

# CLUSTERS AND CLUSTER INITIATIVES: THE ROLE OF COLLABORATION AND SOCIAL CAPITAL IN BUILDING A SYSTEM OF INNOVATION IN IRELAND

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January 2012

Submitted for the degree of PhD at Dublin City University

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## Acknowledgements

I wish to acknowledge the help of a number of people in the research conducted in this thesis. The generosity of the people involved in the different cluster initiatives who provided interviews for the thesis was greatly appreciated. A deeper understanding of how collaboration works would not have been possible without the input and insights of these people (too many to name) from industry, universities, government and state agencies.

Thanks is also due to colleagues in my DCU Professional Doctorate Programme (PDP) ‘action set’ Sinead Brennan, David Kenefick, Peter Robbins and Anthony Briody.

I very much appreciated the support of my employers IBEC, Danny McCoy and Brendan Butler, in undertaking the thesis. I would also like to thank my good friend, and IBEC colleague, Tony Donohoe for proof reading the entire thesis.

I would like to especially thank my supervisors in DCU, Professor David Jacobson and Dr. Siobhain McGovern. I greatly appreciated David’s advice and research experience. Siobhain, as the first Director of the PDP in DCU, was also hugely supportive. The challenges they confronted me with helped to make this thesis what it is.

Finally, my greatest debt of gratitude is to my wife Bernadette, my son Robert and my daughters Aoife, Kate and Róisín. I could not have completed this thesis without their support and good humour, which enabled me to meet the many challenges faced along the way.

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## Abstract

### **Clusters and cluster initiatives: The role of collaboration and social capital in building a system of innovation in Ireland.**

**Patrick R. Ivory**

In Ireland, interest in the cluster concept (Porter 1990, 2003) dates back to the 1990s when enterprise policy focused on the development of competitive advantage in clusters of interlinked sectors (Doyle and Fanning 2007, Culliton 1992). Research in the early 1990s, found a weak system of innovation in Ireland and advocated a focus on broad institutional factors and the potential of clusters in the development of a national system of innovation (Mjøset 1992). International cluster policy is increasingly focused on raising levels of innovation as a means of improving competitiveness (Sölvell et al 2003).

This thesis builds on Irish research focused on the development of clusters. It reviews the state of development of clusters in two sectors of the Irish economy; the high-technology ICT/ software sector of the modern economy and the dairy sector of the traditional economy. The thesis contributes to the literature on clusters through the application of the ‘cluster initiative’ concept in an Irish context and places greater emphasis than previous Irish studies on the role of collaboration. Sölvell et al (2003) defined a cluster initiative as an organised effort to increase the competitiveness of a cluster, involving firms, government and/or the research community. A new framework for analyzing collaboration is proposed, bringing together insights from the literature on clusters, institutional economics and the systems of innovation approach. This framework includes a new concept, organisations for collaboration (OFCs) to describe the role of industry associations and other organisations, which represent the views of business. The social capital concept (Field 2008) is used to add depth to the analysis of collaboration within clusters and cluster initiatives.



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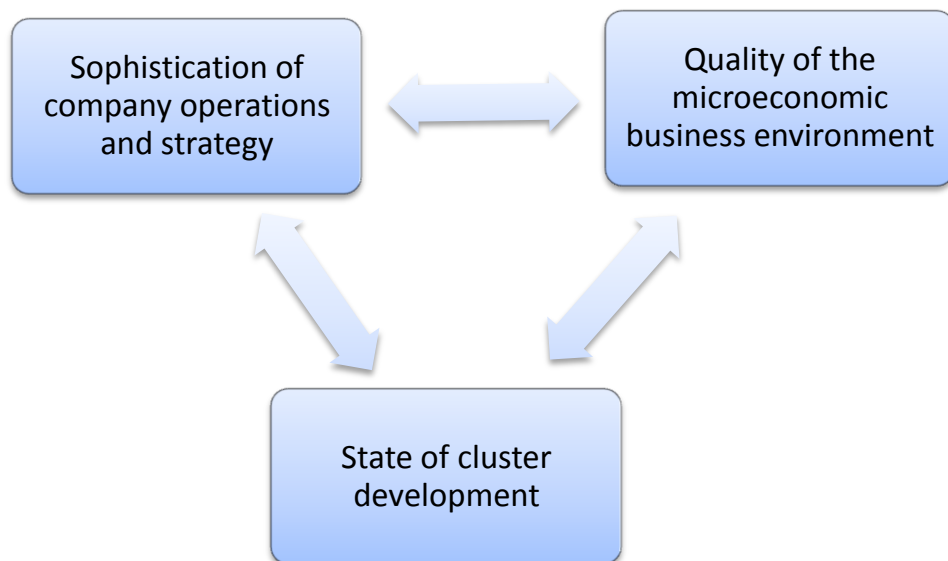
## List of Acronyms

APC	Alimentary Pharmabiotic Centre
AH	Alimentary Health (firm)
CIPM	Cluster Initiative Performance Model
CSET	Centres for Science, Engineering and Technology
CSO	Central Statistics Office of Ireland
CTVR	Centre for Telecommunication Value Chain Driven Research
DAFF	Department of Agriculture, Food and Fisheries
DETI	Department of Enterprise, Trade and Innovation
DOF	Department of Finance
DOT	Department of An Taoiseach
EDA	European Dairy Association
EU	European Union
EWPA	European Whey Processors Association
FDI	Foreign Direct Investment
FHI	Food for Health Ireland
GCI	Global Competitiveness Index
GSK	Glaxo Smith Kline
IBEC	Irish Business Employers Confederation
ICOS	Irish Cooperative Organisation Society
ICSTI	Irish Council for Science, Technology and Innovation
ICT	Information and Communication Technology
IDA	Industrial Development Authority of Ireland
IDIA	Irish Dairy Industries Association
IFA	Irish Farmers Association
IFC	Institutions for Collaboration
ISA	Irish Software Association
L4G	Leadership 4 Growth
MBCA	Mutually Beneficial Collective Action
MNCs	Multinational Corporations
NIE	New or Neo-Institutional Economics
OECD	Organisation for Economic Cooperation and Development
OFC	Organisations for Collaboration
OIE	Old Institutional Economics
OLI	Ownership-Location-Internalisation framework
PD	Prisoner's Dilemma
SFI	Science Foundation Ireland
TCD	Trinity College Dublin
TCE	Transaction Cost Economics
UCC	University College Cork
UCD	University College Dublin
UL	University of Limerick
USA	United States of America
WTO	World Trade Organisation

## Chapter 1 Introduction

The motivation for this thesis arose from the potential of clusters to raise levels of innovation in the Irish economy. Government (DOT 2010) and its state agencies, such as Forfás (2008), the IDA and Enterprise Ireland, often refer to high-technology clusters and the need to create ‘Innovation Ireland’ and a knowledge based economy. Much of this focus is driven by the need for Ireland to maintain high levels of productivity in order to compete on global markets. Porter et al (2008) argued that the foundations of productivity can be divided into ‘macroeconomic competitiveness’ and ‘microeconomic competitiveness’, with the latter in turn dividing into three interactive elements (Figure 1.1)

**Figure 1.1 Microeconomic competitiveness**



Source: Porter et al (2008).

This thesis fits into the third element of microeconomic competitiveness suggested by Porter et al (2008) and considers the depth of clusters in the context of the Irish economy. It examines clusters and cluster initiatives in two sectors of the economy, one ‘modern’, the ICT and software sector, and one ‘traditional’, the dairy sector.

The thesis focuses in particular on the role of collaboration in cluster initiatives for competitiveness and innovation.

Porter et al (2008) argued that productivity rises as a company improves operational effectiveness, assimilates global best practises, and introduces innovative products and processes by adopting appropriate strategies. Two of the elements, the sophistication of company operations and the quality of the business environment, can be measured while data limitations make independent measurement of the third element – the state of cluster development very difficult (Porter et al 2008, p48).

In 2009, the World Economic Forum introduced a new version of its Global Competitiveness Index to create a single, fully integrated index to replace the two previous indices. Data for the GCI was drawn from a mixture of public sources and the World Economic Forum’s annual survey of business leaders. In 2009, this Executive Opinion Survey covered approximately 13,000 business leaders across 133 countries<sup>1</sup>. In an article<sup>2</sup> on this new comprehensive Global Competitiveness Index, Sala-i-Martin et al (2009) identify 12 interrelated pillars of competitiveness. They pointed out that innovation (12<sup>th</sup> pillar) requires appropriate institutions (1<sup>st</sup> pillar) that, among other things, guarantees intellectual property rights, high levels of education and training (5<sup>th</sup> pillar), efficient goods, labour and financial markets (6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> pillars) and extensive infrastructure (2<sup>nd</sup> pillar). Their 11<sup>th</sup> pillar of competitiveness is business sophistication, which encompasses the ‘company sophistication’ concept referred to above, but also concerns the quality of a country’s overall business networks and supporting industries. They state that:

[W]hen companies and suppliers from a particular sector are interconnected in geographically proximate groups (“clusters”), efficiency is heightened, greater opportunities for innovation are created, and barriers to entry for new firms are reduced (Sala-i-Martin et al 2009, p7).

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<sup>1</sup> The data set used for the development of the New GCI model covered 130 countries for up to 7 years (2001-07), the longest period possible given the data sources (Porter et al 2008, p. 52).

<sup>2</sup> Appendix A of this article describes the exact composition of the GCI and the technical details of its construction (Sala-i-Martin et al 2009).

Ketels and Sölvell (2006) completed a study of innovation clusters in the ten new member states of the European Union and used qualitative case studies to assess whether clustering encouraged greater innovation. They stated that:

In-depth analysis of one specific case study per country was carried out in order to pass from 'statistical clusters' to 'recognised clusters', from employment figures to institutions, companies to be analysed and persons to be interviewed (Ketels & Sölvell 2006, p25).

They concluded that allocating more resources to science and R&D in the EU will not be sufficient to improve Europe's innovative capacity. It will also be necessary to improve the microeconomic capacity of European regions by focusing on the quality and specialisation of factor conditions, sophistication of demand, the quality of firm strategies and entrepreneurship, and the presence and depth of clusters (Ketels & Sölvell 2006).

This thesis considers the presence and depth of clusters in two sectors of the Irish economy; the ICT/software sector of the 'modern' economy and the dairy sector of the traditional economy. The thesis provides examples of cluster initiatives that support the development of clusters in these sectors. Cluster initiatives are defined by Sölvell et al (2003, p31) as organised efforts to increase the growth and competitiveness of a cluster within a region, involving cluster firms, government and/or the research community. In particular, the thesis examines the role of collaboration and social capital within these clusters and cluster initiatives in building systems of innovation in Ireland.

The research questions addressed are as follows:

- (i) How can cluster initiatives contribute to embedding the Irish ICT/software and dairy clusters in Ireland?
- (ii) How does the process of collaboration work within clusters and cluster initiatives? The thesis examines if the social capital concept can help in understanding this process.
- (iii) Why do firms, research institutes and state agencies engage in cluster initiatives?

Chapter 2 draws on three distinct literature streams - management strategy, institutional economics and the systems of innovation approach. The chapter begins (Section 2.1) with a review and detailed critique of Porter's 'diamond cluster model' (1990, 2003) within the Positioning School of management strategy. Section 2.2 considers a number of concepts with a theoretical grounding in institutional economics, such as embeddedness (Granovetter 1985), social capital (Field 2008) and morals norms such as trust (North 1990), which can contribute to our understanding of how clusters and cluster initiatives operate and the role of collaboration within these two concepts. Section 2.3 considers literature on the systems of innovation (Lundvall 1985, 2005), including its links with the concepts discussed in the earlier sections. This section also provides a definition for a new concept 'Organisations for Collaboration' (OFCs), which this thesis suggests is a more precise descriptor for industry associations, and similar business organizations, than the IFC (institutions for collaboration) concept proposed by Porter & Emmons (2003). Drawing on key concepts from these three different literature streams, Section 2.4 suggests a new framework with the potential to enhance our understanding of how cluster initiatives work and the role of collaboration within such initiatives. It also outlines the Cluster Initiative Performance Model (CIPM) (Sölvell et al 2003) that is used later in the thesis when analyzing the emergence of cluster initiatives involving collaboration in Ireland.

Chapter 4 outlines the Irish context and empirical setting for the thesis. It begins with a brief overview of Irish economic development with reference to some key institutional factors. It also outlines the evolution of state agencies for the support and promotion of enterprise in Ireland. The chapter draws on the researcher's own knowledge and is supported by reference to legal instruments establishing the various state organisations operating in the industrial development arena in Ireland. It also outlines developments in relation to the organisations representing business interests on a national level. The evolution of both the state agencies and business organisations is an important part of the business environment for industrial development.

Chapters 5 & 6 use a number of research and data sources to identify clusters in two sectors of the Irish economy and a qualitative case study approach for in-depth

examination of clusters and cluster initiatives in the ICT/ software and the dairy/ cheese and ingredients sectors. This approach is very much in line with that adopted by Ketel & Sölvell (2006) for their individual country analysis and reflects the conclusion of Porter et al (2008) that data limitations and the state of cluster development does not facilitate quantitative analysis. However, the focus on the ‘institutional’ aspects of clusters in this thesis is broader than the focus on ‘institutions for collaboration’ by Porter & Emmons (2003). With the concepts of embeddedness and, especially social capital used to add depth to the analysis. The study of such intangible elements also makes the choice of a qualitative research approach appropriate for this thesis.

Chapter 7 summarizes the main conclusions and findings of the thesis. It also outlines the contribution that the thesis makes to understanding the state of cluster development in Ireland, building on the substantial research undertaken by those who have also studied this topic. Finally, it suggests some interesting areas for further research on clusters and cluster initiatives.



## **Chapter 2 Clusters for competitiveness and innovation: collaboration– insights from management strategy, institutional economics and innovation systems**

This chapter will examine, in some depth, contributions from three distinct areas of analysis. The version of the cluster concept proposed by Porter (1990) will be a key focus of section 2.1. Where Porter fits into management strategy will be used to highlight both his contribution and the limits of his model. Section 2.2 will examine collaboration from an institutional economic perspective, arguing that management strategy theories alone are insufficient to understand how and why firms collaborate together and with other economic actors. Section 2.3 reviews the concepts of ‘embeddedness’ and ‘social capital’ that are used as analytical tools in the empirical research for the thesis outlined in Chapters 5 and 6. Section 2.4 will focus on the evolving subject of innovation systems, at a national, sectoral and regional level. It will also suggest and define a new concept “organisations for collaboration” (OFCs) to enhance our understanding of how firms collaborate together and with other actors in the economy. Finally, section 2.5 will draw on the concepts discussed in the previous four sections to propose a new framework for understanding cluster initiatives and collaboration, including those involving firms, research institutes and state agencies.

### **Section 2.1: Management strategy – the firm, clusters and collaboration**

#### **The Positioning school approach and industry ‘clusters’**

Mintzberg et al (1998, 1999) divided management strategy literature into two different groups, the most influential prescriptive school was the Positioning School and the major descriptive school was the Learning School. Literature following the Positioning School of management strategy includes strategic groups, value chains, game theories (Mintzberg and Lampel 1999, p22) and the industry ‘cluster’ approach. A detailed analysis of the cluster concept of strategy is warranted in the

context of this thesis. The major impetus for the cluster approach grew out of Porter's publications on 'competitive strategy' and 'competitive advantage' during the 1980s and 1990s (Porter 1980, 1981, 1990)<sup>3</sup>. Porter (1990) observed that the treatment of location in economics had largely followed the tradition established in the neoclassical theory of trade. In the neoclassical theory of trade, location choices and effects are assumed to be based on an input cost minimisation framework. In effect, the principal focus was on the cost of land, labour and capital with location choices viewed more as an operational detail than strategic (Porter 1990). Porter studied the formation and sustained presence of 'clusters' of interconnected industries at particular locations and argued that a small number of exporting clusters could drive demand for local industries in a region or nation.

Management scholars have criticised Porter, particularly his early work, for paying too much attention to the business environment and too little attention to the firm itself. Porter's firm, it is argued, ends up being determined, like the neoclassical firm, by the market structure — with little room for strategy (Langlois 2003, p285, Best 2001, p8). The resource-based view (RBV) of the firm was introduced by the Learning School of strategy partly in response to the neglect of the firm within the Positioning School (Mintzberg et al 1998, 1999). Pitelis (2005) argued that despite these competing perspectives and Porter's (1999) own criticism of the RBV, there are commonalities between the Positioning and Learning Schools. Porter's later work exhibits some influence of the Learning School. For example, the regression analysis undertaken by Porter et al (2006, 2008) built from a survey developed for the World Economic Forum, included variables under the heading 'Company Sophistication' and variables under the heading 'Business Environment Quality'. Porter accepted that the competitiveness of companies and the competitiveness of locations are different, but also argued that they are related, concepts. Locations compete based on productivity as locations for business, while companies also compete based on productivity, but can choose among locations. He conceded that 'the competitiveness of a company, then, depends on both its internal capabilities,

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<sup>3</sup> Mintzberg puts Porter in the Positioning School but his table does not refer to Porter (1990). Although one could argue that Porter's work from the 1990s on clusters is very different to his earlier work it can still be categorised as part of the Positioning School but with influences from the Learning School.

which is a key pillar of the RBV, and the results of its location choices' (Porter et al 2006)<sup>4</sup>.

Some writers in economic agglomeration and geography (e.g. Boschma and Frenken 2006) tend to ignore Porter's ideas on 'industry clusters', arguing that they are saying nothing new. Other critics such as Martin and Sunley (2003) continue to argue that the definition of clusters is too vague and thus the concept is a problematic source of policy advice. Despite continued debate and criticism the cluster concept remains exceptionally influential, among management practitioners and policy makers (Ketels 2006). Policy makers in both the US and Europe continue to exhibit significant interest in Porter's industrial clusters concept. The concept is generally viewed as different to the idea of an industrial district, a term first used by Marshall (1920)<sup>5</sup> before being revived by a number of Italian economists such as Brusco (1982) in the 1980s (Andreosso and Jacobson 2005, p191). An examination of clusters and cluster initiatives in both modern and traditional sectors of the Irish economy is undertaken in Chapters 5 and 6. The remainder of this section will consider how the concept has developed and criticisms of the diamond model in order to understand why it continues to influence policy makers, particularly in the areas of innovation and upgrading of nations, industries and the firms within them.

