1/01).

Affiliate upgrading is not just the result of performance, but also ‘intrapreneurial’ efforts on the part of local management designed to enhance the headquarters’ perception of the affiliate (Birkinshaw, 1998; Molloy and Delany, 1998). In this case, the local management made a concerted effort to promote and highlight their affiliate’s capabilities and achievements every time they went to the company’s US headquarters. As a result, opportunities for more sophisticated work emerged partially from internal posturing among other Sun affiliates, particularly those doing development work in the US (Sun Microsystems, Research Interview, 2/1/01). Moreover, several elements of the Irish government including IDA Ireland and the Tanaiste<sup>4</sup>, Mary Harney, further supported these efforts.

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<sup>4</sup> The deputy prime minister.

The Irish government actively encourages firms to upgrade and expand their activities. A growing body of research often associated with institutional approaches (Martin, 2000) emphasizes that local institutions must actively support these efforts in order to embed firms more deeply. This is generally the approach taken in Ireland where institutional support for affiliate evolution represents a key component of Irish industrial policy (Department of Finance, 2000). This institutional support comes in numerous forms such as direct financial support for R&D and employee training, relaying firm needs to other relevant parts of government and, as in the case of Sun Microsystems, directly lobbying MNC headquarters on behalf of the locally-based affiliate (IDA Software, Research Interview, 5/19/00). This support is not distributed evenly, as larger, more prominent firms are more likely to receive greater support than smaller firms.

Yet while fostering these kinds of relationships between firms and local institutions has become the conventional wisdom, research empirically testing these propositions in the UK indicates that local institutional supports have little influence on individual firm embeddedness (MacKinnon and Phelps, 2001; Phelps *et al.*, 2003). Instead, factors internal to the firm and not necessarily local are more likely to influence investment or relocation decisions. The research here corroborates this later view, as evident by the case of the Canadian software company, Corel.<sup>5</sup> Corel Corporation first invested in Dublin in 1993 to perform localization. This investment was small with an initial workforce of approximately 20 people, but as Corel began adding new product lines, the workforce expanded. In spite of the Dublin affiliate's expansion, Corel's Ottawa-based headquarters assigned directly its activities. Headquarters told the affiliate what to do, and the affiliate carried out these duties.

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<sup>5</sup> This section about Corel is largely based on two interviews. One with Corel's Localization Manager (5/19/00) and the other with Corel's former managing director and current CEO and President of Alchemy Software Development several months after Corel's closure (2/6/01).

The situation changed in 1997, when Corel hired several experienced, Irish localization managers to run the Dublin affiliate. For many years Corel was a cash-rich company perfectly satisfied releasing, for instance, the German version of CorelDraw 90 days after releasing the English version. The new management in Dublin sought to raise the profile of localization activities within the company. They claimed that they could produce localized versions in 30 days, instead of 90.<sup>6</sup> Headquarters did not, however, support these efforts because the acquisition of Word Perfect and the move to Linux created huge losses and an emerging internal cash crisis. As described by the Localization manager, the affiliate proceeded without the support of headquarters.

So we decided that we were going to change the culture of the company, but we did it without asking permission of the parent. So what we decided to do was make the shift [to 30 days] regardless of support from the parent. We told them we would get it to them, but they didn't believe us. But with the cash crisis, we started to get phone calls from HQ asking how we were doing. (Corel, Research Interview, 5/19/00)

In meeting their goals, the Dublin affiliate saved the company millions of dollars. Corel no longer, for instance, had to introduce the English version into the German market and then take it back upon completing the German version.

The Dublin affiliate's success gave it much more influence within the corporation, and the relationship with the parent became a two-way relationship, rather than one-way. In the words of Corel's localization manager, "We basically proved to the parent that we are a very good child, and that we are now going to be quite a sensible teenager", (Corel, Research Interview, 5/19/00). As a result of this success, the Dublin affiliate took on several other ancillary activities, like human resources and accounting functions, as well as the management of the manufacturing

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<sup>6</sup> Minimizing the difference in time to market between the English language version and non-English versions is a key to success for software publishers.

operation. The affiliate grew to almost 200 employees after starting with only 20 in 1993. In an interview with the Irish Times in 1999, Corel founder and CEO Michael Cowpland claimed, “We can’t get people fast enough into the Dublin office” (*The Irish Times*, 3/30/99). Moreover, the Dublin affiliate generated 50 percent of the company’s revenue stream.