## **Firm location and the evolution of the cluster concept**

So what is Porter asking us to accept under his cluster concept and what are the limitations of his diamond model? According to the Porter 'diamond' model the competitive advantage of a nation is based on developing clusters of competitive industries, which in turn are based on the interrelationship between four different

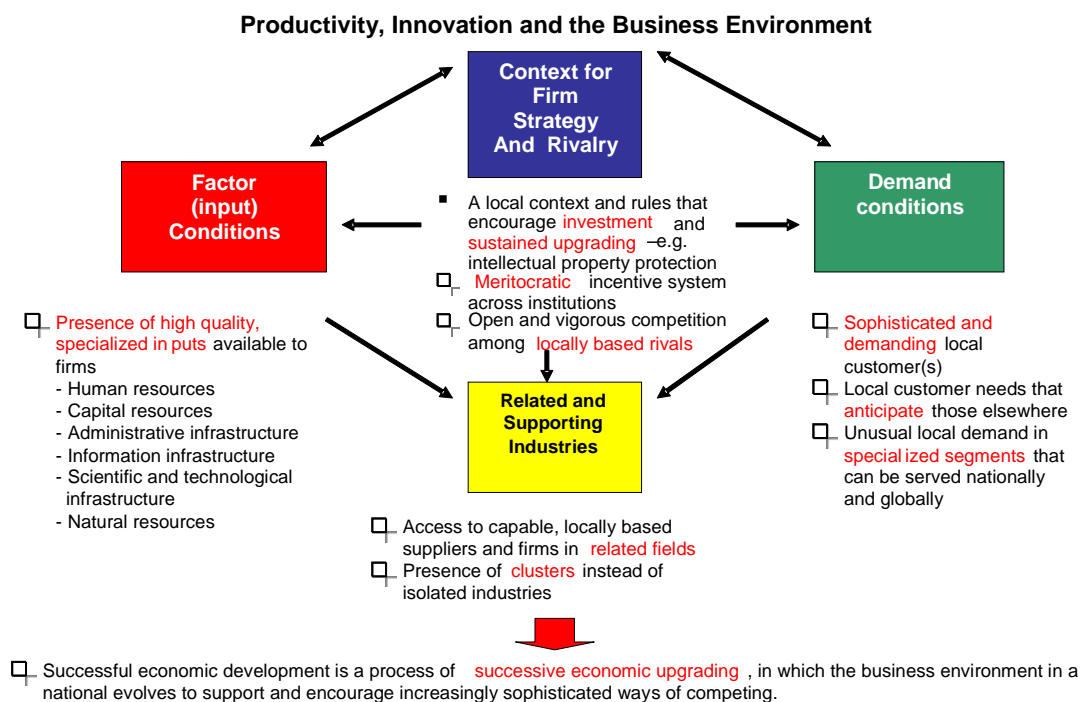
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<sup>4</sup> In common with this idea, some writers have suggested firms should consider combining the insights of some prescriptive and descriptive schools in developing their management strategy. Leavy (2003) used a qualitative case study (of Southwest Airlines, Ryanair, Canon, GE and Nokia) to recommend that many firms would be best served by combining the concepts of core competencies (Learning school) and market positions (Positioning school), 'bifocal vision' as he calls it, to view the available strategic options.

<sup>5</sup> Marshall (1920) is the 8<sup>th</sup> edition, of the book first published in 1890, available in printable format on [www.econlib.org/library/Marshall/marP.html](http://www.econlib.org/library/Marshall/marP.html). Andreosso and Jacobson (2005) reference the 1898 printed edition.

elements - factor conditions, demand conditions, related and supporting industries, and context for firm strategy and rivalry (see Figure 2.1). This framework suggests that clusters affect competition in three broad ways by (i) increasing the productivity and efficiency of companies, (ii) stimulating and enabling innovations, which underpin future productivity growth, and (iii) facilitating commercialization of new products and companies (Porter, 1998b, 2003).

**Figure 2.1: Porter Clusters: the ‘diamond model’**



**Source: Porter 2003**

Porter (1990) emphasised that one important feature of industrial clusters is that interactions between firms are primarily market-based and rivalry among firms is a key factor in the formation of a cluster. Referencing Marshall (1920) he argued that the broader effects of domestic rivalry are closely related to an ‘old but often neglected notion in economics known as external economies’ that accrue beyond the individual firm but within the group of firms of a locality (Porter 1990, p144 and fn 8, p789). He further emphasised that in classic economic treatments these external economies arise because of spillovers of technology and the benefits of specialization that accrue to a large industry through individual firms may be small. Porter also observed that a city or region may become a unique environment for

competing, where the information flow, visibility and mutual reinforcement within such a locale gives meaning to Marshall's observation that in some places an industry is "in the air" (Porter 1990, p156).

This focus by Porter on rivalry is a contrast to the hierarchical network relationships among firms in industrial districts. Perhaps in response to his critics, in a revision of some of his earlier ideas, Porter (1998) described clusters in terms that make them more difficult to distinguish from industrial districts. For example, he began to accord more weight to cooperation and trust (Jacobson et al 2001). Consequently, cooperation as well as competition is now seen as underlying cluster activities in the Porter cluster concept, 'allowing member firms to have higher productivity than would otherwise be possible' (Doyle and Fanning, 2007, p269).

Porter has also recently emphasised that as a consequence of the three broad impacts outlined above, clusters reflect the fundamental influence of externalities and linkages across firms and associated organisations<sup>6</sup> in competition (Porter, 2003). Furthermore, research has shown that cluster dynamics do not occur automatically but (a) depend on action and (b) can be reinforced by action, involving roles for cultural factors and organisations – as well as individual leadership (Ketels 2003). The research undertaken in this thesis provides further evidence to support this contention. Rival firms within clusters compete intensely to win and retain customers; without such vigorous competition the cluster will fail. There is also cooperation, much of it vertical, involving companies in related industries and local organisations (Porter, 1998b). One limitation of the Porter cluster model is the failure to fully understand the role of horizontal cooperation or collaboration, I use these terms interchangeably, between firms in an industry. In fact it may be, although neoclassical economics finds it difficult to accept, that both intense competition and intense collaboration can generate success among groups of firms. The theme of collaboration involving firms is dealt with in more detail in the sections 2.2 to 2.5 below.

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<sup>6</sup> Here, and in the remainder of this paragraph, I have replaced 'institution', used by Porter and Ketels, with 'organisation'. The reason for taking this liberty is explained in detail in the section 'Organisation for collaboration'.

## **Criticisms of the ‘diamond cluster model’**

While the basic model has stayed the same over time, Porter’s has made attempts to address significant criticisms. Others have also built on the ‘diamond model’ and the cluster concept, thus ensuring its broad and enduring policy appeal. Ketels (2006) addresses in a formal way a number of criticisms and extensions of the diamond model. For example, one criticism is that the diamond model is close to ‘picking winners’ in the tradition of the ‘new’ strategic trade policy. However, the competitiveness framework developed within the diamond model identifies the degree of competition to which a cluster is exposed as one of the critical factors driving firm productivity – an insight that runs against a ‘picking winners’ approach that curbs competition (Ketel 2006, p123). The following four sections outline in greater detail some further criticism of the diamond model.

### **A. The emphasis on local demand in the ‘diamond cluster model’**

An aspect of the ‘diamond model’ that has been widely discussed and criticized is the emphasis placed on both the size and quality of local demand. Ketels (2006, p124) argued that the focus on local demand does not imply that global market access does not matter but that it is usually not a factor that differentiates one location from another.

But how does one define ‘local demand’ particularly when attempting to apply the cluster concept to small open economies within a highly developed customs union? We can see the limitations of this overemphasis on local demand, when we try to apply the diamond model to Ireland. Ireland as part of the European Union operates within a highly developed customs union with a single market in goods since 1993, with no tariff or regulatory barriers to trade between countries, and which, in 2010, made some significant progress to moving towards a single market in services. To an extent, Ireland – rather than being a completely separate national economy – is a region within the European Union (EU). As such it is surely inappropriate to restrict the definition of local demand to the small domestic Irish home market

(O'Donnellan 1994). Furthermore, competitiveness of small open economies as locations may be intrinsically linked to membership of a broader market union, such as the European Union. For example, Ireland's success in attracting FDI investment, which has been an important part of its economic development, is linked to its membership of the EU. Porter placed too much emphasis on the competitive advantage of large nations and he does not consider how his model might have to be modified in order to be applied to a broader range of economy types. Particularly countries that from an economic perspective can, in many ways, be viewed as regions of a market union rather than as independent nations in the sense that the USA and Japan are.

## **B. Foreign investment and the role of multinational corporations in clusters**

A second criticism of the diamond model in international studies is in relation to the role of foreign investment in clusters. The relative importance of local demand and the home base is also related to this second contested element. The question is what is the role of the multinational corporations (MNCs) in the diamond model? Porter (1990, p679), in a passage referring to developing countries, acknowledged an occasional 'seed' role for MNCs but his emphasis was almost exclusively on indigenous home-based industries (Clancy et al 2001, p11; O'Malley and Van Egeraat, 2000). Ketels (2006, p125) maintained that there is nothing in the Porter concept of competitiveness and clusters that denies the important role of multinational firms; they can contribute new skills, technology, ideas and provide better channels into other clusters and markets. But he emphasised that multinationals are most likely to be critical to the success of emerging cluster locations. He argued that in more mature clusters multinationals may emerge, from the national base, as indicator of the success of the cluster.

Dunning (1998, p15) would agree with Porter (1990, 1998a) that attention needs to be given to location *per se* as a variable affecting the global competitiveness of firms. But for Dunning the role of FDI and the MNC in building competitiveness is much deeper than the 'occasional seed' suggested by Porter (1990, p679) or the

emergence of domestically owned MNCs in the clusters referred to by Ketels (2006, p125). For small open economies, such as Ireland, both inward and outward foreign direct investment (FDI) have important roles to play for various industries at different stages in the economic development process. Dunning's Ownership-Location-Internalisation (OLI) framework (Dunning 2001, 2002) could be a useful tool in drawing attention to the most important theories to explain the impact of multinational corporations in industry development. Ireland provides at least two examples: - in the case of inward FDI in high technology areas of computer technology and software and in the case of outward FDI in the low/medium technology area of the dairy industry. The first of these two examples can certainly be linked to the concept of Ireland as a region of the European Union which attracted US investment to gain access to that market; Dunning's OLI framework may explain this better than Porter's cluster model<sup>7</sup>. But the second example may fit Ketel's point that domestically owned MNCs can emerge from established clusters<sup>8</sup> and this is considered using the diamond model in an examination of a cheese and ingredients cluster in Ireland in Chapter 6.

### **C. The role of Government policy in clusters**

Some critics have also argued that 'government' is missing in the Porter framework. Berggren and Laestadius (2003) examined the importance of public-private partnerships and system building in the development of the telecommunication sectors in Finland and Sweden. They argued that the telecoms sector had followed a complex trajectory with clustering developing on two levels – the supranational (primarily bi-national) and the local district (regional) level. They claim that one

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<sup>7</sup> In an early paper presented to a Nobel symposium on the international location of economic activity in Stockholm, Dunning (1976) emphasised a distinction between two ways of considering a country's economic space that is particularly important in understanding the economic development of small open economies. The first way is to consider a country's economic space in terms of the value of output within a country's national boundaries independently of the ownership of that production. The second way is to consider the output produced by a country's own firms, including that part produced outside its national boundaries. This further distinguishes between the competitive advantage of countries and the competitive advantage of firms (Dunning 1995, 2001).

<sup>8</sup> Dunning's OLI framework may still be relevant in explaining why exactly this happens from the point of view of the individual firm and therefore might be useful to consider in a firm level analysis, which is beyond the scope of this thesis.



notable weakness of Porter's diamond model is 'neglect of long-term cooperative relations and the role played by government' (Berggren and Laestadius 2003).

However, supporters of Porter's model maintain that government impacts on all dimensions of the diamond and that much of the advice derived from applying the diamond is directed at government policy (Ketels 2006, p124). In a chapter of his 1990 book focused on the role of government, Porter suggested a 'more subtle, and thoughtful, role for policy makers' than commonly supposed (Porter 1990, p617). Porter's approach to government was influenced by the economic backdrop and context during the period when he wrote his seminal contributions. He argued that during the 1980s subsidised capital, research, raw materials and exports were employed by nearly every nation, but were rarely successful in building sustainable competitiveness. Instead, in many cases, a culture of reliance on subsidies delayed adjustment and innovation rather than promoting it. Porter took the view that tax incentives were better vehicles than subsidies because they resulted in firms undertaking projects with an economic return. Indirect subsidies in areas such as education, research universities and infrastructure were a much better investment of government funds than direct subsidies (Porter 1990, p640).

Essentially, Porter's view was that the central goal of government policy should be to create an environment in which firms can increase productivity and innovation by introducing more sophisticated technology and methods to (i) upgrade competitive advantages in established industries and (ii) develop the capacity to compete successfully in new industries (Porter 1990, pp618-619). An upgrading economy should be ready for less productive jobs to move to other nations via outward direct investment and foreign outsourcing. But if high productivity jobs are lost to a firm's foreign rival, then long term economic prosperity is compromised. However, uncoordinated action by government in a single policy area, such as R&D, taxation or regulation could actually harm competitiveness if taken in isolation. In summary Porter (1990) saw a very limited role for government intervention and argued that the role of government was frequently overstated because the economic underpinnings of success were not examined in studies that set out to examine the influence of government. There also tended to be a focus on a small number of

highly supported industries, for example steel and automobiles, rather than a more representative sample of the economy (Porter 1990, fn. 67, p788).

Dunning (1998) also argued that governments need to pay closer attention to ensuring that their actions help to fashion, support and complement efficient firms and markets. He maintained that this is necessary for two reasons: (i) in order to make optimal use of the existing location-bound assets within their jurisdiction and (ii) to promote the dynamic comparative advantage of resource capabilities of their economy and the firms operating in it.

#### **D. Firm and industry collaboration within clusters**

Collaboration among the different players in an economy is an issue that was not fully developed in the diamond model presented by Porter in 1990 or in subsequent versions of his cluster concept. Porter (1990, pp152-153) did express support for mechanisms that facilitate information flow and create trust, mitigating perceived differences in economic interest between vertically and horizontally linked firms. However, Porter saw a limited role for cooperative research (1990 p635) and expressed the view that cooperative R&D among direct competitors was a risky approach that could reduce incentives to innovate within firms (1990, p594).

When addressing the strategy that the individual firm should adopt in taking advantage of a domestic cluster, he took a more open view towards cooperation with customers and suppliers. Porter emphasised that home-based buyers and suppliers are allies in international competition and not just the other side of transactions (Porter 1990, p589). In this context, he encouraged firms to develop trust by pursuing regular contact between senior management and interchange between research organisations. He also referred to the potential for cooperation in penetrating and serving international markets.

One important option for firms is to participate in trade associations involved in ‘factor creation’ by investing in improving information flow, training and education initiatives, infrastructure, and research that benefits the entire national industry. In

this way firms, through industry or cluster-wide (sectoral) programs, can complement and support their internal efforts at factor creation to improve competitiveness (Porter 1990, p594). Despite his reservations in relation to cooperation between direct competitors, his own research provides some evidence to the contrary. Porter provides examples of how firms in the Italian apparel, shoe, ceramic tile and furniture industries, while competing fiercely, still recognised that cooperation through trade associations could improve communications and logistical facilities, investment in process technology and help promote their products at trade fairs. In Japan, Porter observed that ‘umbrella trade associations’ often cover many distinct industries within a sector and sponsor factor-creating investments that add benefit to the competitiveness of clusters. In America, the Electronics Industry Association showed initiative by taking an active role in working with schools and universities to raise skill levels into which firms could then tap (Porter 1990, p594)<sup>9</sup>. This thesis will show that a similar approach was taken by ICT Ireland, the business association representing the computer and software industry in Ireland, which is discussed in further detail in Chapter 5. Trade associations that are primarily lobbying organisations are squandering many of the important potential benefits of factor creation.

In the US, the development of trade associations was not helped by antitrust authorities adopting a suspicious view due to the perceived risk of them degenerating into cartels that would damage competition and harm consumers (Porter 1990, fn 3, p807). These antitrust concerns can be overcome when both firms and government recognise that trade associations involved in factor creation, such as collaborative R&D with universities, can improve competitiveness while not engaging in activities of a price-fixing or cartel nature. Strong governance of trade associations, with executives fully aware of what is and what is not allowed from a regulatory competition view point, is also important in terms of gaining the trust of both business and government.

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<sup>9</sup> While Porter clearly saw a role for trade associations, he warned against direct competitor to competitor cooperation, sometimes justified on the basis of avoiding duplication of effort or achieving economies of scale, even going as far as to state that ‘joint production by leading competitors should be prohibited’ (Porter 1990, p667). This is a rather severe and narrow view of the potential of joint ventures. But his view was that such direct cooperation was both bad public policy and bad strategy that could undermine competitive advantage in the long run.

A final limitation of the Porter (1990) cluster diamond model is that it offers a framework to examine whether a cluster exists or not, but does not address how clusters might be developed and further embedded in an economy. More recent research by Sölvell et al (2003) focuses on organised efforts to increase the growth and competitiveness of clusters within a region. They describe these as ‘cluster initiatives’ involving firms, government and/or the research community. Section 2.5 will outline in detail the cluster initiative performance model (Sölvell et al 2003) and comment on the role of collaboration between different economic actors within clusters.

## **Section 2.2: Collaboration and the ‘institutional economics’ approach**

Despite the potential of collaboration to improve competitiveness of firms and economies, there has been little research to date on the role of a wide variety of collaborative organisations (Porter et al 2006). One recent example that highlighted interactions between state, local firms and multinationals, and the conditions enhancing collective learning, was an analysis of two clusters in Chile, a tomato processing cluster and a farmed salmon cluster (Perez-Aleman 2005). The state role in the initial stage was to provide a space for exploration of new business ideas and productive activities. The formation of associations among Chilean firms was found to be more important. It pushed productivity performance, facilitated the flow of ideas across firms and was crucial in moving from the early stage when firms entered the new activity to the point of reaching a critical mass of globally competitive firms (Perez-Aleman 2005, p670).

In recent years Emmons has developed some Harvard case studies with Porter coining the phrase ‘institutions for collaboration (IFCs)’ (Porter and Emmons 2003). For example the Colombian trade association ‘Acoplásticos’, established in 1961 as a lobbying group for the nation’s major plastic manufacturing companies, shifted its focus towards improving the productivity of the plastics and rubber cluster. A new director appointed in 1984 expanded the association’s membership to include additional industries associated with the plastics manufacturing value chain and

shifted the activities towards improving the productivity of the entire chain, with particular emphasis on upgrading technology and human resources in the cluster. While setting up a not-for-profit institute for training and research, Acoplástico commissioned a strategic analysis of the international competitiveness of the Colombian plastics and rubber industry that not only improved the associations ability to formulate appropriate activities for improving the cluster's productivity, but also developed skills in assessing changes in the cluster's needs over time (Porter and Emmons 2006).

Porter and Emmons (2003, 2006) suggested a positive role for collaboration but did not provide a precise definition for an IFC. However, they did list examples including industry associations, professional associations, chambers of commerce, technology transfer organizations, quality centres, non-profit think tanks, university alumni associations and others. They suggested that the type of organisation that falls into the category of IFCs can be a matter of degree, and refer to an autonomous government entity such as an 'export promotion agency' as a possible example. Robust research will require a deeper understanding of the role of collaboration and more precise definitions. This thesis argues that the term 'institution' is not the most appropriate term to describe the list of examples referred to above by Porter and Emmons (2003, 2006). In order to contribute to this literature Section 2.4 of this thesis will provide a precise definition for an alternative concept of 'Organisation for Collaboration' (OFC).

The remainder of this section will consider the institutional economic tradition, not only with a view to forming a precise definition for an OFC but also to consider how concepts within the discipline may help to understand collaboration in a broader sense. Institutional economic theory focuses on the origins of institutions, how they affect human action or agency, and how they change or evolve over time. The theory is markedly different to neoclassical economic theory. Neoclassical economics relies on the assumption that individual agency, following decisions based on rational choices, will lead to optimal outcomes under the market system. In institutional economic theory, in contrast, individual agency is viewed as leading to suboptimal outcomes. This gives the *raison d'être* for the development of institutions. They are created because they enable individuals to avoid these suboptimal outcomes.

Institutional theory recognises that collaboration among individuals and firms can have a greater impact on decisions than neoclassical theory assumes. This thesis builds a framework influenced by the institutional economic approach in order to better understand how firms collaborate together in clusters and with different economic actors in clusters initiatives

The theory may be divided into two major schools - 'Old' and 'New' institutional economics. Both schools present theories that, to varying degrees, offer alternatives to or build on the neoclassical economic approach. Original critical institutionalism (i.e. 'Old') rejects mainstream economic assumptions regarding the efficiency of the market system while neo-institutionalism (i.e. 'New') is more accommodating towards the market system (Krier 2009, p412).

### **Old or Original Institutionalism**

Old or original institutionalism is generally viewed as being founded in the early decades of the twentieth century in the USA. Its founders included Veblen, Commons, Mitchell and Ayres. It was very influential in the 1920s, largely dominating the American economic profession (Hodgson 2002).

The neoclassical idea of 'rational economic man' is replaced in old institutionalism by the idea of institutionalized agent, driven in the main by habit and routine. Accordingly, old institutionalism generally regards economics as 'evolutionary' in character (Hodgson 2002, p529). Veblen (1898) defined an institution as a habit of thought common to the generality of men. Commons (1961) defined an institution as collective action in control and enlargement of individual action. While the two definitions appear to be in conflict they are quite congruent and represent heuristic tools for analysis – with Veblen's definition stressing the cognitive aspect of institutions and Commons stressing the interpersonal or interrelation aspect (Samuels 1995, p575). Some have defined the term institution as a cluster of moral beliefs that configure power (Stanfield 1999) deriving the definition from Ayres's observation that institutions commonly share the attributes of designating authority. But one should be careful not to place too much emphasis on the power struggles in an

economy because, as Ayres noted, authority is not simply a question of force but more importantly of custom (Ayres 1952, p43). Ayres also stated that economists should know better than anyone that no one creates anything except as a participant in a culture shared with other members of a community (Ayres 1967, p7).

Central to old institutional economics (OIE) is the analysis of human wants and the resources available to meet them. Human wants and technology do change, thereby altering the menu of available resources, not randomly but through human agency and influences that are endogenous to the human social system (Stanfield 1999, p234). This is a sharp contrast to neoclassical economics where human wants are treated as exogenous variables. Stanfield (1999) summarised the ‘critical historical OIE method’ as relying more on case studies, that investigate and carefully compile information about the activities of human groups, than on the econometric techniques favoured by neoclassical economists.

It would be wrong to view OIE purely as an American tradition; key influential European writers include Kapp, Myrdal and Polanyi. Kapp observed that old institutionalism argued that economic processes cannot be adequately understood and analysed as closed self-contained and self-sustaining systems, which are isolated from a social and physical environment from which they derive important inputs and through which they are related in many reciprocal interdependencies (Kapp 1976, p212). OIE views an economy as an open system in continuous interaction with a larger social and political system, from which it receives influences and in turn exerts negative and positive influences. This approach is attractive in the context of this thesis because of its focus on the role of collaboration in clusters and cluster initiatives. The case studies explored in Chapters 5 and 6 will show that interaction between firms and the different actors in the economy, such as government, state agencies and universities, can contribute to building systems of innovation.

Myrdal’s (1978) most important contribution was the development of the idea of ‘circular causation with cumulative effects’. Under circular causation the dynamics of a social system meant that if there is a change in one endogenous condition in society, for example brought about by a policy intervention, then other conditions will change in response. Hence there is no one basic explanatory factor but rather

‘everything causes everything else’, implying interdependence among social processes and, generally, that states of equilibrium do not exist (Myrdal 1978, p774). Of the older OIE European writers, Polanyi is most relevant for this thesis because he introduced the concept of embeddedness, which was further developed by the contemporary writer Granovetter (1985) and is considered in detail in section 2.3 below.

### **‘New’ or neo-institutional economics**

New or neo-institutional economics (NIE) is closer to neoclassical economics than the ‘old’ institutional approach. NIE tends to open up or expand the reach of neoclassicism, in particular in the theory of the firm (Samuels 1995, p578).

Williamson, more than any other writer, is associated with NIE and his work is defining for the school. He took as a major inspiration Coase’s (1937) *Economica* article on the ‘Nature of the Firm’ and coined the phrase ‘new institutional economics’ precisely to distinguish his approach from the original school of institutionalism (Hodgson 2002, p525).

The ‘rational spirit’ and employing a ‘systems approach’ to issues such as hierarchies, markets and power in the economy is the economic perspective according to Williamson. Within that perspective, the more focused lens of transaction cost economics (TCE) is an interdisciplinary approach in which law, economics and organization are joined together (Williamson 1997, p1). TCE is framed mainly around an economizing perspective in which markets and hierarchies are alternative modes of governance, the aim being to ascertain where transactions go and why, with the role of power being strictly limited (Williamson 1995). In the mid-1970s Fischer (1977, p322) had criticised the tautological status of transaction costs on the basis that everything could be rationalized by invoking suitably specified transaction costs with the required degrees of freedom after the fact. Coase had defined a tautology as a concept that is ‘clearly right’ (Coase 1988, p19). Williamson asserted that while Commons (1934) was the first to propose that the transaction be the basic unit of analysis TCE only began to overcome its tautological reputation on asking and answering the question ‘What are the crucial dimensions with respect to which transactions differ?’ (Williamson 1997, p13). Hence for



Williamson (1997, pp6-7) the predictive content of TCE rests on the argument that transactions, which differ in attributes, are aligned with governance structures supported by distinct forms of contract law, which differ in their costs and competencies. Williamson's NIE approach extends the reach of neoclassicism in explaining interaction between firms in such formal agreements, but is not an appropriate analytical tool to explore collaboration involving firms and other actors in the economy in less formal arrangements.

### **North 'Old' or 'New' institutionalism: the rules of the game, the players - moral norms and ethical codes**

North is a second writer generally associated with new institutionalism but whose theories deviate more significantly from the neoclassical principles (Vanderberg, 2002, p217). His contribution is more relevant to an in-depth analysis of the process of collaboration, which is the focus of this thesis, than that of Williamson. According to North (1991), throughout history, institutions have been devised by human beings to create order, reduce uncertainty in exchange, and provide the incentive structure that shapes economic growth, stagnation or decline<sup>10</sup>. North (1997) listed three landmarks in the historical reduction of transaction costs (i) the evolution of the institutions that made impersonal exchange possible, (ii) the assumption by the state of the protection and enforcement of intellectual property rights and (iii) the realization of the gains from modern revolution in science. In many respects the systems of innovation approach, outlined below in section 2.4, and associated policy support; fits into this categorisation by North. In a departure from Williamson's approach he observed that while a narrow economic definition of transaction costs is the cost of measuring what is being exchanged and enforcing agreements, in the larger social context transaction costs are all the costs involved in human interaction over time (North 1997, p149). Essentially North argued that institutions are the rules

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<sup>10</sup> For example, in the 12<sup>th</sup> and 13<sup>th</sup> Century the need for agreed rates of exchange and credit led to the development of financial institutions, such as banking. As trade evolved with the shipping of goods overseas, the need to transform uncertainty into risk resulted in the establishment of institutions offering marine insurance from the 15<sup>th</sup> Century onwards. Thus, the development of Western Europe into a world economic power by the 18<sup>th</sup> century can be seen as a gradual evolution of economic institutions and political structures interacting together to reduce transaction costs and produce modern business and economic growth (North 1991).

of the game and organizations and entrepreneurs are the players who try to influence the outcome of the game (North, 1990, 1994).

While North is generally viewed as being part of the NIE School, his writings provide evidence of commonality with the OIE tradition. For example his fundamental definition that institutions are ‘human devised constraints that shape human interactions’ (North 1990, p1) is very compatible with Veblen’s: an institution is ‘a usage which has become axiomatic and indispensable by habituation and general acceptance’ (Veblen 1967, p101); and Common’s (1961): ‘an institution [may be defined as] collective action in control of individual action’ (Stanfield 1999, p233). For North, human learning is accumulated and passed on from one generation to the next through culture and the shared experiences of the members of society (Denzau and North 1994, North 1997). This also exhibits commonality with both contemporary and older writers in the OIE tradition. For example, Hodgson (2007) stated that rules and means of understanding are learned in social contexts and human reasoning capacities are linked to their evolving social context. Veblen (1898, p391) pointed out that ‘the economic life history of the individual is a cumulative process of adaptation of means to ends that cumulatively change as the process goes on’, but that what is true of the individual in this respect is true of the group in which he lives as well. In other words all economic change is a change in the economic community, a change in the community’s method of doing things and finally a change in its habit of thought (Veblen 1898). North, Hodgson and Veblen would all agree that ‘players’ behave differently within an institutional context than they would as individuals or organisations outside of that context (Hodgson 2007).

The following two paragraphs draw on a discussion of ‘free riding, opportunism and legitimacy’ in Vanderberg (2002, p225) and are complemented with a discussion of rational choice institutionalism by Shepsle (2005, pp8-10). It is particularly relevant to the focus on collaboration in this thesis and will serve to illustrate one key difference between the institutional approach of Williamson and North. It also highlights further similarities between North and writers in the OIE tradition.

Neoclassical economics, being based on the notion of individual welfare maximisation, struggles to explain the logic of collective action by firms in industry

associations. Positive outcomes from collective action by a group are in many cases public goods. While they are desired by members of the group, it is impossible to ensure that all prospective beneficiaries will contribute to the cost of achieving such outcomes. This raises the ‘free rider’ problem in economics and other social science disciplines. Olson (1965, 1988) used this free rider logic to argue that a group must be able to offer things of value to contributors and only to contributors – selective benefits and not just collective benefits<sup>11</sup>. Williamson staying close to neoclassical principles grouped the free rider problem and other issues of ‘self-interest seeking guile’ under the banner of opportunism which is central to his institutionalism (Williamson, 1995, p47). North disagreed with the neoclassical assumption that individuals are always motivated by self-interest arguing that support for lobby groups can at times follow certain moral and ethical codes such as fair play built on trust. Essentially North (1981, p11) along with OIE writers such as Hodgson (1988, p265) reject the pervasiveness of opportunism because it is unable to explain group action in which free riding is possible but not acted upon.

One possible solution to the opportunism is the so-called prisoners’ dilemma (PD), with repeat PD situations providing logic for individuals to seize cooperative benefits. In a consideration of the PD, Axelrod (1984) listed three options for the individual (i) cooperate with another and capture a benefit, (ii) exploit the cooperative inclinations of the other by non-cooperating and do even better while the other suffers a loss, or (iii) join his opposite number in non-cooperation and get nothing. However, in situations where plays are repeated, today’s payoff may influence the behaviour of others tomorrow and encourage cooperation rather than simply seizing once off benefits. North (1981, p35) also recognised that such game-theory approaches that involve repeated plays offer some explanation as to how opportunism is reduced. But North argued that this was only part of the explanation

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<sup>11</sup> Small groups, such as a few large firms in a concentrated industry, may organize without selective incentives, since each member gets a significant fraction of the benefit of any action its takes in the interest of the group and strategically motivated cooperation may also occur’ (Olson 1988). In the context of Olson’s view, it is important to emphasize that genuine collaboration and networking among firms has nothing to do with cartels, price-fixing, collusion or any anti-competitive activity. It is rather the coming together of business to solve information problems, understand markets and regulations, drive innovation, encourage economic growth and productivity and communicate with government and other institutions in the economy. Price-fixing, or any other anti-competitive activity, has no part to play.

for cooperation. The other, perhaps more important, part of the explanation arises from a commitment to ideology and the support it can lend to legitimacy, loyalty and trust (North 1981, p12). Vandenberg (2002, p226) concludes that the importance of norms for North should not be underestimated, with strong moral and ethical codes being seen as an essential part of society and viable economic systems. Vandenberg (2002) also provided a link between the importance of moral norms for North and the literature on social capital (reviewed below), where moral norms, particularly trust, underpin economic and social relations. In fact, after a detailed examination, Vandenberg (2002, p233) correctly concluded that North is best placed between neoclassical and old institutionalism. North's theory can also be seen as a modern development of Marshall's ideas on the character of people and their social and political institutions (Andreosso and Jacobson 2005, p188).

This thesis is focused on the role of collaboration within cluster initiatives, which support the development of clusters particularly in relation to building systems of innovation in the Irish economy. Two concepts influenced by institutional economics that are relevant to the empirical work undertaken in this thesis, are embeddedness and social capital. The following sections review major literature on each of these two interrelated concepts.

## **Section 2.3: Embeddedness and Social Capital**

### **Embeddedness**

Polanyi (1944) was the first to refer to the concept of 'embeddedness' in his seminal book 'The Great Transformation', but many view his conceptualisation as problematic and ambiguous. On the one hand, when taking a holistic view in his analysis of the organisation of production, Polanyi argued that economic life could only be understood as part of social relations and institutions. On the other hand, he proposed that over time there is an institutional separation of the market economy from the rest of society, suggesting that embeddedness could be viewed as an historical variable. Gemici (2008) argued that this fundamental fracture in Polanyi's writings has resulted in two different and contradictory notions of embeddedness. Essentially Polanyi switched from a holistic view to a restrictive institutional view

when he began to compare the market system with other economic systems such as household, reciprocity and redistribution. Polanyi's theoretical proposition that the market economy becomes disembedded and institutionally separate from society is misleading; but his methodological principle that all economies are embedded in social institutions remains valid (Gemici 2008, pp25-26).

Block (2001, 2003) argued that these tensions in Polanyi's work can be understood as a consequence of his changing theoretical orientation. When he began his research in the 1930s, Polanyi was working within a specific Marxist framework. But, as he was writing the book, he developed new concepts that led in new directions, which directly challenged not only Marxists and but also market liberals. Key among these new ideas was the embedded market economy. However, the concept was not fully developed due to Polanyi's desire to publish the book quickly in order to influence government policy at that time.

Contemporary applications of the concept of embeddedness in economic sociology owe much to Granovetter's (1985) version of the concept (Krippner et al 2004, p110). Granovetter argued that most behaviour, including economic behaviour, is closely embedded in networks of interpersonal relations. He viewed this characterisation of behaviour as avoiding the extremes of 'under-socialised' and 'over-socialised' views of human action (Granovetter 1985, p504). Neoclassical economics tends to ignore the importance of socialisation by assuming that social outcomes are merely the aggregation of independent rational decision makers' actions. Although credit is due to Williamson for trying to introduce a socialised dimension into the neoclassical approach Granovetter criticised Williamson's (1975, 1981) TCE for being 'under socialised'. For example in TCE malfeasance, the use of force and fraud, is seen to be averted because clever institutional arrangements make it too costly to engage in (Granovetter 1985, p489). This is in sharp contrast to Granovetter's view that economic actors, individuals and firms, build relations and structures that firstly generate trust and secondly discourage malfeasance. For Granovetter economic sociology on the other hand tended to over emphasise socialisation by taking the view that individual action is completely determined by

social norms and values<sup>12</sup>. In contrast, Granovetter argued that social and culture influences are not static but dynamic; they not only shape their members but are also shaped by them, partly for their own strategic reasons (Granovetter 1985, p486).

Granovetter (1973, 1983) distinguished between strong (close) and weak ties in economic and social relations. Strong ties are the ties that bind a network together and as such they motivate people to help others. They are associated with close relationships where the people involved know and to a large extent trust each other. Weak ties represent contacts between individuals who are not part of the same societal or in the case of this thesis, economic grouping. Weak ties provide individuals with bridges to other societal and economic groupings opening up new opportunities. Weak ties can counteract the tendency that strong ties, at times, may have to restrict the behaviour of, and the information available to, network members. Weak ties provide access to the way different groups behave and to the different ideas that different groups have.

Granovetter (1974, 1983) illustrated his ideas on the strength of weak ties with reference to how people find new job opportunities. Close friends are likely to have the greatest overlap in terms of contact with those one already knows, so they are likely to have access to much of the same information on job opportunities. In contrast, acquaintances who move in different circles to close friends are likely to have access to information that one does not already have. Consequently, weak ties with acquaintances may open up new job opportunities, which one would miss by relying solely on close friends. Of particular relevance to this thesis is the fact that Granovetter saw weak ties as applicable to innovation diffusion (Granovetter 1973, pp1365-1369). In his view, the innovativeness of a group may be restricted by the intellectual perspectives of that group, but weak ties with other groups may enable new ideas to emanate from the margins of a network (Granovetter 1983, p216).

The idea that new ideas and ways of doing things may emanate from weak ties with other groups or networks, and I use these terms interchangeably, will be an important

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<sup>12</sup> For example Granovetter criticised Bowles and Gintis's (1975) view that the American education system destined different social classes for certain jobs in the hierarchy of production as being rather mechanical.

part of the empirical analysis that takes place in Chapters 5 and 6. Granovetter's view that cultural influences are not static, but dynamic, is also relevant in understanding the development of social networks. The empirical work undertaken in this thesis will illustrate that networks, which shape how individuals behave, are also shaped by their members. For example members who leverage off weak ties, and build bridges to other networks and groupings within an economy, may influence their own network.

In order to understand social relations Granovetter argued that one also has to analyse institutions, culture and politics and all the micro and macro elements, of which the 'meso-level' of social networks is in the middle (Krippner et al. 2004, p114). Heanue and Jacobson (2008), acknowledging Granovetter's contribution, suggested a concept of embeddedness that is defined by a complex web of social, economic and institutional connections that contribute to the innovative performance of firms and industries. Granovetter himself commented that even when markets are impersonal, and appear not to be mixed up with personal relationships, they are still embedded in a larger institutional framework, with a culture and set of rules that have been put there by a social process (Krippner et al. 2004, p115).

Granovetter (2004) stated that it is a 'fool's errand' to try to measure embeddedness in quantitative terms. Rather one should use it as a conceptual umbrella under which one can analyse the connections between economic activity and the social, the political, the institutional, the historical and the cultural elements with which economic activity is mixed up (Krippner et al. 2004, p133).

## **Social capital**

Another intangible and difficult to measure concept, which analytically overlaps with the embeddedness concept, is social capital. This thesis is concerned with how innovation arises from collaboration and it can be seen in the case studies presented in Chapters 5 and 6 that the accumulation of social capital plays a role in this process.