In spite of this success, Corel’s Dublin affiliate could not escape the company’s overall shortcomings. According to Dublin affiliate’s former managing director, the company had gotten away from its core competency when it took on Word Perfect and Linux (Alchemy Software, Research Interview, 2/6/01). Every time the company took on a new activity, it shifted all of its resources to the new project while failing to maintain the others. As Corel’s Word Perfect and Linux failed to break Microsoft’s market dominance, the losses mounted. In August 2000, after CEO Michael Cowpland left the company, Corel announced a major reorganization resulting in the closure of the Dublin office and the loss of 139 jobs (*The Irish Times*, 9/7/00). Most of these jobs were in localization and eventually relocated to Ottawa. A small number of staff remained in Dublin to manage Corel’s outsourcing relationships with third party firms in Ireland and Europe. Also the development of the software used to do the localization was spun-off to a new company, Alchemy Software (of which Corel owns 24.9 percent), operated by the former MD and employing approximately fifteen former Corel employees (Alchemy Software, Research Interview, 2/6/01).

The great irony of Corel’s Dublin closure is that in the week preceding the announced closure, RTE<sup>7</sup> planned to air a feature depicting Corel as a model investor. The Corel case study illustrates several of the key limitations and lessons involved in

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<sup>7</sup> The national radio and television station.

affiliate development. The affiliate's superior performance or good relationships with local institutions proved inconsequential in determining the affiliate's future. The case demonstrates that the competitiveness of individual firms and the competitiveness of particular places are two entirely separate issues. Ultimately it was not local factors but rather factors internal to the corporation that determined the embeddedness of this particular affiliate. This is not necessarily an indictment of the skills contained in the local labor pool, but rather the weakness of the wider corporate network. As a result, local factors such as adequate supplies of skilled labor and institutional support are necessary, but not sufficient factors for embedding firms.

### **Explaining Embeddedness: The Conditionalities of Place**

While the issues discussed in the previous two sections dominate much of the research relating to MNC embeddedness, this section demonstrates that local conditions not related directly to inter-firm or institutional relations, further influence firm embeddedness. Within the Irish context, these local conditions are related heavily to the growing spatial concentration of employment and industry within the Greater Dublin Region<sup>8</sup>. The Greater Dublin Region is growing faster than the rest of Ireland, and attracts a disproportionate share of FDI and MNC employment. The pace of this influx of industry and people into the Dublin region<sup>9</sup>, contributes to an inadequate supply of available office space and housing. Rising costs within Dublin and the search for more affordable housing in Dublin's hinterlands, results in a physical expansion of the Greater Dublin Region (William and Shiels, 2000).

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<sup>8</sup> This includes the planning regions of County Dublin and the Mid East (Counties Meath, Kildare and Wicklow).

<sup>9</sup> Between 1996 and 2011, an estimated 350,000 people will be added to the Greater Dublin Region. To put that into perspective, that is like permanently relocating the entire populations of the eight counties of Cavan, Monaghan, Sligo, Leitrim, Offaly, Longford, Laois and Carlow to Dublin (McEnaney, 2001).

However, employment growth in Dublin's hinterlands is not keeping pace with its population growth. A recent study by the state-funded Economic and Social Research Institute (Morgenroth, 2001) shows that in spite of the population growth in Dublin's surrounding counties, most employment remains concentrated in Dublin. As a result, the Greater Dublin Region experiences greater commuter traffic and longer commuting distances. While the Irish government created successfully a policy regime conducive to the needs of mobile capital, these issues undermine those efforts (Ellis and Kim, 2001) primarily because they hinder the ability of firms to recruit and retain staff. Although many observers (Sweeney, 1998; Horner, 1999; Williams and Shiels, 2000; Ellis and Kim, 2001) identify these new problems as a threat to Ireland's attractiveness to foreign investors, few specifically examine the consequences for firm embeddedness.