Despite the complexity and ambiguity of the concept, much of the research carried out to date in the social capital area has been based on large volume survey data, for example Putnam (2000), NESF (2003) and Beugelsdijk and Van Schaik (2005). The term social capital is increasingly referred to in a range of academic research but often this reflects the popularity of the term rather than a clear understanding of the concept. Writers studying a range of areas, including education, community life, economic development and collective action, have all provided different definitions for social capital (Adler and Kwon 2002, p17). However, the origin of the concept is usually attributed to three writers, Bourdieu, Coleman and Putnam. The remainder of this section examines different definitions and dimensions of social capital emphasised by these key contributors and some prominent users of the concept.

### **Definitions: bridging and bonding forms of social capital**

Bourdieu (1986, p243), who was among the first modern writers to use the term, defined social capital as:

[T]he aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition.

Bourdieu's definition of social capital can fit easily into strategic models of economic behaviour (Sobel 2002, p139). For Bourdieu (1986) the volume of social capital possessed by any given actor depends on the size of the network of connections and the volume of capital possessed by those to whom the actor is connected. He illustrated his view by reference to how the upper middle classes in France in the 1960s and 1970s cultivated connections in order to maintain their superior position in society (Field 2008, p22). This view is described by Adler and Kwon (2002, p19) as a 'bridging' form of social capital where the focus is on external relations, as opposed to a 'bonding' form of social capital where the focus is on internal ties. This distinction between bonding and bridging social capital is important in understanding the concept and how it can impact on any given actor.



Coleman (1988, 1990, 1994) took a wider view of the unit of observation and introduced a vertical component to social capital, which opened the door to a broader interpretation of the concept (Grootaert and van Bastelaer 2001, p4). Coleman's conceptualisation of social capital, which he saw as complementary to human capital, was developed within rational choice sociology where actors choose to cooperate because it is in their own self-interests to do so (Field 2008, p27). Coleman (1988, pS98) defined social capital as follows:

Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspects of social structures, and they facilitate certain actions of actors – whether persons or corporate actors – within the structure.

For Coleman, structure is important and he saw social capital as building up 'social structural resources' (Coleman 1994, p302). His definition enabled the concept to be used to examine behaviour within and among entities such as firms, with vertical associations being characterized by hierarchical relationships with unequal power distribution among members (Grootaert and van Bastelaer 2001, p5). Physical capital (plant and machinery) and human capital (people's skills and capabilities) can be combined to facilitate production. The social capital that exists in the relations among persons can also facilitate productive activity, particularly if the group or network embodies extensive trust among its members (Coleman 1988, pS101). Coleman argued that closure of the social structure created trustworthiness that allowed the proliferation of obligations and expectations within a network (pS107). Hence, for Coleman (1988, 1994) social capital has significant bonding elements. This idea of network closure might seem to conflict with Granovetter's (1973, 1983) ideas on the strength of weak ties and Bourdieu's (1986) emphasis on external relations. However, Sobel (2002, p151) argued that this superficial conflict might be reconciled by reference to the type of social capital required. For example, collective action might require strong ties (or bonding social capital) while obtaining information might require weak ties (or bridging social capital). But Coleman seems to suggest that strong ties in an enclosed network will be best at generating trust for social capital to develop. In contrast, Granovetter's (1973, 1983) recognised that strong ties bind a network of actors together but allowed for the possibility that weak

ties could build bridges to other networks, which could also lead to trust and enhanced social capital. Being the broker between two groups or networks also, presumably, requires a certain level of trust. See the discussion on Burt (1997, 2004), below.

Bourdieu's treatment of social capital is somewhat circular and dark in the sense that it is social capital that plays a significant role in maintaining privileged position and class differences in society. Coleman's view is more optimistic, based on the assumption that social capital is available to all actors in society regardless of privilege or disadvantage (Field 2008, p31). Coleman's definition can be criticised for being too vague but his emphasis on structure is interesting, particularly in understanding bonding social capital. Coleman influenced the concept of structural social capital, developed by Grootaert and van Bastelaer (2001) and others in work for the OECD, which is outlined in further details below and is used as an analytical tool in Chapters 5 and 6.

Putnam (1995, 2000, 2001) stated that the central idea of social capital is that networks and the associated norms of reciprocity have value. Putnam's writings did much to popularise the social capital concept, particularly in the USA. He defined social capital (Putnam 1995, p67) as the:

[T]he features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit.

In this later work Putnam<sup>13</sup> distinguished between bonding and bridging social capital, with the former providing denser networks and the latter creating larger networks (Sobel 2002, p151, Beugelsdijk and Van Schaik 2005, p1061). Putnam (2001) argued that, at least in some instances, there are 'demonstrable externalities' to social capital, benefits to the public (public goods), as well as private benefits to people who are involved in the networks. However, while undoubtedly influential in a policy sense, one of the limits of Putnam's work is that his rhetoric often

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<sup>13</sup> Putnam's wide ranging ideas on declining political, civic and religious participation were brought together in his book 'Bowling alone: The Collapse and Revival of American Community' (Putnam 2000).

overwhelms logic and the repeated use of descriptive statistics often substitutes for detailed analysis (Sobel 2002, p140-141). A second limitation of Putnam's conceptualisation is the tendency to assume that social capital can only lead to positive outcomes, whereas the concept may also have a negative or 'dark side', which is considered in detail below.

The advantages of bridging social capital have also been emphasised by Burt (1997, 2004) in his analysis of how brokerage can span the gaps or structural holes that delineate the space between networks.

The structural hole argument defines social capital in terms of the information and control advantage of being the broker in relations between people otherwise disconnected in social structure (Burt 1997, p340).

In a study of a large American electronics company Burt (2004, p349) found that managers who acted as brokers between different networks were more likely to express ideas and have these opinions evaluated as good ideas. Furthermore, managers who brokered connections across structural holes were rewarded through higher compensation, positive performance reviews and promotions (Burt 2004, p386). However, while the originality of the brokerage argument is significant, one of Burt's weaknesses is that he generalizes his model to markets without really testing it on firms (Comet 2007, p667).

The distinction between bonding and bridging forms of social capital is important to research undertaken in this thesis. The qualitative methodology adopted in Chapters 5 and 6 draws out the significance of the distinction and the contribution it can make to our understanding of how social capital works. Purely bonding types of social capital, while facilitating collective action, could potentially result in too narrow a focus for network members. Cooke (2007a, 2007b), who referred to the social capital concept in his regional studies of SME (small and medium enterprise) performance in the UK, highlighted that Granovetter (1992) and Grabher (1993) both warned of the dangers of an over reliance on too narrow a range of business and social contacts – described by Grabher as 'lock-in' of relationships (Cooke 2007a, p81). Bridging types of social capital have the potential to open-up the minds

of network members to new ideas generated by members of other networks. However, an over reliance on external ties or bridging forms of social capital could also be limiting, particularly if collective action is needed to develop an idea and bring it to the market. This suggests that individuals and groups who can effectively utilize both bonding and bridging types of social capital may be best placed to advance their objectives. At the firm level, Cooke (2007a, p83) argued that the use of social capital could contribute significantly to the development of ‘the dynamic capabilities of the firm’ (Teece 2007), with trust, especially of the reputational or goodwill kind, being a key element in this regard.<sup>14</sup> He included the capability to influence government policy and state agencies that design and run industrial development programs among the potential positive benefits of social capital.

### **Further definitions - structural and cognitive social capital**

The social capital term has been used by both the World Bank and the OECD in addressing social and economic challenges of development. This has led to further definitions and some refinement of the concept. Woolcock (1998), for many years a member of the World Bank’s Development Research Group, defined social capital as:

[T]he information, trust, and norms of reciprocity inhering in one’s social networks.

Woolcock (2001, p5-6) placed social capital within an evolutionary approach to understanding the factors of production and capital in economics. Economists identified land, labour, and physical capital as three basic factors of production that shape economic growth. In the 1960s, neo-classical economists, among them Becker (1962), introduced the notion of human capital, arguing that a society’s endowment of well educated and trained workers determines its productivity and its use of the factors originally identified by classical economics. Woolcock (2001) argued that

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<sup>14</sup> In a discussion on measurement, Putnam states that he agrees with Woolcock that social trust while not being part of the definition of social capital is a close consequence, and could be thought of as a proxy (Putnam 2001)

**Table 2.1: Definitions of social capital**

Bourdieu (1986)	The aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition.
Coleman (1988)	Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspects of social structures, and they facilitate certain actions of actors – whether persons or corporate actors – within the structure.
Putnam (1995)	The features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit.
Burt (1997)	The structural hole argument defines social capital in terms of the information and control advantage of being the broker in relations between people otherwise disconnected in social structure.
Woolcock (1998) Woolcock (2001) (Note 1)	The information, trust, and norms of reciprocity inhering in one's social networks. Social capital refers to the norms and networks that facilitate collective action.
Grootaert (1998)	The norms and social relations embedded in social structures of societies that enable people to co-ordinate action to achieve desired goals.
Krishna and Uphoff (1999)	The first category [structural] capital <u>facilitates</u> MBCA [mutually beneficial collective action] through established <i>roles</i> and <i>social networks</i> supplemented by <i>rules</i> , <i>procedures</i> and <i>precedents</i> , while the second [cognitive] <u>predisposes</u> people toward MBCA on the basis of shared <i>norms</i> , <i>values</i> , <i>attitudes</i> and <i>beliefs</i> .
Lundvall (2005) (Note 2)	The willingness and capability of citizens to make commitments to each other, collaborate with each other (sic) and trust each other in processes of exchange <i>and</i> interactive learning.
Cooke (2007)	Social capital is defined as the application or exercise of social norms of reciprocity, trust and exchange for political or economic purposes.
Nooteboom (2007)	Social capital as contributing to goal achievement of actors on the basis of relationships. Here, actors may be individual people but they may also be groups, such as firms or other organisations.
Field (2008) (Note 3)	Social capital may be termed capital insofar as it gives rise to resources that can be deployed in order to enable actors – both individuals and groups – to pursue their goals more effectively than they could without it. ...What social capital brings to social theory is an emphasis on relationships and values as significant factors in explaining structures and behaviour.

- Notes: 1. Woolcock (2001) eliminated trust from this later definition, see discussion of social capital and trust.  
2. For Lundvall definition see discussion of national and regional innovation systems, in Section 2.4.  
3. For Field definition see discussion of social capital and government.

Source: Author's table

human capital resides in individuals and social capital resides in relationships - with the two concepts, in essence, being complementary.

Coleman also viewed social capital as complementary to human capital and was particularly influenced by Becker's work on human capital, Becker like Coleman was employed at the University of Chicago (Field 2008, p23). However Coleman's definition of social capital encompassed both individual and collective aspects, with social capital viewed as 'a capital asset for the individual' and also comprised of 'social structural resources' built up in the environment (Field 2008, p28, Coleman 1994, p302).

In slightly earlier work under the World Bank's social capital initiative, Krishna and Uphoff (1999, pp6-7) used the approach known as 'subordinate conceptualization' to break down the social capital concept into major components, with the aim of bringing more analytical rigor to the use of the term. They argued that the core meaning of capital is that it represents a stock of assets that yields a flow of revenue and described the revenue flow from social capital as mutually beneficial collective action (MBCA). They proposed two main categories or forms of social capital: structural forms and cognitive forms, both pertaining to and affecting social relationships.

The first category [structural] capital facilitates MBCA through established *roles* and *social networks* supplemented by *rules, procedures* and *precedents*, while the second [cognitive] predisposes people toward MBCA on the basis of shared *norms, values, attitudes* and *beliefs* (Krishna and Uphoff 1999, p7 — underlined words and words in italics original authors').

This distinction between two distinct types of social capital – structural and cognitive – has been taken up by researchers at the OECD (2000), who referring to Grootaert (1998) define social capital as:

[T]he norms and social relations embedded in social structures of societies that enable people to co-ordinate action to achieve desired goals.

Grootaert and van Bastelaer (2001, p5) argued that structural social capital facilitates information sharing, collective action and decision making. In these instances, social networks and structures supplemented by rules, procedures and precedents are important. To a degree, this type of social capital is easily quantified as the number of networks, network membership, precedents etc are externally observable. Cognitive social capital, which refers to norms, values, trust, attitudes and beliefs, is a more subjective and intangible concept (Uphoff 2000). Ferlander (2007, p116) also distinguished between the structural dimension (networks) and cognitive dimension (norms) of social capital but added a third behavioural dimension to capture the importance of participation on the part of the individual (Field 2008, p160-161). Naphapiet and Ghosal (1998) also suggested three dimensions of social capital – structural, cognitive and relational. The dual distinction between ‘bonding and bridging’ and ‘structural and cognitive’ social capital was used in this thesis, because it provided greater theoretical clarity and, in the opinion of this author, a clearer analytical tool for examining collaboration within cluster initiatives.

Both structural and cognitive social can be measured quantitatively, with much research to date in the social capital area focusing on the number of networks in society and on large survey data measuring people’s participation rates within networks. While such research has merit, it can only tell us so much about social capital. In order to understand what motivates people to engage in collaboration, what they contribute to and get from such interactions, we need to go deeper. These various dimensions suggest that a deep understanding of the way social capital works will require more qualitative methods of analysis and research.

The distinction between structural and cognitive social capital is part of the social capital analytical tool kit used to add depth to the exploration of collaboration in clusters and cluster initiatives in Chapters 5 and 6. Once again, the qualitative methodology adopted draws out the significance of the distinction and the contribution it can make to our understanding of how social capital works.

## Social capital and trust

The role of 'trust' in social capital is a complex issue. It will be seen as playing a significant role in the collaborations analysed in Chapter 5 and 6. Trust is seen by some researchers as epiphenomenal, that is as arising out of social capital. It is seen by others as a causal variable, as a phenomenon that must precede the development of social capital. Nooteboom (2007, p30) argued that while trust may be built within relationships, it may also arise outside relationships, on the basis of institutions and it may be facilitated by intermediaries or a go-between. He did not aim for essentialist definitions of social capital, institutions and trust but for pragmatic definitions that, as much as possible, accorded with established meanings, but also clarified them with the aim of explaining phenomena. In this context Nooteboom (2007, p32) defined social capital as contributing to the goal achievement of actors on the basis of relationships, with actors referring not only to individuals but also to groups, such as firms and organisations. In the latter case he emphasised the relationship between groups, rather than within groups, as the most relevant relationship in social capital terms. Social capital requires investment, in the sense of effort and sacrifice, but trust as a feature of social capital cannot be bought and installed – if not present; it needs to develop in time (Nooteboom 2007, p33).

Bourdieu (1986) did not emphasize trust in his definition of what essentially is a bridging form of social capital, which builds benefits from 'mutual acquaintance and recognition'. Coleman (1988) who defined a bonding form of social capital by its functions also did not specifically mention trust in his definition. However, in further discussion, he does state that productive activity is particularly facilitated by networks that embody extensive trust among its members (Coleman 1988, pS101). Of the three writers considered to be the originators of the concept, it is Putnam (1995) who saw an integral role for trust in his definition of social capital. He identified it as facilitating coordination and cooperation for mutual benefit. As such, Putnam sees trust as a cause of social capital.

The OECD (2000) referred to Grootaert (1998) who did not mention trust in his definition, but later (Grootaert and van Bastelaer 2001, p5) referenced Uphoff (2000)



who included trust among his examples of cognitive social capital. In fact in their work for the World bank Krishna and Uphoff (1999, p51) listed trust as a primary form of cognitive social capital. They argued that trust makes cooperation efficacious and view trust in this case as something that gives people the confidence to engage with others in the knowledge that others will act in a reliable way. This suggests that, for cognitive forms, trust may be a driver of social capital. In their discussion of structural social capital they emphasize that rules, procedures and precedents create expectations and provide assurance about how others will act (Krishna and Uphoff 1999, p50). This suggests that, for structural forms of social capital, trust may be an outcome rather than something that necessarily precedes social capital. Woolcock (1998) specifically mentioned trust in his definition of social capital, but in a later paper he stated that ‘social capital refers to the norms and networks that facilitate collective action’ and argued that:

“[T]rust” is better understood not as social capital *per se*, but rather as a measure of it. We invest in the networks and social institutions that produce trust, not trust in and of itself (Woolcock 2001, p9).

In contrast Cooke (2007) appeared to view ‘trust, especially of the reputational or goodwill’ to be a cause of social capital in business networks. Finally, Granovetter (1985), in his development of the embeddedness concept, viewed economic actors, individuals and firms, as building relations and structures that generate trust.

Sobel (2002, p149) pointed out that it would be useful to know whether the capacity to trust is based solely on deep rooted culture, as suggest by Fukuyama (1995) and Putnam et al (1993), or whether it can be influenced by the kind of institutions that can be constructed and nurtured. Nooteboom (2007, p37) argued that relationship reliance, which for him covered both control and benevolence, is always a part of social capital – but that trust, which goes beyond control and self interest, may not be. The qualitative methodology adopted in Chapters 5 and 6 and the use of the distinctions between the different forms of social capital — ‘bonding and bridging’ and ‘structural and cognitive’ — facilitates an exploration of this issue of trust in social capital.

## The dark side of social capital in a collaborative business context

Social capital is generally discussed as a positive concept that can contribute to our understanding of how society works and how individual and groups within communities are supported. But it is important to acknowledge that social capital is not always a positive thing and that there is a potential negative side to the concept as well. In the most extreme negative sense, social capital can facilitate criminal gang and 'mafia' activity by creating strong bonds between individuals with favours granted, building obligations that anticipate future return that involve illegal activity e.g. drug cartels etc. But less extreme cases of a dark side of social capital are also possible. Sobel (2002, p146) pointed out that the ability to use network relationships to gain beneficial outcomes may come at a cost to individuals outside the group and society itself may lose when group members exploit social capital. For example, highly organised farm and industry groups who adopt a very protectionist trade stance may damage those outside their country who, as a result, continue to face high tariff levels and restricted market access.

Field (2008, p92) highlighted that while trust has a general value in easing economic cooperation and reducing the transaction costs associated with more formal mechanisms such as contracts, hierarchies and bureaucracy rules (Fukuyama 2001, p10), it is precisely these features of social capital that represent an opportunity for those who wish to engage in fraud. Inappropriate use of social capital in a business context can also lower productivity and facilitate cartel behaviour. Business people who socialise with one another may be able to turn their competitive rivalry into a basis for cooperation in order to avoid bidding wars and keep up prices (Ingram and Roberts 2000). This may also reduce the impact of competition on business behaviour, and insulates employers from the views of customers. Far from stimulating innovation, then, social capital can sometimes produce stagnation and inefficiency' (Field 2008, p95-96). But modern anti-trust and competition laws, and adequate enforcement of these laws, can protect society against these negative aspects of social capital.

However, social capital can also have less obvious negative aspects that restrict behaviour and appear to limit choices, at least in the minds of those trying to follow a different path to the group. Field pointed out that many people who emigrate from high-trust societies do so because they feel suffocated by the close and self-monitoring community that surrounds them.

At first sight, then, it seems that bonding social capital (combined with particularised trust) is to blame for social capital's dark side..... [But] Not all the evidence points to such a straightforward model. Bonding social capital – clannishness, the use of family connections – is frequently associated with such public goods as raising educational attainment, reducing the costs of job search and minimising risks of malfeasance in business exchanges (Field 2008, p97).

Therefore, even in the case of family and community, which the individual does not choose, social capital properly used can be a positive rather than negative thing. In a business context, this potential dark side of the bonding type of social capital is presumably less of an issue, as one chooses the networks in which one participates. However, that being said, close knit and strongly bonded business networks can potentially restrict behaviour by closing off members of the network to new ideas and ways of doing business. Business networks / associations that engage in bridging forms of social capital can mitigate against this downside to social capital.

Bridging social capital can also have a dark side. Field pointed out that:

[B]ridging social capital can nurture insider networks and thus reproduce inequality; it may also have perverse goals. For example informal networking of highly skilled knowledge professionals was partly responsible for disguising the over-reporting of profits in the 'new economy' (Field 2008, p98).

In summary, one cannot see connectedness as invariably positive, as sometimes it can serve negative ends as well as good; and frequently it forms part of a wider structure of systematic inequality (Field 2008, p99). On the other hand,

connectedness is increasingly recognised as providing a range of positive aspects and the social capital concept provides a way to examine these in a more systematic way, particularly from a policy perspective.

## **Social capital and government**

Interaction in cluster initiatives between industry and government, and state agencies, is an important element of the empirical analysis carried out for this thesis. Hence it is useful to consider the relationship between social capital and government in a general sense, before presenting a more in-depth examination of the relationship in the Irish context.

Treating networks and shared norms as a form of capital has given the social capital idea resonance among economists and sociologists, and has helped open the door to serious policy debate. The OECD and World Bank have both used the social capital concept in policy areas such as sustainable development. In early 1990s, Putnam argued that US job training programmes for the unemployed would work better if complemented by the creation of linkages between community groups, schools, employers and workers; and the social capital idea influenced both US and British administrations in the early 2000s (Field 2008, pp133-135). Governments can create a stable and safe environment where different views are tolerated and property rights, including intellectual ones, are protected. This, in itself, can help generate social capital because people can be confident in associating together, expressing their views freely and knowing that the property they generate, intellectual or other types, will be protected by the state. Consequently, government awareness of social capital can be an important aspect of understanding economic development and generating new ideas and innovation in a society. Emerging economies, with less developed protection of intellectual and other property rights, may run the risk of losing out on some of the benefits of social capital in this regard.

However, social capital is not easy to generate through public policy and one needs to be careful about state intervention. Firstly, governments and their agencies can have a serious negative impact on social capital when they start to undertake activities that are better left to the private sector or to civil society (Fukuyama 2001,

p18). Cooperation among individuals is often based on habit and practice; if the state gets into the business of organising everything, people may become dependent on it and lose their spontaneous ability to work with one another.

A second danger of state intervention is that organisations may spring up that are good at writing proposals to gain access to state funds. But these organisations are likely to have little durability once the outside source of funds dries up (Fukuyama 2001, p18). Essentially such organisations are little more than what economics would describe as rent seekers. In contrast, privately funded organisations that from time to time work with state agencies, while gaining access to government funds for various initiatives, are likely to have greater sustainability and consequently a greater social capital impact in the long term. State development agencies also need to be careful that they do not damage social capital by enticing people away from already established networks/associations, rather than working in partnership with these organisations. Coleman (1994, pp312-313) accepted that social capital could suffer from under-investment as a result of market failure, but expressed concern that state intervention might make matters worse if it replaced existing activities and relationships freely entered into by individuals, which is the essence of social capital (Field, 2008, p135).

Cooke (2007, p80) presented the results of a research project examining the effects of social capital on small and medium-sized enterprise (SME) performance in the UK and stated that:

Social capital is defined as the application or exercise of social norms of reciprocity, trust and exchange for political or economic purposes.

He warned that state agencies need to ensure that policy efforts are not applied only to a rather exclusive 'in group', creating social capital strength for only a few favoured firms (Cooke 2007, p104). Agencies focused on the development of SMEs need to be aware of this danger, which could reduce the potential economic impact of policy initiatives. Particularly since the chosen few may naturally like being part of a *small elite group* that receives a lot of policy attention and be happy to see competitors excluded from such initiatives (Cooke and Wills 1999). From the

firm perspective they should strive to build social capital themselves both domestically, by embedding themselves more deeply in indigenous networks, and globally, by developing linkages to networks outside the home base. (Cooke 2007, p104).

However, Field (2008, pp139-142) outlined a number of points that support the case for policy intervention in the creation of social capital. First, people's ability to access resources through their social capital, in areas such as health and education, can make a considerable difference to their life chances.

Second, one should be aware that policy decisions themselves may impact on existing social capital, in either a positive or negative way. Field referred to a UK report (Performance and Innovation Unit 2002, pp57-58) that listed certain policies that contributed to the creation of social capital in a number of areas including the voluntary sector, the promotion of business sector clusters and citizenship education. On the other hand, the report found that housing policy in Britain following WWII, while providing better housing, had the unintended consequence of destroying neighbour connections in working class areas. The policy to move inner city Dublin communities to high-rise flats and housing developments, with inadequate recreation, education and transport facilities, on the outskirts of the city during 1960s also destroyed such neighbour connections in Ireland.

Third, other actors in the economy recognise the potential of social capital. For example, limited evidence suggests that firms who invest in social capital are more productive than firms who leave things to chance (Field 2008, p140). At times, it can also be damaging if governments ignore the use of social capital by other actors, consequently in modern societies public policy is often explicitly designed to prevent people from using their connections inappropriately e.g. anti-trust and lobbying legislation in the USA and competition laws in the EU.

Fourth, the behaviour of other people or groups can affect stocks of social capital. For example, public policy decisions, such as zoning and road / infrastructure development subsidies, which favour multinational retail chains and stand alone shopping centres, can impact on the local social capital of towns.

Fifth, one of the strengths of the social capital idea is that it emphasises resources that communities already have and encourages external agencies to work with and build on, this potential (Woolcock 2001, p15). In this sense, social capital is highly congruent with the emerging interest in partnership as a basis for policy development and for ensuring that least advantaged members of society are not excluded from such strategic partnerships (Field 2008, p141).

Sixth, there is evidence that citizens are concerned about the erosion of social capital in poor communities and the impact this has on the disadvantaged in society; in contrast to the more well-off in society whose use of social capital may at times unintentionally further disadvantage the poor.

Finally seventh, and in Field's view most important, public support for social capital can help achieve more equitable access to public governance and decision making (2008, p142). He supported the link between social capital and democracy, which he pointed out, was an important part of the thinking developed by the National Economic and Social Forum (NESF 2003) in Ireland.

To date, a relatively small number of research studies have used the social capital concept in Ireland. Some have focused on the role of the community and voluntary sector in the generation of social capital. The National Economic and Social Forum (NESF) commissioned an Irish survey focused on citizen involvement in voluntary or community groups, and concluded that 'social capital is one resource, among others, which can be used in support of community development and social inclusion' (NESF 2003, p3). In a quantitative study, building on the NESF survey, Healy (2005) concluded that the distribution of social capital in Ireland varied according to social group, age, marital status and level of education. He argued that the main value of the social capital concept was as a useful tool for qualitative analysis of social systems and those quantitative analyses that employ qualitative indicators (Healy 2005, p71).

Few Irish studies examine the relevance of the social capital concept in an economic and business context. Breathnach (2006) studied the relationship between social

capital and the effectiveness of national social partnership. She concluded that there were negative, as well as positive, aspects of social capital, which excluded some from the benefits of the policy process and insulated others from broader environmental and development opportunities (Breathnach 2006, p39). With respect to developing an innovation culture in Ireland, Bradley (2007, 2009) warned against ignoring the social context and emphasised the importance of human interaction and culture. Bradley and Kennelly (2008a, 2008b) advocated that social factors, such as collaborative problem-solving abilities and self-knowledge, were more important to the success of an innovation policy than levels of R&D expenditure in universities, *per se*.

Field (2008) suggested a pragmatic usage for the term that facilitates a variety of different theoretical frameworks to bear on the concept:

Social capital may be termed capital insofar as it gives rise to resources that can be deployed in order to enable actors – both individuals and groups – to pursue their goals more effectively than they could without it. ...What social capital brings to social theory is an emphasis on relationships and values as significant factors in explaining structures and behaviour (Field 2008, pp159-160).

The use of the social capital term in this thesis will follow this suggestion by Field (2008) drawing on a number of the definitions and forms of social capital outlined in Table 2.1 and discussed above. In this way the empirical analysis undertaken in Chapters 5 and 6 will identify resources deployed by actors in different relationships in order to pursue their goals and create social capital. The following section will examine the third area that will go to make up the new framework proposed in this thesis and which is influenced by some of the concepts outlined in this section.



## Section 2.4: Innovation systems - national and regional

### National systems of innovation

In the management strategy area Porter (1990) argued that while globalisation of competition might appear to make the nation state less relevant, instead it makes the nation more important because competitive advantage is created and sustained through localised processes.

Differences in national economic structures, values, cultures, institutions and histories contribute profoundly to competitive success. The role of the home nation seems to be as strong as or stronger than ever (Porter 1990, p19).

As discussed above, the diamond model has been criticised for placing too much emphasis on the home market, but the local demand is not the only role for the home nation. More importantly, Porter recognised that the home nation takes on a growing significance in a free trade environment, where firms and industries are less protected, because it can be the source of the skills and technology that underpin competitive advantage.

Of course, this implies the need for appropriate policies to ensure the development and provision of such skills and technology, encapsulated perhaps in a 'national system of innovation' (Lundvall 1985, 1992, 1998, 2005). Lundvall was the first to use the expression 'national system of innovation', but he recognised that the idea dates back to List (1841) whose main concern was to re-establish Germany's competitiveness, compared to Britain, by advocating not just the protection of infant industry but through promoting policies concerned with learning about new technology and applying it (Freeman 1995, p5). However, Lundvall (1998) provided a much clearer concept of the idea. He argued that under the National Systems Innovation (NSI) perspective, where the focus is on economic development, successful innovation is more important than efficient allocation. This is an alternative perspective to neoclassical economics where individual agents with given preferences and sets of information, including publicly shared technical knowledge, make rational choices among well defined alternatives. Table 2.2 illustrates this key

basic intention behind the NSI concept ‘to change the analytical perspective away from allocation to innovation, and from making choices to learning’ (Lundvall 1998, p408).

**Table 2.2: The NSI and standard neoclassical perspective**

	<b>Allocation</b>	<b>Innovation</b>
<b>Making Choices</b>	1. Standard neoclassical perspective	2. The neoclassical perspective applied on innovation
<b>Learning</b>	3. Austrian approach to market as a process of learning	4. National System of innovation perspective.

Source: Lundvall 1998, Table 1, p408.

Under Lundvall’s NSI approach, innovation is rooted in ‘interactive learning’, which does not thrive in the short-term perspective of the pure markets promoted by neoclassical economics.

He introduced uncertainty, localised learning and bounded rationality as assumptions of microeconomic behaviour in his analysis of innovation. These more realistic assumptions are in contrast to the neoclassical assumptions of perfect information and hyper rationality, and contributed in the ability to define a strong system of innovation that would impact on a nation’s path of development (Lundvall 1993). He argued that:

If instrumental rationality<sup>15</sup> were completely dominating among professors and students, masters and apprentices as well as among engineers from R&D laboratories belonging to different firms, very little learning would take place. Innovation systems where a different kind of ‘communicative rationality’ were playing a major role in the private sector would therefore be better off in the long run than the standard exchange economy (Lundvall 1998, p410).

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<sup>15</sup> Lundvall (1998, p410) argued that economic transactions in the form of single and isolated exchange acts tended to support patterns of behaviour corresponding to instrumental rationality.

In the NSI approach ‘communicative rationality’ refers to the idea that relationships between agents, with shared collective goals, lead to more complex decisions than the rational choice decisions of the individual agent under the neoclassical approach. Therefore, NSI is an appropriate approach for considering issues around collaboration and the use of social capital to enhance innovation. Furthermore, in the NSI approach decisions are to a degree influenced by the process of engagement as well as the outcome of the engagement. Lundvall argued that the institutional role of ‘trust’ was particularly important in the context of learning and innovation:

Trust is a multidimensional and complex concept. It refers to mutual expectations regarding consistency in behaviour and full, truthful revelation of relevant information and loyalty in difficult times. Trust can be very local, or it can extend to a wider set of actors. These dimensions of trust are crucial for interactive learning and innovation (Lundvall 1998, p410).

The role of trust is also an important issue in social capital theory (see discussion in section 2.3 above). Lundvall advocated that the National Systems of Innovation concept should be used for analyzing economic development.

Table 2.3 presents Lundvall’s illustration that economic growth is faced with a double challenge in terms of sustainability, based on the distinction between tangible and non-tangible resources, introduced by new growth theory (Romer 1990), and a further distinction between resources that are more or less reproducible. Therefore, for Lundvall, social capital is an intangible and non-reproducible resource.

Lundvall (2005) elaborated further on the important linkages that exist between interactive learning, social capital and economic performance. He argued that:

[T]he kind of interactive learning that interconnects users and producers in processes aiming at new products may have a major impact on economic performance of the economy<sup>16</sup>. To understand the prerequisites for such

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<sup>16</sup> Chapter 6 will look at the relationship between dairy ingredient producers and infant formula manufacturers, and the impact this had on innovation levels in the dairy industry in Ireland.

learning to take place should therefore be of major concern not only to management but also for policy-makers at the national level (Lundvall, 2005, p3).

**Table 2.3: NSI approach – resources fundamental for economic growth, combining the tangible and reproducible dimensions**

	<b>Reproducible resources</b>	<b>Non-reproducible resources</b>
<b>Tangible resources</b>	1. Production Capital	2. Natural Capital
<b>Intangible resources</b>	3. Intellectual Capital	4. Social Capital

Source: Lundvall 1998, Table 2, p415.

Producers learn by doing while customers and consumers learn by using. Connecting producers and users can lead to innovations in terms of new products and systems i.e. interactive learning. The cluster concept also emphasises the role customers and consumers, for example, through demand conditions and related and supporting industries in the diamond model. Freeman referring to Lundvall and others pointed out that:

[M]any improvements to products and services came from interaction with the market and with related firms, such as sub-contractors, suppliers of material and services (Freeman 1995, p11).

Lundvall (2005, p5) also argued that Williamson’s transaction cost view is not compatible with empirical evidence on product innovation. Williamson basically argued that uncertainty coupled with opportunism will limit competition leading to higher transaction costs thereby providing incentives for firms to integrate vertically i.e. substituting a hierarchy for the market. In contrast, Lundvall argued that ‘organised markets’ and mechanisms that limit opportunism can support interactive learning between producers and users with consequent benefits in terms of innovation. North (1996) referred to the importance of human learning as a source of

economic change<sup>17</sup> but the main focus of his analysis is that the key to efficient markets is institutions that lower transaction costs. While acknowledging the importance of efficient markets, Lundvall added that in the learning economy it is at least as important that institutions support learning within and between organisations. In this context Lundvall (2005) defined social capital as:

[T]he willingness and capability of citizens to make commitments to each other, collaborate with others and trust each other in processes of exchange and interactive learning (Lundvall 2005, p10).

This thesis provides evidence that collaboration between firms, research institutes and state agencies is one way to limit opportunism, reduce business costs, but at the same time support learning within and between organisations. One of the key benefits of this type of interactive learning is that it enables the outcomes of learning at the local level, for example between an individual firm and its customers, to become more widely diffused in the economy (Lundvall 2005, p10). This has the potential to enhance innovation and the consequent wealth creation benefits at economy level.

### **Sectoral and regional systems of innovation**

During the 1980s, in the early years of the development of the systems of innovation approach, the main emphasis was on the national level, but since then sectoral and regional variants of the approach have also emerged. Edquist argued that these various approaches complement rather than exclude each other and that for very large countries the national innovation approach may be less relevant, although even in large countries laws and policies may be set at the national level (Edquist 2001, p2 and fn2).

Malerba (1999, pp5-6) stated that the definition of a sectoral system contrasts sharply with the standard definition of a sector within industrial organisation theory.

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<sup>17</sup> Lundvall criticises North (1996) for, despite referring to human learning as important, largely discussing institutions in terms of their impact on transaction costs rather than their impact on learning (2005, p9).

Industrial economics concentrates on firms as the main actors, with these firms using similar types of technologies to supply goods to their customers. Strategic decisions in relation to competition, cooperation and command are facilitated by vertical integration. In contrast, the sectoral system of innovation (SSI) approach emphasises the degree and determinant of ‘agents’ *heterogeneity* and behavioural and organizational *variety* within sectors’ (Malerba 1999, p5 – italics original author’s). Malerba also highlighted that the SSI approach:

[G]ives importance to *links and complementarities at the input and demand levels*. These complementarities are both static and dynamic and include interdependencies among vertically or horizontally related sectors, the convergence of previously separated final products or the emergence of demand from existing ones. Thus interdependencies and complementarities define the *real boundaries* of a sectoral system. They may be at the input, or at the demand level, and may concern innovation, production and distribution

One can identify certain similarities between this SSI approach, the emphasis on factor (input) and demand conditions and related and supporting industries in the Porter diamond model (see figure 2.1). However, the SSI approach, in addition:

[P]laces significant emphasis on the role of *non-firm organisations* such as universities, financial institutions, government, local authorities and of *institutions* and rules of the game such as standard, regulations, labor markets and so on. Non-firm organizations and institutions greatly differ across sectors and affect the innovative, and productive activities of firms (Malerba 1999, pp5-6 – italics original author’s).

Here one can see the influence on the SSI approach of North’s ideas (1990, 1994) from institutional economics, although the distinction between organisation and institution should be clearer (see section below on the need for conceptual and theoretical clarity in the SI approach). Malerba (1999, p29) argued that the SSI approach differs significantly from the transaction costs approach that North is generally associated with, but this thesis supports the view that North’s contribution

spans the old and new institutional tradition, and is wider than the narrower TCE focus (see section 2.2).

The main difference between the NSI and SSI approaches is essentially the focus on sectors, rather than on the technological capabilities of countries. Studies that focus on regional systems of innovation (RSI) that often involve an overlap with a sector, for example in the case of studies of industrial districts, are closer to the SSI approach (Malerba 1999, p30).

Similarly studies that combine clusters analysis with a focus on RSI overlap with SSI in their movement away from the national level approach. Even in small countries there has been a shift in the spatial dimension of innovation systems approach from the original national level<sup>18</sup> to the regional level (Giblin 2007, p44). In the context of this thesis, it is useful to briefly consider the regional approach and the role that clusters and cluster initiatives might play within it for two reasons. Firstly, clusters and cluster initiatives may be located in the different regions of Ireland. Secondly, from an economic perspective, Ireland as a small open economy member of the EU and the Euro zone, behaves in many respects as a region of the European Union.

Cooke (2002) argued that a consensus has formed that accomplished regional economies tend to display the important common features of: agglomeration, institutional learning, associative governance, proximity capital, and interactive innovation. He pointed out that Krugman in a study of Ireland (Krugman 1997) itemised three advantages of agglomeration as follows:

1. A concentration of producers supports local suppliers of specialised inputs, helping to generate external economies of scale.