The shortfall of skilled labor associated with Dublin's environment of rapid growth presents the most pressing problem for the software industry. Skills shortages are endemic to the global software industry, as in Western Europe where there is a projected shortfall of 1.7 million IT workers (Power and Klee, 2000: 26). Within the Irish context, the Irish Software Association (ISA) identifies a shortfall of almost 3000 people with 70 percent of software companies (both indigenous and multinational sectors) experiencing difficulty in hiring suitable staff (Irish Software Association, 1998). The ISA further claims that between 1995 and 1998, salary costs rose 50 percent and staff turnover reached approximately 20 percent annually (Irish Software Association, 1998). As noted elsewhere (O'Riain, 1997), many prominent multinationals experience less difficulty finding and retaining people because they offer superior career opportunities. Nonetheless, among the firms interviewed there

was no real consensus about the severity of the skilled labor shortage, but most firms did identify it as the greatest drawback about Dublin's business environment.

Immigration partially eased this tightening labor market within the multinational software sector, as the employment opportunities created in Ireland attracted many Irish emigrants home. Unlike previous waves of emigration, Irish emigrants since the mid-1980s were highly educated (King and Shuttleworth, 1995), and as a result returning emigrants bring both skills and experience back to Ireland. In fact, the Irish government launched recruiting missions to places like Silicon Valley and London to make the most skilled Irish émigrés aware of the available opportunities in Ireland. During the 1990s return immigration not only provided an added boost of technical and managerial skills, but also allowed the economy to expand without undue pressure on skilled wage rates (FitzGerald, 2000). However the diminishing stock of Irish emigrants means that many software companies now look to other sources like India and Eastern Europe to meet their skilled labor demands. The importance of foreign knowledge workers further illustrates the importance of non-local factors to firm embeddedness (Bunnell and Coe, 2001).

Although immigration eased the skills shortage, many software firms continue facing difficulties not only in staff recruitment, but especially staff retention. This is illustrated by a 2001 survey by Deloitte & Touche<sup>10</sup> identifying some of the negative consequences of Dublin's rapid growth on business. This survey shows that overall, more than half of Irish corporate managers think that Dublin's traffic problems hurts their business. Table 3 highlights several of the survey's key findings. <<Insert **Table 3 around here**>> Overall, half the MNC affiliates surveyed and two-thirds of the Dublin-based firms indicated that vehicle traffic negatively impacted their

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<sup>10</sup> The Deloitte and Touche Survey was conducted in June 2001, and the results were publicized in late August 2001. The survey had a total of 214 respondents of varying size, ownership, location and activities.

business. Unpredictable journey times and excessive commuting distances were among the most common explanations for the negative impact. Most important for this study is the number of respondents reporting staff leaving to work closer to home. Over 50 percent of the MNC affiliates and Dublin-based firms indicated that they had staff leave to work closer to home.

Interviews confirmed these findings within the multinational software sector. Combined, these problems limit MNC's ability to meet their staffing needs. Not only must firms find people with the necessary skills, but increasingly people living within a reasonable commuting distance. As explained by the managing director of one software MNC,

We are in a good location here [Blackrock], but if people don't have access to the rail system, the DART<sup>11</sup>, and they have to commute, then they are looking at very long commute times. Two offers that have gone out this month have been rejected on the basis of commuting time. Which is really understandable because the government has a long way to go. There is going to be a decade, if not two, before that is fixed; which is disgraceful (Lionbridge, Research Interview, 5/22/00).

With lengthening commuting times, more and more people are choosing jobs on the basis of what falls within a reasonable commuting distance. This makes retention, particularly for the most skilled and experienced people (who presumably have the most options), increasingly difficult (Oracle, Research Interview, 5/28/01). The increased difficulty in retaining people extends to foreign knowledge workers recruited to work in Dublin. As the manager of one relocation services company describes,

Companies like Compaq and Oracle that set up HQs in Dublin and recruited from all over Europe have lost a lot of people who are disgusted at the cost of living there (Quoted in Kennedy, 2002, p.15)

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<sup>11</sup> The DART is the Dublin Area Rapid Transit. It is not a mass transit system, but rather an old rail line that stretches along the east coast from Malahide in north county Dublin to Greystones in County Wicklow.

The diminishing quality of life makes Dublin a less competitive location in the global competition for internationally mobile knowledge workers (Florida, 2002). In addition, affiliates must instead devote time and resources to hiring and training new staff rather than developing and enhancing the MNC affiliate's capacities.