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<sup>18</sup> The concept 'national' is pragmatically defined as those persons who are citizens of a sovereign state, but like many concepts in the social sciences, it is unclear and essentially contested (Cooke 1997, p477). European examples of a less than definitive nature include Flanders and Wallonia in the case of Belgium, the 'Basque Country' in the case of Spain, and Scotland and Wales in the case of the UK. The case of Ireland is also interesting. For example Northern Ireland, the nature of whose sovereignty has been a major political issue for generations, is in some aspects closer to the Republic of Ireland than to other areas of the United Kingdom e.g. population size, lower levels of traditional manufacturing, etc.

2. A localised skills pool benefiting workers and firms creates flexible labour market opportunities.
3. Information spill-over is implied by agglomeration.

In regional innovation, these translate into opportunities for lowering transaction costs by reducing uncertainty due to the possibilities for specialist, tacit knowledge exchange arising from the agglomeration (Cooke 2002, p135). This view follows North's norms, routines, "rules of the game" and "conventions" whereby certain practices are acceptable and promote trust in relationships among firms, also helping to reduce costs. Cooke emphasised that openness to learning good practice from others is of growing importance both via the "learning organisation" or firm and via government agencies that "learn by monitoring", with such learning being global as well as local. Under associative governance, government agencies should facilitate regional innovation by 'letting go' of the function, or at least sharing this responsibility with legitimate private governance bodies such as business associations or chambers of commerce (Cooke 2002, p135)<sup>19</sup>.

In addition, Cooke listed two forms of 'proximity capital' important to regional development. The first is access to trustful ways of raising investment capital, not necessarily through banks but also through local entrepreneurs or 'business angels', which is particularly important for SMEs. The second is intellectual capital, arising from investments in university and research institutes that flows to, and complements, the innovation capabilities of firms in proximity to these institutes. This second form of Cooke's 'proximity capital' is more relevant to this thesis, although empirical evidence provided in the thesis suggests that drawing on intellectual capital that is not proximate or within the region can also be important. Cooke also pointed out that 'interactive innovation'<sup>20</sup>, a concept very much associated with the "national systems of innovation" literature, is also relevant at regional level.

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<sup>19</sup> These fit into my OFC categorisation outlined later in this chapter.

<sup>20</sup> 'The idea of benefits from interactive learning was inspired by a case where a Swedish dairy technology producer (Alfa Laval) kept an affiliate in Denmark making repeated losses year after year. Asking the management of Alfa Laval why they did not close it down, they responded that they were willing to pay a price for being close to and learning from the most advanced dairy technology-users in the world.' (Lundvall, 2005, fn. 11, p7).



This “new regional science” approach is obviously compatible with evolutionary economics<sup>21</sup>, with both approaches (a) envisaging innovation and learning processes involving knowledge transfer in a systemic interaction within political economies and (b) being concerned with questions of path dependency, development trajectories and the role of institutions and the way they evolve over time (Cooke 2002, p136). According to Giblin (2007) who refers to Doloreux (2002), the dynamics of a regional innovation system are defined by social embeddedness involving networks of firms, which generate and diffuse knowledge, interacting with public technology transfer and advisory agencies and R&D organisations<sup>22</sup>, such as universities and research institutes (Giblin 2007, pp46 -47).

### **Systems of Innovation (SI) – need for conceptual and theoretical clarity**

Edquist (2001, 1997) criticised the SI approach for using concepts such as ‘institution’ and ‘organisation’ in inconsistent ways, which led to lack of theoretical clarity. The review of North’s contribution to institutional economic outlined in section 2.2 supports this distinction. North argued that institutions are the rules of the game, and organizations and entrepreneurs are the players who try to influence the outcome of the game (North 1990, 1994). Edquist also characterised certain key dimensions of the SI approach, which addressed this weakness of the SI approach:

Maybe the most important one [dimension] was that innovations are normally seen as based on learning that is interactive between organisations in the SI approach; firms do not generally innovate in isolation (Edquist 1997: [Ch]7, [pp]20-22). Another important feature is that institutions are considered to be crucial elements in all versions of the SI approach (Edquist 1997: [pp] 24-26). The institutions shape (and are shaped by) the actions of the organisations and the relations between them (Edquist 2001, p2)

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<sup>21</sup> The evolutionary economics approach is influenced by institutional economics. For example, Nelson and Winters (1977, 1982), the first writers to develop a comprehensive evolutionary theory of economic growth, change and innovation, started in neoclassicism but moved in the direction of institutionalism (Samuels, 1995, p579).

<sup>22</sup> Giblin referring to Doloreux (2002) mentions R&D ‘institutions’ but following Edquist and Johnson (1997, pp46-47) they are more accurately described as R&D organisations.

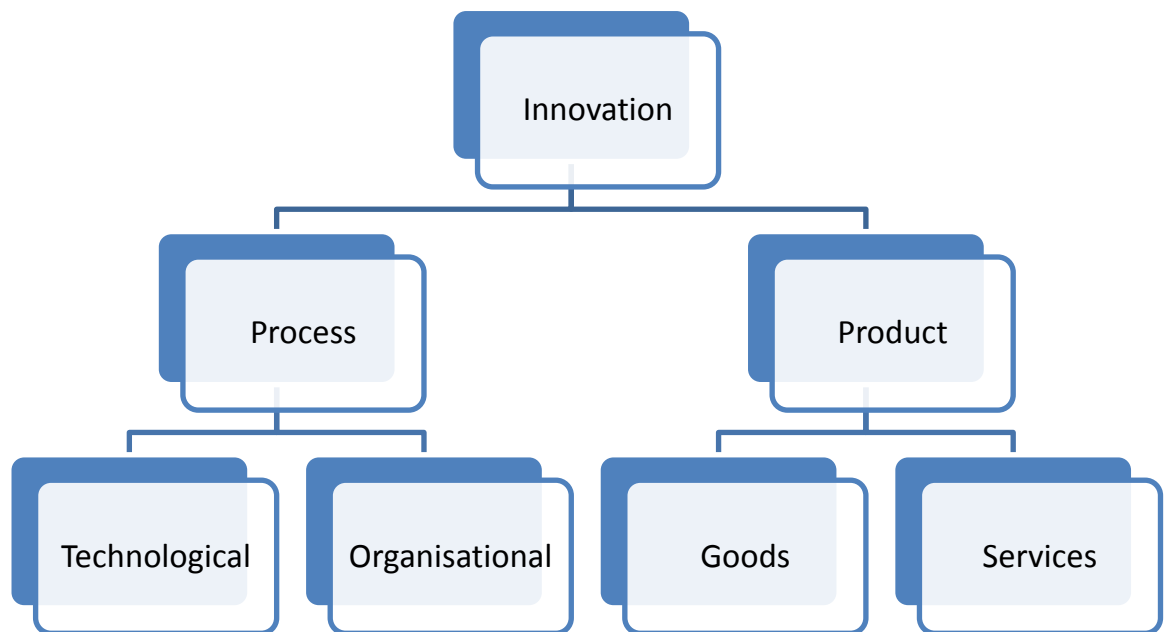
He argued that theoretical development and sharpening of the SI approach required a greater degree of rigour and specificity, for example with regard to statements on relationships between variables. The best way of achieving this was to use the SI approach in empirical research and through applying theoretical constructs to empirical evidence to arrive at clearer concepts and unambiguous statements (Edquist 2001, p3).

Further weaknesses of the SI approach were identified by Edquist (2001), who argued that the approach partly neglected other kinds of learning processes than those directly leading to innovation. This criticism applied to certain kinds of organisational learning, such as the building up of firm routines and databases. In addition, he argued that individual learning in the form of education was largely neglected in the SI approach:

Another weakness of the SI approach is that it lacks a ‘theoretical’ component about the role of the state. This is an important neglect, since the state and its agencies are obviously important determinants of innovation in any SI (Edquist 2001, p3).

Edquist (2001) pointed to this lack of focus on important determinants of innovation as a general weakness of studies focused on innovation, not just of the SI approach. The roles of state agencies and business organisations for collaboration, and the relationships between the two, are important elements of the empirical analysis undertaken in this thesis. Edquist (2001, p7) also emphasised that different kinds of innovation can be expected to have different determinants and proposed a taxonomy of innovations (Figure 2.2). These roles will be considered with reference to cluster initiatives focused on innovation (and competitiveness) in the Irish context, which fit into the organisational process stream of this categorization.

**Figure 2.2: A taxonomy of innovation**



Source: Edquist 2001, p7.

### **Definition and characteristics of organisations for collaboration (OFC)**

Porter and Emmons (2003, 2006a, 2006b) can also be criticised for a lack of theoretical clarity in their description of organisations such as industry associations and chambers of commerce as ‘institutions for collaboration’ (IFC). They did not provide a precise definition for an IFC, but instead stated that IFCs may be a matter of degree and listed various examples such as industry associations, technology transfer organizations and state agencies for export promotion as possibilities.

In their writing on the SI approach, Edquist and Johnson (1997) clearly distinguished between institutions and organisations. They defined institutions as:

[S]ets of common habits, routines, established practises, rules, or laws that regulate the relations and interactions between individuals and groups (Edquist and Johnson 1997, p46).

In a discussion of the main components of SIs, Edquist (2001, p5) provided two examples of important institutions in SIs (i) patent laws and (ii) norms influencing the relations between universities and firms. In contrast, they defined organisations as:

[F]ormal structures with an explicit purpose, which are consciously created (Edquist and Johnson 1997, p47).

Examples of organisations in the SI approach are ‘companies (which can be suppliers, customers or competitors in relation to other companies), universities, venture capital organisations and public innovation policy agencies’ (Edquist 2001, p5).

These definitions of institutions and organisations are influenced by North and the Old Institutionalism Economic (OIE) tradition. As outlined in Section 2.2, North (1990, p1) defined institutions as essentially ‘human devised constraints that shape human interactions’, which is very compatible with the old or original institutional economist Veblen’s definition of an institution as ‘a usage which has become axiomatic and indispensable by habituation and general acceptance’ (Veblen, 1967, p101). So, essentially, institutions are the rules of the game and organizations and entrepreneurs are the players or actors who try to influence the outcome of the game (North, 1990, 1994). In this context, the work of the European Commission and Parliament or the US administration in establishing practices, rules and laws that regulate activity between different players in the market can be described as institutional. They do this in a whole range of areas, including those impacting on enterprise and innovation. Industry associations, chambers of commerce etc. that try to influence the practices, rules or laws in these areas are not institutions in this sense. They can be described, more accurately, as ‘organisations for collaboration’ (OFCs) rather than ‘institutions’. Many OFCs are private sector organisations, for example industry associations funded by their members. Some public sector

organisations, such as state development agencies, may at times take on or support the role of an OFC, although they are likely to have a much broader remit than collaboration — for example, allocating state grants to industry. The following section outlines in detail the key characteristics of an OFC in the industry or business context.

The first basic function of an OFC is to facilitate information flow and exchange, for example by improving access to information on regulatory changes at national and international level. This type of activity can be important for industry development, particularly if the OFC not only passes on the information but also helps firms interpret and understand the impact that such regulatory changes will have on their businesses. In this way, OFCs can complement and support internal efforts by firms to improve competitiveness; by supporting regulations that reduce costs and increase productivity and opposing changes that do the opposite. This information dissemination and interpretation function has the potential to strengthen ties and build social capital bonds among firms.

A second function of an OFC is to act as facilitator of interaction (a) between firms, large and small, within an industry and (b) between firms and other players in the economy, such as government. OFCs can also help build long term relationships between industry and the other stakeholders in the economy, improving communication with governments at national and international level, for example. While some of this interaction with governments might be of a traditional lobbying kind, for a modern business association it may also be of a more developmental long term nature.

A third function that an OFC can perform is to enhance international connectivity for firms via linkages with OFCs in other countries and supranational OFCs — for example within the European Union. In these situations the OFC is spanning the gap between knowledge available to its members at a national level and the knowledge available to industry at the supranational level. For example, the Irish government is likely to interact with Irish industry associations, whereas the EU Commission and Parliament tend to engage with European industry associations that, generally speaking, comprise the industry associations of different member states. By actively

participating in a European association, a national OFC is also exposed to the views of OFCs in other countries and to the views of EU Commission and Parliament. Engagement with these international organisations can include the participation of both OFC executives and firm executives, who are members of the national association. In addition to the interaction at formal committee and working group meetings, executives who participate in these initiatives also have the opportunity to build informal (weak) ties with their counterparts in organisations and firms in other countries. Therefore OFCs, which engage in this bridging social capital, build international linkages that can help senior executives in firms anticipate future developments in their industries that, in turn, can contribute to management capabilities to prepare appropriate strategies to enable firms to compete and grow. From the individual firm perspective Teece defines dynamic capabilities as ‘the firm’s ability to learn to sense the need for change and then reconfigure internal and external competences to seize the opportunity created by rapidly changing environments’ (Teece 2002, p157) . OFCs certainly can play a significant role in that regard. Involvement by firms in business and trade associations at national and international level can be an important means of building such dynamic capabilities, as firms are exposed to three elements that could impact substantially on their business: (i) the ideas, approaches and strategies of other firms, (ii) the development of policy by national and international government institutions, and (iii) changes in the regulatory environment and global market. OFCs that build linkages with OFCs in other countries are, therefore, likely to enhance the dynamic capabilities of the firms involved in them.

Business OFCs, such as industry associations, can also engage in a range of other activities that support the development of their member firms. Sector specific OFCs can often communicate an industry message to the wider public via websites, print media, radio and television. Again, this has the potential to strengthen ties within an industry and build social capital bonds.

Of course, social capital within OFCs is not automatically a positive thing for society in general and some industry associations may engage in protectionist type activity seeking to keep competitors out of their market. However, such an approach is short-sighted and likely to restrict and hold back innovation and long term

competitiveness, rather than enhance and support it. OFCs that engage in any anti-competitive activity such as price-fixing, or any activity of a cartel nature, are not only acting illegally but are doing nothing to improve the long term competitiveness of their member firms.

OFCs might also fall into what Best (1999, p113) describes as ‘inter-firm networks’ in his diagram on regional growth dynamics. OFCs are likely to fit into the related and supporting industry part of the Porter diamond, facilitating and enhancing the level of embeddedness of an industry in a location. The potential of OFCs to facilitate collaboration in cluster initiatives, focused on raising levels of competitiveness and innovation, will be explored in greater details in Chapters 5 and 6 and is a key focus of the empirical work for this thesis.

## **Section 2.5: Collaboration within a new framework**

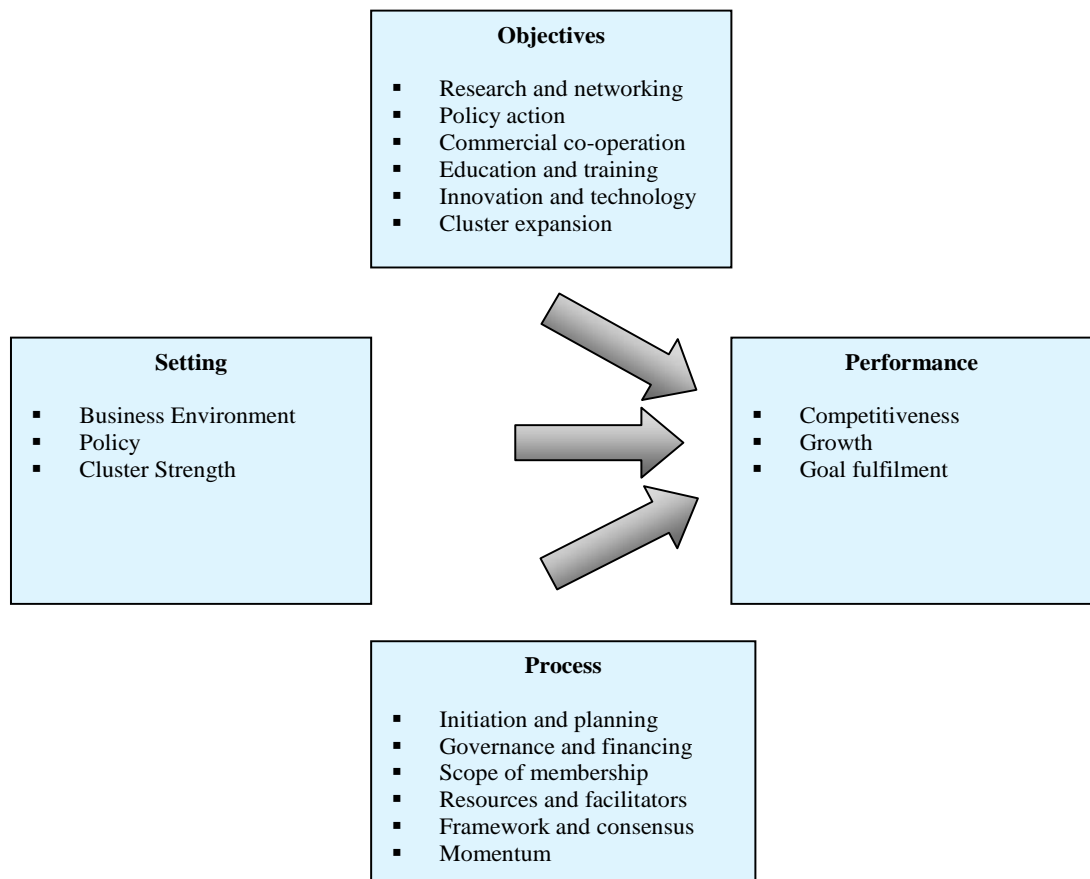
This chapter has reviewed literature in three different areas — management strategy, institutional economics and systems of innovation. Giblin (2007, p50-51) correctly observed that industrial clusters (from the management strategy area) and regional innovation systems have both different and overlapping features. Regional innovation systems are likely, by their nature, to cover a number of different economic sectors. Industry clusters can exist within a region with an innovation systems approach. Giblin argued that clusters focus on building competitive advantage via production chains, supply services and networking while the systems innovative approach focuses on building the technology, science and research base, and capacity of the region. However, this distinction between clusters and innovation systems is an over simplification. Recent cluster work in Europe has a much greater focus on innovation than in the past (Ketels and Sölvell 2006, Sölvell et al 2003). This thesis suggests that the overlap between the development of the cluster approach and the innovation systems approach is greater than suggested by Giblin and builds on the work begun by Sölvell et al (2003).

Section 2.1 provided a review of the cluster diamond model developed by Porter (1990) and others and placed in the broader context of management strategy theories.

It highlighted some important limitations of the model for example in relation to the role of multinational corporations and the role of government in clusters. However, the idea of clusters remains influential in policy terms and writers in both the EU and the USA continue to build on the concept. One comprehensive study developed by Sölvell et al (2003) places greater emphasis on collaboration between various economic actors, defining ‘cluster initiatives’ as:

[An] organised effort to increase the growth and competitiveness of a cluster within a region, involving cluster firms, government and/or the research community (Sölvell et al 2003, p31).

**Figure 2.3: The Cluster Initiative Performance Model (CIPM)**



Source: (Sölvell et al 2003, Figure 16, p25)

The institutional set-up is a core feature of this cluster initiative approach and in addition to the three sets of actors listed in their definition (firms, government and



the research community), they identify a fourth actor involved in clusters - financial institutions. However, the focus is not only on competitiveness and the objectives set out in their clusters initiatives performance model (CIPM) (Figure 2.3) clearly also exhibit a strong focus on innovation and an emphasis on commercial cooperation.