Given the increased difficulty in recruiting and retaining staff, firms must give serious consideration about selecting their location in Dublin. Firms are becoming more skeptical about the benefits of locating in one of the government-owned industrial estates found on the outskirts of the city. These issues played an important role when the US firm, Novell, sought to consolidate its two Dublin-based operations<sup>12</sup> into one location. As explained by a Novell manager,

I used to work at Lotus at Airways Industrial Estate [north of the city centre near the airport] and they [IDA Ireland] talked about what a high-tech industrial park that was, Oracle, Lotus is there. It's manufacturing and shipping, it's located close to the airport and close to the port, that's why it is there. No facilities whatsoever. They presented on CityWest and said that by 2002 it will be completely accessible by Luas [light rail]. Absolutely no one believes it.<sup>13</sup> We had to realize that either we stay in town or we lose some of our good people (Novell, Research Interview, 5/28/01).

With its workforce split 60-40 between Southsiders and Northsiders, Novell eventually decided to stay close to the city centre.<sup>14</sup> While industrial estates provide adequate space for expansions and the best access to broadband infrastructure, other firms voice concerns about their associated inaccessibility to public transport, difficult commuting distances and the lack of shops and restaurants.

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<sup>12</sup> Novell locates its sales and shared services operations in the Grand Canal Docks (City Centre) and its software localization operation in the Iona Building in Ballsbridge (Dublin 4 south of the City Centre).

<sup>13</sup> ...and for good reason, as the Luas system remains under construction and behind schedule.

<sup>14</sup> Novell planned to construct, what would have been, a 110,000 sq. ft., high-profile building on the newly decontaminated site of the old Dublin Gas Works. This all became moot as slowdowns in the global software market and a downturn in the economy caused Novell to pull out of that project in March 2002 (*The Irish Times*, 3/8/02).

Firms have implemented a number of strategies to alleviate the strains placed on their work force by the negative externalities of Dublin's growth. For instance, Microsoft opened four satellite offices around the city in order to provide their employees with greater flexibility in their commuting to and from their main facilities in South County Dublin (Microsoft, Research Interview, 11/3/00). In addition, a number of companies indicated that they offered E-working arrangements. Nevertheless, these arrangements were not viable options for every role or task, particularly those involving teamwork. So while E-working alleviates some of these issues, it does not completely resolve them. In fact, some argue that providing people with telecommuting arrangements diminishes their need to be close to work, making people more likely to live further away from their workplace and become even more car dependent (Gillespie and Richardson, 2000). It should also be noted that smaller firms are generally less capable of committing the resources necessary to provide these alternatives.

Regional locations present another opportunity to overcome Dublin's congestion and rising costs. Regional offices experience less difficulty in hiring and retraining staff. For instance, nearly half of Ericsson's 1500 Irish employees are located at their Athlone software campus in the middle of the country. Compared to the company's Dublin-based affiliates, the Athlone affiliate experiences less difficulty in recruiting and retaining staff. The lower housing costs and the perceived higher quality of life play important contributing factors (IDA Software Division, Research Interview, 5/16/00). Currently with the implementation of the National Development Plan (Department of Finance, 2000) and the National Spatial Strategy (Department of Environment and Local Government, 2002), there is a strong push by the Irish government to achieve more balanced regional development. The government has

attempted to promote regional locations to MNCs not only by offering greater investment incentives, but also by trying to highlight the reduced competition for labor and access to local technical institutes. Although it is too soon to fully evaluate the efficacy of these programs, the results to date have been disappointing. Software firms in particular continue to locate overwhelmingly in Dublin, or to a lesser extent in Ireland's other major cities (Cork, Limerick and Galway), mainly because these locations offer not only a large pool of skilled laborers but also present better access to broadband and the transportation infrastructure. Moreover, these urban locations provide firms with a certain comfort level because so many other software companies are there and have been relatively successful there. Nonetheless, this pattern is unlikely to change in the near future given that services activities like software remain largely urban activities (Sassen, 1991).