They presented data on 250 of these emerging forms of partnership in cluster initiatives (CIs) around the world. Based on a survey and a series of case studies, they argued that many of the cluster initiatives identified follow on from Porter's diamond model concept. The CIs identified were mainly in Europe, North America, New Zealand and Australia.

Some of key findings of Sölvell et al (2003, p10) were that: (i) cluster initiatives were most frequent in developed and transition economies tending to focus on technology intensive or 'high-tech' areas such as information and communication technology (ICT), medical devices, biopharmaceuticals; (ii) however, 'low-tech' clusters like furniture, processed food and textiles were also represented; and (iii) that cluster initiatives were present in a range of other areas including plastics, aerospace vehicles and engines, and financial and business services.

Most of the initiatives analysed were relatively recent, with 72 percent of the CIs surveyed in 2003 initiated in 1999 or later. Most were in economies where science and innovation promotion is an important part of government policy and occur in clusters that are often of national importance and always of regional importance. Of the cluster initiatives surveyed, 32 percent were initiated by government, 27 percent by industry and 35 percent equally by government and industry. With regard to financing of cluster initiatives, in 54 percent of cases funding came from government, in 18 percent of cases from industry and in 25 percent of cases equally from both government and industry. Firms or companies were the most influential parties in the governance of the cluster initiatives. Only in rare cases did government initially pick the members of the cluster. In general, they tended to have a narrow geographical focus, with members within one-hour travel distance in 50 percent of cases. Finally, the cluster initiatives tended to have a broad membership and rarely excluded foreign owned companies, competitors or small companies from cluster involvement. In fact, Sölvell et al (2003, p11) found that cluster initiatives limited to

domestic companies performed worse. The national social, political and economic context within which CIs were implemented was important for performance, with key factors including:

[A] high level of company trust in government initiatives and having influential local government decision makers, which are both clearly related to good CI performance.

CIs that served strong clusters of national and regional importance were more successful than others. Furthermore, CIs that built a clear framework, based on the cluster's own strengths, and spent time sharing the framework with all the parties, were more successful in promoting competitiveness (Sölvell et al 2003, p12)

Sölvell et al (2003, p17) also observed that cluster initiatives are emerging within three distinct policy areas: (i) regional, industry and SME policies, (ii) foreign direct investment (FDI) attraction policies, and (iii) science, research and innovation policies. Cluster initiatives were used to boost development of weaker regions. Initiatives were also undertaken to rejuvenate industry clusters, with emphasis shifting from cost reduction (via subsidies and tax incentives) towards promoting innovation and new partnerships. FDI policies have shifted from a focus on attracting individual firms to attracting industry clusters and more embedded investments. In the policy areas of research and innovation, the tendency has been to focus on science-driven industries such as ICT, medical devices, biopharmaceuticals etc.

With a focus on collaboration, Sölvell et al (2003, p18) placed institutions for collaboration (IFCs) (Porter and Emmons, 2003) as a fifth actor at the centre of the interaction between the four actors involved in clusters i.e. companies, the research

community, government, and financial institutions<sup>23</sup>. However, in section 2.4 above, an alternative “organisations for collaboration (OFCs)” is suggested, which is more robustly defined than the IFC.

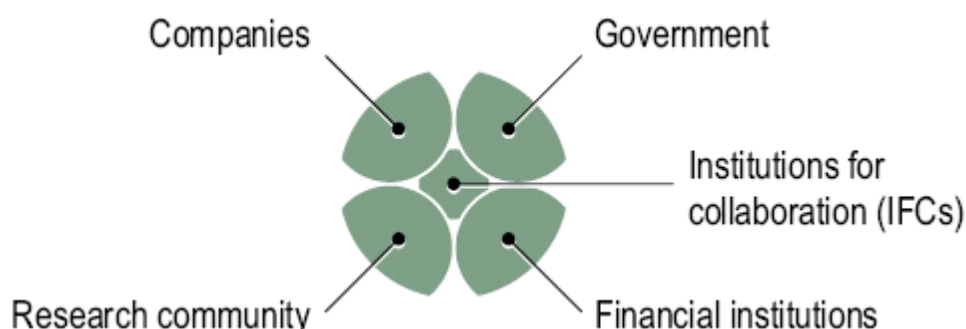
In order to better understand the role of collaboration in clusters and cluster initiatives this thesis explores institutional economics and the discussion in Section 2.2 provides some important insights useful in considering how collaboration works. North (1990, 1994, 1997), who is normally associated with new institutional economics, was shown to have commonality with the old institutionalists as well. For example, North (1981) suggested opportunism is not simply overcome by the threat of being caught out in repeat plays, but that it can be partly overcome by a commitment to ideology and the support it can lend to legitimacy, loyalty and trust.

There is also a link between the emphasis that North places on moral norms and the literature on social capital, where moral norms, particularly trust, underpin economic and social relations (Vandenberg 2002). Embeddedness argues that social action is embedded in ongoing networks of social relations (Granovetter 1985). Social capital resulting from participation in embedded networks, involving significant levels of trust at both local and non-local level, can contribute significantly to the dynamic capabilities of the firm (Cooke 2007).

The social capital concept was explored in some depth in section 2.3, with distinctions being made between ‘bonding and bridging’ forms and ‘structural and cognitive’ forms. These distinctions have proved particularly insightful in the analysis of the case studies presented in this thesis. Table 2.1 provides a list of the

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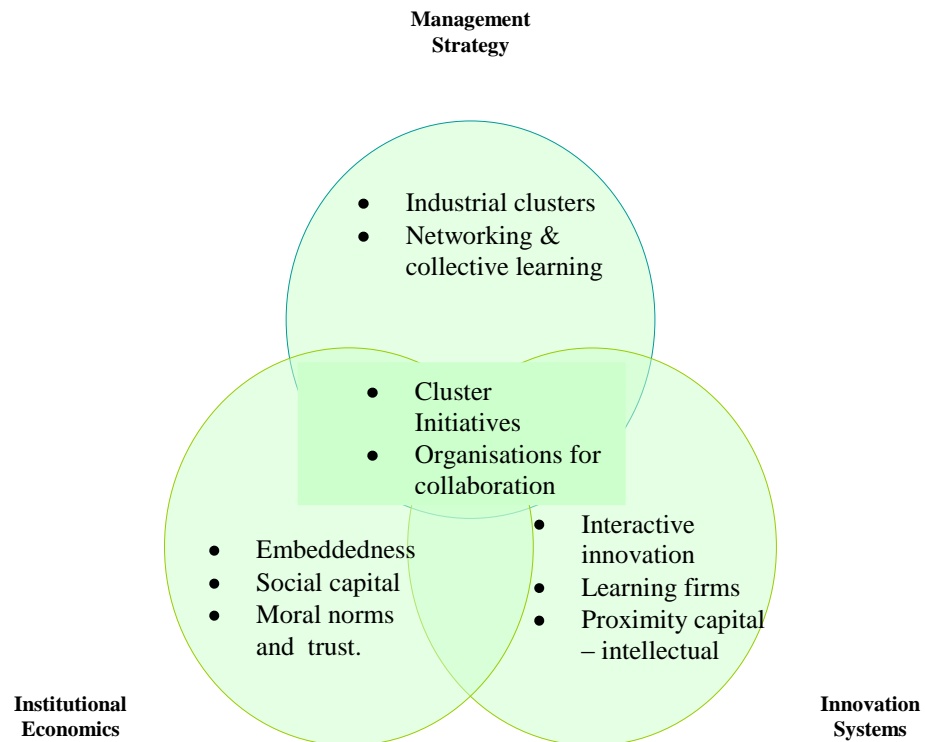


definitions of social capital covered in the discussion and that were important to consider in the context of this thesis. This review of the institutional economics tradition, with a particular emphasis on key concepts such as social capital, helped to build a research tool kit that is important in terms of adding depth to the empirical analysis of how collaboration works, undertaken in Chapters 5 and 6.

The focus on collaboration and social capital in clusters also led to a consideration of linkages with the systems of innovation approaches, at national, sectoral and regional level, in Section 2.4. A key concept of the innovation systems approach is 'interactive innovation' (Lundvall 2005). Here, social capital can be defined as 'the willingness and capability of citizens to make commitments to each other, collaborate with each others and trust each other in processes of exchange *and* interactive learning' (Lundvall 2005, p10). There are also links between North's work and Lundvall's (2005) view of interactive innovation as outlined in Section 2.3. Edquist (2001, 1997) criticized the SI approach for a lack of theoretical clarity, and for using the concept such as institution and organisation in inconsistent ways.

A significant difference between the cluster approach and the systems of innovation approach is the emphasis placed on institutional economic factors. To date, these have played a relatively peripheral role in the analysis of industrial clusters in contrast to their more central role in innovation systems. In later contributions, Porter (1998c, 2000) placed stronger emphasis on social relations between cluster participants, facilitated by trust and coordination that enhanced knowledge flows, but these were still described in relatively limited form in comparison to the innovation systems approach (Giblin, 2007, p51). It remains the case that the importance of institutional factors is not fully understood in research on industrial clusters and cluster initiatives. This thesis provides a stronger link between institutional economics and clusters than previously expounded, supporting complementarities between the cluster and innovation systems approaches. The call by Edquist (2001) for greater theoretical clarity combined with (i) the lack of a precise definition for the IFCs concept put forward by Porter and Emmons (2003, 2006) and (ii) the understanding of collaboration gained from the review of key concepts from institutional economics undertaken in section 2.2 and 2.3, enabled this thesis to define a more useful concept of organisations for collaboration (OFCs).

**Figure 2.4: Clusters Initiatives & Collaboration - key concepts from 3 sources**



Note: Organisations for Collaboration (OFCs) included in the interface between the three disciplines, along with Cluster initiatives, replaces what Porter and Emmons (2003) describe as ‘Institutions for Collaboration (IFCs).

**Source:** Author’s diagram.

This thesis also provides a new framework presented in Figure 2.4 using key concepts drawn from the three areas of literature reviewed in this chapter – management strategy, institutional economics and systems innovation. Cluster initiatives focused on competitiveness and innovation involving collaboration

between different actors in the economy, such as firms, research communities and government agencies, are placed at the centre of this new framework.

Organisations for collaboration (OFCs), also placed at the centre of this framework, are proposed as an alternative to Porter and Emmon's (2003, 2006) Institutions for Collaboration (IFCs). The OFC concept is theoretically grounded in institutional economics and better explains the contribution of industry associations, and other such business organisations, in helping the different actors in the economy to collaborate together within clusters. North's (1990, 1994) major contribution to economic theory was to explain the development of institutions; included among these were foreign exchange, banking and marine insurance. North (1990, 1994) also made an important distinction between institutions and organisations, describing the former as the 'rules of the game' and the latter as 'players', including firms, which try to influence these rules and the outcome of the game. In this context the work of the EU Commission and Parliament in agreeing directives and regulations impacting on the enterprise and innovation environment for EU member states, including Ireland, can be viewed as institutional in nature.

In extending economic theory, Williamson (2005) in his new institutional economics argued that the firm can be described not only in technological terms as a production function but also in organisational terms as a particular mode of governance among a number of alternative modes. In 2005, the integrated NEWGOV project<sup>24</sup> under the EU's 6<sup>th</sup> Framework Programme produced a glossary of different modes of governance, under which 'coordination' was described as a non-hierarchical mode of governance where actors accommodate behaviour in a process of communicative exchange – without being subject to binding legal obligations. OFCs, such as industry associations and business representative groups, are such an alternative non-hierarchical mode of governance. To a significant degree OFCs, using North's (1990, 1994) terminology, can be described as players that try to influence governments at national level and the EU Commission and Parliament in an EU context. OFCs also strengthen industry ties and build bridges to other actors in the economy.

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<sup>24</sup> [http://www.eu-newgov.org/public/NEWGOV\\_pub.asp](http://www.eu-newgov.org/public/NEWGOV_pub.asp), Glossary of shared terminology (M)

As well as being theoretically grounded in institutional economics, the OFC concept is consistent with the systems of innovation (SI) approach, particularly that of Edquist and Johnson (1997, pp46-47) who also clearly distinguished between institutions and organisations. They defined institutions as common sets of habits and routines that regulate interaction between individuals and groups, while organisations are structures with an explicit purpose, which are consciously created.

Chapter 4 as part of setting out the Irish context for the thesis, will outline the evolution of OFCs in the business sector in Ireland. In their research Sölvell et al (2003) placed substantial emphasis on collaboration between various economic actors. In the application of the Sölvell et al (2003) cluster initiatives model in chapters 5 and 6, the OFC concept is used in preference to IFCs. This main empirical work will consider the role of organisations for collaboration (OFCs) in facilitating not only information flow, exchange and interaction among firms, both large and small, but also interaction between firms and other actors (or players) in the economy, such as government and state agencies. It will also illustrate that OFCs can enhance international connectivity by facilitating contact between industry and business associations at a national level and similar organisations, and their members, at a European or global level.

### **Concluding comments**

The OECD has made some interesting observations in relation to public sector involvement in clusters that indicate a need for a deeper understanding of the role of collaboration. At the government level, evolutions in regional, science and technology and industrial/enterprise policies are converging on the objective of supporting linkages between firms, people and knowledge. One of the vehicles commonly used to achieve these goals is to support clusters involving concentration of firms and supporting actors (OECD 2007, p1). The following are listed by the OECD as some examples of such programmes: the Pôles de Compétitivité in France, the Centres of Expertise in Finland, and Japan's Industrial Clusters.

There is a need to develop robust tools, with strong analytic frameworks, to evaluate and measure both the performance of clusters or cluster initiatives and the impact of

particular public policy interventions. According to the OECD (2007, pp6-7), early learning indicates the following three factors that could contribute to a more robust analytical framework: (i) Cluster programmes need to be well designed, realistic and flexible enough to achieve their goals. (ii) Governments need to pay attention to policy coherence. Policy makers in one area (e.g. regional policy) need to understand policies in other related areas (science / technology and industrial/ enterprise policies) and how they can work together in a complementary fashion. (iii) The long term effectiveness of cluster initiatives depends on private sector involvement during a programme and continuing to act after a programme ends. In this regard, the OECD argues that the public sector needs to avoid excessive involvement and develop effective exit strategies.

How to evaluate government intervention in establishing industry-led networks, some of which are linked to cluster initiatives, was considered by Lynch et al (2009) who proposed a logic model based on an analysis of inputs and outputs in a chain of cause and effect approach. This thesis takes a different, more qualitative, approach and will provide some Irish examples that could be added to the OECD list.

The new framework presented in Figure 2.4 above suggests that, in terms of understanding cluster initiatives and collaboration, there is much to be gained from combining the insights of concepts from a number of different disciplines. It proposes that firms embedded in collaborative cluster relationships, involving significant levels of trust, can achieve benefits from social capital. These benefits include the opportunities to reduce costs, improve competitiveness and raise levels of innovation within firms and industries. Involvement in cluster initiatives and organisations for collaboration (OFCs) can enhance a firm's dynamic capabilities, enabling it to build strategies that anticipate, rather than react to, change. The social capital concept is used to add depth to the analysis of such 'interactive innovation' involving business, government agencies and research institutes, including universities.



## **Chapter 3– Philosophical basis and Methodology of the thesis**

This thesis addresses the problem of improving systems of innovation in an Irish context. Despite evidence of a weak system of innovation (Mjøset 1992), efforts to build a stronger national system of innovation have been fragmented. A better understanding of collaboration within clusters and cluster initiatives, in both the modern and traditional sectors of the economy, can contribute to solving this problem. Organisations for Collaboration (OFCs), such as industry associations, have a particular contribution to make in this regard, which is not well understood. The three central research questions of the thesis are:

- (i) How can cluster initiatives contribute to embedding the Irish ICT/software and dairy clusters in Ireland?
- (ii) How does the process of collaboration work within clusters and cluster initiatives? The thesis examines if the social capital concept can help in understanding this process.
- (iii) Why do firms, research institutes and state agencies engage in cluster initiatives?

### **Section 3.1: Philosophical basis of thesis**

This thesis draws on two main disciplines –management strategy and economics, particularly institutional economics. The methodological and philosophical approaches of different disciplines fuel and contribute to a debate within business research. From a methodological perspective the debate might be distilled down into the question ‘what is the correct balance between quantitative and qualitative methods of analysis?’ From a more fundamental philosophical perspective, questions of ontology (what is the form and nature of reality?) and epistemology (what is the relationship between what is being researched and the researcher?) arise. Karami et al (2006) carried out an analysis of preferences in 120-refereed articles published between 1991 and 2000 in twenty top management journals. They found that the debate has centred on the relative value of two fundamentally different and competing schools of thought or paradigms, positivism and phenomenology.

Positivism contends that sense perceptions are the basis of knowledge. It refers to a set of epistemological perspectives that advocate the scientific method as the best approach to understanding the processes by which physical and human events occur. The term is associated with the 18<sup>th</sup> century British empiricists<sup>25</sup>, who established the academic foundations for economics, and with the 19<sup>th</sup> century philosopher Comte, who is credited as a founding father of sociology. Phenomenology is essentially the study of lived experience and its emphasis is on the world as lived by a person, not the world or reality as something separate from the person (Lavery 2003). For the phenomenologist, sense perceptions go beyond what we can see and measure (Benton and Craib 2001, p83). Phenomenology is associated with the 20<sup>th</sup> Century philosophers Husserl and Heidegger among others.

Healy and Perry (2000, p118) identified different views by which researchers investigate the world; included among these is realism. In both economics and management strategy, the dominant ontological perspective is realism. Realism is based on the notion that a reality is “out there”; it is an objective reality in the sense that it is assumed to exist independently of the language we use to describe it. Where economists and management strategists begin to diverge is in relation to epistemology i.e. how we come ‘to know’ and what is the relationship between what is being researched and the researcher?

The epistemological perspective of orthodox economics is the positivist doctrine . One core principle of positivism is that to accept a knowledge claim as true then it must be capable of being shown to be true or false, by referring to and indeed testing actual or possible sources of evidence (Benton and Craib 2001, p15). Hume introduced an element of scepticism when he established that inductive inference – that the past acts as a reliable guide to the future – while useful, cannot be justified as a matter of logical necessity (Russell 1946, pp634-647). Popper<sup>26</sup> provided an important solution to Hume’s problem of induction through his criterion of falsification that econometricians have adopted through the testing of ‘null

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<sup>25</sup> The fundamental academic foundations for economics emerged from the philosophy of the eighteenth century, dominated by the British empiricists e.g. Locke (1623-1704), Berkeley (1685-1753) and Hume (1711-1776).

<sup>26</sup> The Austrian philosopher Karl Popper (1902-1994) was professor at the London School of Business from 1949 to 1969.

hypotheses' (Popper 1972). Subsequently a new research style emerged<sup>27</sup>, one based in deductive methods, the falsification philosophy of Popper, and the multivariate statistical methods characteristic of econometrics (Rumelt et al 1991, p8). The logic of deductive reasoning is first to build a theory, then to test a specific hypothesis by reference to observations. This deductive process will at least indicate if the theory is valid or invalid.