Although most discussions of firm embeddedness concentrate on the issues discussed in the previous two sections, this section shows that these issues effect directly firm embeddedness. These local influences show themselves in two ways. First, they hinder the ability of individual affiliates to increase their internal capacity. In some instances, staff turnover serves as a key mechanism for transmitting knowledge throughout a region, and in turn enhancing the region's innovative capacity (Henry and Pinch, 2000). There is evidence indicating that these processes are at work in the Irish software industry, particularly in regard to indigenous entrepreneurs gaining experience in software MNCs (O'Malley and O'Gorman, 2001). That said, it is again important to remember that firm competitiveness and regional competitiveness are two separate issues, and in this instance most firms indicated that high staff turnovers hindered individual firm competitiveness. The seniority and experience of labor is an accumulated sunk cost (Clark and Wrigley,

1997), and considerable sunk costs in the form of accumulated labor skills and management practices are required to develop the capabilities necessary to expand and upgrade (Phelps and Fuller, 2000). Industrial development is expressed not only by a growing number of firms, but also in the growth of individual firms (Bresnahan, *et al.*, 2001). Consequently, reducing staff turnover can lead potentially to deeper firm embeddedness.

## **Conclusion**

This paper complements other attempts (Phelps *et al.* 2003) to better conceptualize the notion of firm embeddedness. It does so not only through the traditional consideration of issues such as the local linkages between multinationals and host regions (e.g. Turok 1993), but also the consideration of more recent concerns such as affiliate evolution and upgrading (e.g. Amin *et al.* 1993, Phelps and Fuller 2000). With regard to the former, the research presented here supports the findings of previous studies (Jacobson and O'Sullivan, 1994, Coe, 1997, O'Riain, 1997), by showing that in some sectors dependent linkages exist between suppliers and large software MNCs. That said dependent linkages are not characteristic of all parts of the sub-supply sector. Over time linkages in areas such as localization services are becoming more collaborative in nature, as evident by the growing prominence of vendor partnership arrangements.

In terms of affiliate expansion and upgrading, this study demonstrated that the potential does exist for Irish-based affiliate to undertake more sophisticated work. That said, factors internal to corporate networks are much more likely to influence individual firm embeddedness than strictly local influences. As noted by Phelps and Fuller (2000), the international business literature on intra-MNC competition and

repeat investments shows that much of what occurs in MNCs is neutral in regard to the affiliates actual location (Birkinshaw and Fry, 1997). The case studies described here support the position that non-local factors influence significantly local firm embeddedness (e.g. Mackinnon and Phelps 2001). If there are any local advantages, these advantages are more likely to be general assets such as the workforce's general skills or the tax regime, than unique assets or tacit knowledge so often emphasized in the geographic literature (Malmberg and Maskell, 1997).

This paper further contributes to the concept of firm embeddedness by illustrating that aspects of place further influence the process of embedding. In this instance, the negative externalities associated with Dublin's environment of rapid growth influenced the ability of software multinationals to recruit and retain staff. This in turn hinders their ability to build internal capacity and take on more sophisticated work. This again demonstrates the importance of supply-side factors for determining future firm embeddedness (Amin *et al.*, 1994, Bresnahan, *et al.*, 2001). These factors also highlight the need to consider the local conditions that exist in real places, where real people live and work (Lovering, 1999).

Although multinational software firms are appearing to become more deeply embedded, the industry itself is in a continuous transition. Ireland's relative cost competitiveness is diminishing and emerging software centres in Eastern Europe and India pose real threats to future sustainability (*Economist* 2003). Ireland's declining relative cost competitiveness will be somewhat offset if there are improvements in the physical and business infrastructure, in addition to the continued development of skilled labor. The future of the multinational software sector is reliant on the ability for Irish affiliates to build their internal capacity, as well as enhancing their position within their wider corporate networks. Consequently, future research must examine

not only the continued local development of technical skills, but must also focus on the processes through which Irish-based affiliates gain greater influence and control throughout their entire global production network. Moreover, comparative research is required to identify the extent to which the processes occurring in Ireland can be generalized to other emerging software centres.

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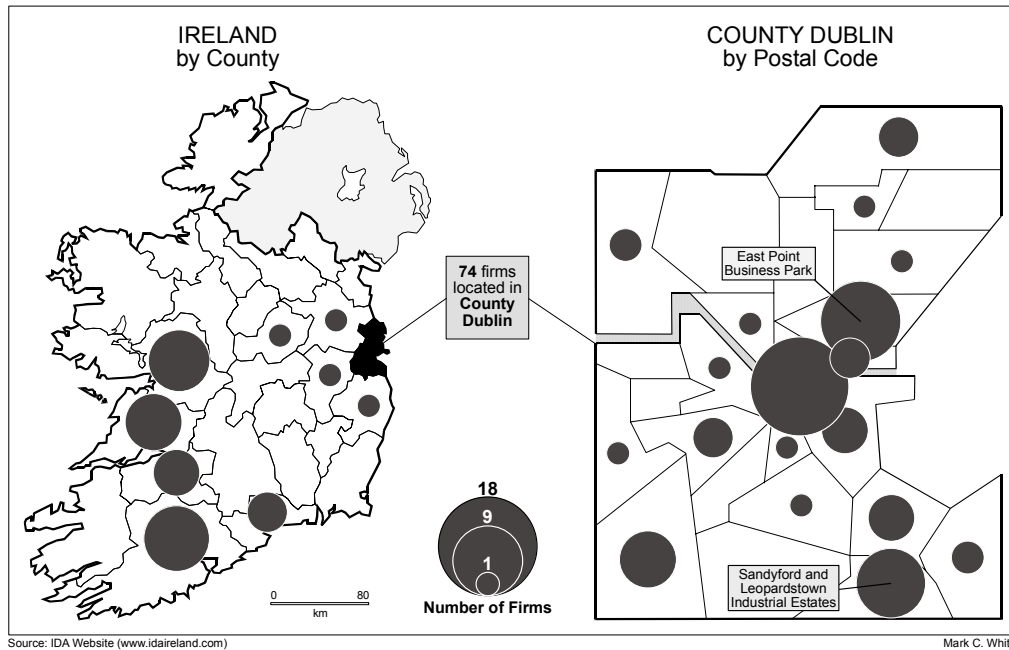
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**Figure 1: Foreign Software Firms in the Republic of Ireland**



**Table 1: Irish Software Industry Statistics, 1993-2000**

Year	Irish			Overseas		
	Employment	Revenue (IR£m)	Exports (IR£m) [as % of Rev.]	Employment	Revenue (IR£m)	Exports (IR£m) [as % of Rev.]
	(% of Total)			(% of Total)		
1993	3801 (48.8%)	300 (11.9%)	147 [49.0%] (6.3%)	3993 (51.2%)	2230 (88.1%)	2192 [98.3%] (93.7%)
1995	5773 (49.0%)	490 (12.9%)	287 [58.6%] (8.0%)	6011 (51.0%)	3316 (87.1%)	3282 [99.0%] (92.0%)
1997	9200 (50.6%)	650 (11.4%)	455 [70.0%] (8.4%)	9000 (49.4%)	5032 (88.6%)	4981 [99.0%] (91.6%)
1998	9250 (42.8%)	913 (13.8%)	566 [62.0%] (9.7%)	12380 (57.2%)	5704 (86.2%)	5293 [92.8%] (90.3%)
1999	11,100 (44.6%)	1278 (16.8%)	792 (12.1%)	13,791 (55.4%)	6347 (83.2%)	5728 [90.2%] (87.9%)
2000	14,000 (46.7%)	1400 (13.8%)	875 [62.5%] (10.3%)	16,000 (53.3%)	8750 (86.2%)	7625 [87.1%] (89.7%)

Source: National Software Directorate website ([www.nsd.ie](http://www.nsd.ie))

**Table 2: Geographic Origins of Software MNCs in Ireland**

<b>Origin</b>	<b>Number of Firms</b>
United States	56
United Kingdom	13
Germany	9
Other (Europe)	15
Other (Non-Europe)	13
<b>Total</b>	<b>105</b>

Source: IDA Ireland Website ([www.idaireland.com](http://www.idaireland.com))

**Table 3: Negative Consequences of Vehicle Traffic on Business in Dublin,**

**Ireland**

<b>% of firms answering affirmatively to the following</b>	<b>MNC Affiliates</b>	<b>Dublin based firms</b>	<b>Total</b>
<i>Overall:</i>			
Vehicle traffic is having a negative impact on business	51.5%	65.7%	61.2%
<i>Reasons why vehicle traffic is having a negative impact:</i>			
Journey times are unpredictable	71.4%	85.6%	84.7%
Commuting distances for staff are too long and time consuming	82.3%	85.6%	71.0%
Staff are leaving to work closer to home	51.4%	52.2%	41.2%

*Source:* Deloitte & Touche 2001

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