Modern orthodox economics can be criticised for an almost exclusive reliance on this formalistic-deductive framework. In contrast, this thesis adopts what might be described as a heterodox economic approach. 'Heterodox economics' is an umbrella term for economics that extends beyond, and challenges, the neoclassical mainstream approach. It includes, but is not limited to, the approaches of old and new institutional economics discussed in Chapter 2.

This thesis is also influenced by mainstream management strategy theories. Management strategists generally do not outline any philosophical underpinnings for their research. As a result, it is difficult to identify a clear philosophical orientation in much of this work. However, the prescriptive nature of much of this literature, and the substantive links between it and industrial economics, would suggest no fundamental contradiction between it and the choice of pragmatic realism as an approach for this thesis.

### **A pragmatic realist philosophy of research**

From an ontological perspective, pragmatic realists are similar to positivists: both assume that reality is objective. But from an epistemological perspective, they diverge. Pragmatic realism, associated with Hilary Putnam and others, is a development of the philosophical tradition<sup>28</sup> first established in America around the turn of the 19<sup>th</sup> century by the classical pragmatists: Peirce, James and Dewey (Hookway 2010)<sup>29</sup>. A broadly empiricist approach to the study of inquiry is central

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<sup>27</sup> Prior to the 1970s, academic management strategy research consisted mainly of clinical case studies of actual situations, with generalization sought through induction. This qualitative style of research continues to play an important role.

<sup>28</sup> Richard Rorty has also extended pragmatism, but in a post-modernist direction.

<sup>29</sup> This section draws on Christopher Hookway's comprehensive overview of Pragmatism presented in the Stanford Encyclopaedia of Philosophy (Spring 2010 edition), which is available online.

to pragmatic realism developed by Putnam. In contrast to the positivist conception of verification as “truth likeness”, Putnam concluded that it is the interdependence between our conceptual abilities and our practical abilities that is at the heart of the verification of our beliefs (Putnam 1995, pp305-306). A theory is preferred if it solves our problem. This is different to the strictly positivist position on verification, where the researcher is seen as completely separate to what is being researched and attempts to prove theory as true from this strictly objective stance. This means that pragmatic realists do not need everything to be precisely measurable and objectively proven beyond doubt before choosing to accept a theory. They trust everyday beliefs until given a reason for doubting them, with further discussion and investigation then helping to identify errors, correct these errors and arrive at more robust theories and beliefs.

The key point here is that, for a pragmatic realist, the focus of epistemological inquiry is not on showing how we arrive at absolute certainty. Instead, we need to understand how we can arrive at methods of inquiry that contribute to making sense of imperfect information. This is different to the neoclassical economic approach which assumes the existence of perfect information. When commenting on institutionalism in economics, Heiskala (2007, p256) referred to North’s (1990) view that modern Western societies are as close to costless information as any known society has been but that:

[E]ven in these societies, actors spend a great deal of time on acquiring information, and even then the result is far from the state of perfect information. What prevails instead is a chronic lack of information and its asymmetrical breakdown between different actors. ... Enforcement costs, again, are costs of implementing norms.

Chapter 2 highlighted that North (1990), while generally associated with new-institutionalism, has significant commonality with the old tradition of institutionalism. Heiskala (2007, p258) points out that the work of the old economic institutionalism was partly based on American pragmatist philosophy and that:

In pragmatist institutionalism, institutions are seen as socially shared habits some of which are conscious, some tacit; there is a continuum of different institutions from explicitly and formally defined ones, with formal sanctions, to mere half-conscious or unconscious regularities in interaction, without other sanctions than the mere existence of the tradition.

Having removed the positivist's necessity of proving the absolute truth of theories, pragmatic realists are free to incorporate unobservable concepts into theory<sup>30</sup>. In contrast to positivists, pragmatic realists hold such concepts as being true without having to prove or comment on their veracity. In line with the pragmatic realist approach, analytical concepts such as embeddedness and social capital, which has significant intangible elements, are incorporated into this thesis. This thesis provides evidence of the usefulness of these intangible concepts in understanding collaboration within cluster initiatives, which involve different economic actors. Pragmatic realism is well suited to addressing the problem of how and why firms, research institutes and state organisations collaborate in addressing challenges of innovation. Pragmatic realism has also been used as a philosophical basis for public administration and policy (Hildebrand 2005, Shields 2003), which supports it as a philosophical basis for this thesis, given the focus on policy issues around clusters and cluster initiatives.

Therefore, the aim for pragmatic realists is to solve problems and to do so by adopting a range of different quantitative and qualitative research methods. The choice of method will depend on the nature of the problem to be solved or the question to be addressed. It will take on board the unique and general characteristics of the problem. Pragmatic realists include, among their tools, qualitative methods involving an element of interpretation by the researcher, but interpretation undertaken from a broadly empiricist perspective rather than, for example, a more phenomenological based perspective. Conclusions reached will still be based on evidence provided and generally accepted beliefs established through the experience

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<sup>30</sup> Positivists do not have a problem with the use of unobservable concepts in theories but unlike the pragmatic realist do not agree that one can confer truth status on them.

of actions in the past<sup>31</sup>. Finally, while pragmatic realism is used as a philosophical guide, the main contribution of the thesis is at the level of content. The following section will outline the methodology used in this thesis.

## **Section 3.2: Methodology of thesis**

A pragmatic realist researcher may choose quantitative, qualitative or some combination of these two methodologies<sup>32</sup>. The selection criterion will be how useful is the methodology in solving the problem posed.

While multiple strategies can be used in research studies, there are also situations in which a specific strategy has a distinct advantage. For the case study, this is when ‘how’ and ‘why’ questions are being asked about a contemporary set of events, over which the researcher has little or no control (Yin 2003a, p9). Consequently case study research continues to be an essential form of social science inquiry. Yin (2003b, pxvii) outlines that the method is appropriate when the researcher desires, or is forced by circumstances, to: (i) define research topics broadly and not narrowly, (ii) cover contextual or complex multivariate conditions and not just isolated variables, and (iii) rely on multiple and not singular sources of evidence. One reason for qualitative research is to study a case when is it of special interest – in order to gain a greater understanding of the case.

We want to appreciate the uniqueness and complexity of the case, its embeddedness and interaction with its context (Stake 1995, p16).

This thesis addresses the process of collaboration within clusters and cluster initiatives, involving different economic actors, in the Irish economy. It provides evidence that such initiatives can support the embedding of clusters and help build systems of innovation. The thesis also considers the contribution that Organisation

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<sup>31</sup> This is in contrast to a constructivist view that adopts an instrumentalist approach to knowledge and argues that one view of the world is as valid as any other.

<sup>32</sup> It is important to note that a researcher’s epistemological approach does not necessarily determine the methodology s/he may use. Quantitative methods are generally associated with positivists, who accept the notion that reality is adequately described by stable, general laws. However, researchers far removed from such a premise may also use quantitative methods.

for Collaboration (OFCs), such as industry associations, can make to achieving these goals. Staber (2007) argued that situational context is important in understanding the complex area of collaboration, involving intangible concepts such as social capital, in cluster analysis. This thesis asks ‘how’ and ‘why’ questions about a contemporary set of events in Ireland around the development of clusters and cluster initiatives involving collaboration between firms, government, including state agencies, and universities. Yin emphasised that:

[R]eliance on theoretical concepts to guide the design and data collection for case studies remains one of the most important strategies for completing successful case studies (Yin 2003b, p.3).

Consequently, this thesis used a case study methodology guided by the theoretical framework developed following the literature review undertaken in Chapter 2. This framework included intangible concepts such as social capital and interactive learning in systems of innovation. Because of their nature, it is difficult to show how these concepts emerge and develop over time using quantitative techniques. The qualitative methodological approach of this thesis fits into what Yin (2003b, p.13) describes as a replication design and logic, whereby the overall investigation is focused on determining whether similar frameworks and causal events within each case produce positive outcomes. Influential international studies on clusters and cluster initiatives, such as those by Porter (1990, 2003), Sölvell et al (2003), and Ketels (2006), also use qualitative techniques, specifically case studies.

The author could be viewed as an insider researcher with a contextual understanding of the clusters and cluster initiatives explored in the thesis. He is currently head of a policy unit of a national OFC, IBEC, and in this capacity has collaborated with various sector based organisations for collaboration (OFCs), including ICT Ireland and the ISA, which formed part of the analysis of Chapter 5. He was executive director of the sector based OFC the Irish Dairy Industry Association, between 1994 and 2004, which formed part of the analysis in Chapter 6. The author has also actively participated in various committees and working groups of a number of European OFCs and has been involved in building social capital bridges between European and international OFCs.

The position as an insider researcher raises questions as to whether the author had preconceptions of the process he was investigating and whether this might have led to some personal biases. However, the author was not close to the specific initiatives being investigated and he was not directly involved in any of the cluster initiatives covered in the various case studies<sup>33</sup>. Therefore, he understood the context of initiatives and knew some of the people involved but was not a participant himself. The author also analysed collaboration through the lens of a framework built around academic literature, of which he was unaware – prior to his research for this thesis. This enabled him to take a fresh approach to how he viewed collaboration. The guidance and challenges presented by his academic supervisors for the thesis also mitigated against any unconscious tendency towards personal biases.

Substantial information was gathered, and analysed, from a range of sources including government, company, industry organisations and state agencies. CSO statistical data on the national accounts, industrial production and trade were useful for analysis of the national economy and the different sectors covered in the thesis. The evolution of state agencies presented in Chapter 4 was complemented by an analysis of the relevant statutory instruments establishing the various agencies between 1950 and 2003.

## **Outline and methodology of the case studies**

Chapter 5 examines the stage of cluster development in the ICT/software sector and includes five case studies focused on collaboration within clusters and cluster initiatives. Case study 1 examines the role of industry OFCs in building social bonds in the ICT/ software sector of the Irish economy. Case 2 examines the role of OFCs in building social capital bridges between ICT/ software firms and other actors in the economy, including government, state agencies and the broader business community. Case studies 3 and 4 examine collaboration involving universities and high technology firms within cluster initiatives, supported by the state agencies – SFI, IDA and Enterprise Ireland. Case study 5 examines a cluster initiative involving an

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<sup>33</sup> As Director of the IDIA, the author did facilitate and participate in the functional foods mission to Japan referred to in case study 6, but had left this position by the time the national functional foods forum was formed in 2004 and had no involvement in the subsequent establishment of FHI cluster initiative.



industry OFC, a state agency and a leading international university. Tables 3.1 provides the code used to identify different interviewees and a description of individuals interviewed for the 5 case studies included in Chapter 5.

**Table 3.1: List of interviewees for the 5 case studies in Chapter 5**

Interviewee 5A:	Executive director of the organizations for collaboration for the ICT and ISA sectors and member of a number of collaborative groups involving industry and state participants.
Interviewee 5B:	Senior manager of ICT multinational, Chair of ICT Ireland (organisation for collaboration) working group and industry representative on Customs Consultative Committee established by government.
Interviewee 5C:	Senior civil servant of Irish government department, chair of a number of collaborative groups and task forces involving industry and state participants.
Interviewee 5D:	Leading Irish software entrepreneur, founder of software SME and chair of CSET initiative.
Interviewee 5E:	University Professor and Deputy Director of CSET initiative.
Interviewee 5F:	Senior manager for human resource development in a state agency deeply involved in design of cluster initiative.
Interviewee 5G:	CEO of software company and chair of industry organization for collaboration (OFC); deeply involved in design of cluster initiative and firm level participant in the initiative.
Interviewee 5H:	CEO of company, with substantial international experience, and Irish mentor for group of CEO participants in the programme under the cluster initiative.
Interviewee 5I:	Leading Irish software entrepreneur, founder of software SME and Irish mentor for group of CEO participants in the programme under the cluster initiative.

Source: Author's table

Chapter 6 examines the stage of cluster development in the traditional dairy sector of the Irish economy and includes a case study (number 6 of the thesis) examining collaboration within a cluster initiative, involving four Irish cooperatives/ companies, four universities and a state agency. Table 3.2 provides a code and

description for the individuals interviewed for the cluster analysis and case study of Chapter 6. As less cluster research has been carried out in the dairy sector than in the high technology sector, the cluster analysis was strengthened by interviews 6A and 6B. The cluster initiative examined in case study 6 is a relatively new development for the traditional economy and its analysis is supported by interviews 6C to 6H.

**Table 3.2: List of interviewees for cluster research and case study in Chapter 6**

Interviewee 6A:	Managing Director of consumer foods and growth strategy division of major Irish cooperative.
Interviewee 6B:	Board member / former Managing Director of infant formula / baby food company.
Interviewee 6C:	Senior manager in state agency with responsibility for the development of the food and beverages sector.
Interviewee 6D:	Director of state agency with responsibility for development of the food and beverages sector.
Interviewee 6E:	Senior commercial and research manager in dairy cooperative / company and board member of cluster initiative.
Interviewee 6F:	Senior commercial and research manager in dairy cooperative / company and board member of cluster initiative.
Interviewee 6G:	Professor of food microbiology at major university, with extensive food research experience, who was deeply involved in establishing cluster initiative.
Interviewee 6H:	CEO of cluster initiative and former director of international food company.

Source: Author's table

The author leveraged off his own social capital in approaching and gaining access to high-level civil servants, state agency and business executives, and entrepreneurs interviewed for the thesis. Each interview was digitally recorded and then transcribed, mainly by the author of the thesis, which facilitated a deep level of analysis and interpretation guided by the theoretical concepts referred to earlier.

Interviews were between 45 minutes and 1.5 hours in duration, most were conducted face to face. However, some interviews were conducted by telephone due to the travel schedules of individuals being interviewed. Each interviewee was informed, at the outset, that the purpose of the interview was to contribute to analysis for a PhD thesis and that transcripts would be destroyed after the research had been completed.

Interviewees were also assured that a code would be used for quotes from interviews, included in the thesis, to protect the identity of individuals. Each individual was also informed that the interview could be stopped at any time, if they felt uncomfortable with the line of questioning or if they wished to withdraw from answering particular questions. In one situation, an interviewee did ask for the recording to be paused in to consider a particular question. After a brief discussion to explain the context, the interviewee freely agreed to answer the question and the recording resumed.

### **Concluding comments**

Government reviews and reports, including those produced by Forfás and various government departments, in the areas of innovation, science and technology and food research were used to strengthen the thesis analysis. State agency documents relating to various cases studies were examined and website material relating to these cluster initiatives was also explored. The websites and annual reports of a number of companies involved in the clusters and cluster initiatives provided useful information for various parts of the analysis. Leveraging off his own social capital, the author also gained access to unpublished minutes of meetings of cluster initiatives involving government and industry. EU Commission websites provided access to useful data and reports on the cluster issues being examined. The European Cluster Observatory and Oxford Research AS websites were very useful for information and country reports relating to cluster development. These various sources of information were complemented by detailed interviews with senior management and directors of organisations for collaboration, companies and state agencies involved in the clusters and cluster initiatives being studied, as outlined in tables 3.1 and 3.2 above. Chapter 4 will outline the empirical setting and Irish context of the thesis.

## **Chapter 4 The Irish Context –state agency and business organisation evolution**

Chapter 2 developed a new framework to analyse collaboration within clusters and cluster initiatives focused on competitiveness and innovation. Staber (2007) argued that situational context is important in understanding social capital in cluster analysis. The empirical setting for this thesis is Ireland; hence the chapter begins with a brief overview of Irish economic development with reference to some key institutional factors. Brief comment is also made on cluster policy and the historical weakness of the system of innovation in Ireland. Field (2008) argued that social capital can be termed capital insofar as it gives rise to resources that can be deployed to enable actors to pursue their goals more effectively than they could without it. The core meaning of capital is that it represents a stock of assets that yield a flow of benefits; Krishna and Uphoff (1999, p6) proposed that the revenue flow from social capital is mutually beneficial collective action (MBCA) that produces positive-sum outcomes. The stock of social capital in an economy includes state organisations and business associations that engage with each other in the creation of such a revenue flow. With a view to setting the scene for the main empirical work of the thesis, this chapter explores the evolution of state agencies focused on industrial development and business organisations for collaboration, as examples of the stock of potential social capital assets in the Irish economy.

### **Section 4.1: Irish Economic Development – institutional factors**

Like all small open economies, Ireland is extremely dependent on international trade. In 2010 exports of goods and services accounted for 102.9 percent of Gross Domestic Product (GDP) or 126.9 percent of Gross National Product (GNP), which adjusts for net factor income from abroad<sup>34</sup> (CSO 2011a). However, the ability to trade for any economy should not be taken for granted. Behind these figures lies the transformation of Ireland, over the last 50 years, from an economy based on

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<sup>34</sup> Given the high levels of foreign investment by multinational corporations in the Irish economy it is important to adjust for net factor income from abroad for comparison with GDP of other countries, where FDI is a lower proportion of the overall economy.

agriculture and a limited traditional manufacturing sector to a much more broadly based economy. Today, Ireland has strong economic bases in areas such as pharmaceutical, health and life science manufacturing and internationally traded services, including computer related services. This transformation is inherently linked to a number of institutional changes that effectively changed the rules of the economic game in Ireland.

### **The impact of institutional economic change on Ireland**

Perhaps the most important factor in economic, political and social change in the history of the Irish state was Ireland's decision to become a member of the European Union. Ireland became a member state of the EEC (the forerunner of the EU) in 1973, after spending a period of more than ten years preparing for membership in parallel with its major trading partner at that time, the UK<sup>35</sup>. Embracing the institutional changes that EU membership entailed meant that Irish governments were no longer solely responsible for setting the rules of the game, either politically or economically. In many areas such as agricultural and industrial development the Irish government now had to negotiate with fellow member states and the EU Commission to agree rules, regulations and legislation. Social changes resulting from EU membership also had economic impact. For example, EU equality legislation meant that the so-called 'marriage bar', whereby women had to leave public sector employment after marriage, could no longer be used in Ireland. While it took over a decade for the impact of this change to be seen from the late 1980s, there was a very significant rise in married women's participation in the labour market (Russell 2002, p94), which made a significant contribution to economic growth during the Celtic tiger period.

In many respects Ireland can be viewed as a regional economy located on the periphery of the EU. There is, from an institutional economic perspective, also evidence of a long term Irish commitment to the EU. For example, Ireland supported the development of the Economic Monetary Union (EMU) during the 1990s and was one of the most enthusiastic adopters of the EU single currency – the euro – from

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<sup>35</sup> During the period of preparation for EEC membership, one significant development in terms of industrial policy was the signing of the Anglo-Irish Free Trade Agreement by the UK and Irish governments in 1966.

January 1999. This was despite the fact that Ireland's nearest neighbour, and still one of its most important trading partners, chose to remain outside the euro system. In addition to the implications for trade of adopting the euro, it also meant that the Irish government relinquished unilateral control over monetary policy, for example in the setting of interest rates. Authority to set interest rates passed to the European Central Bank (ECB) in 1998. In a very real sense, this makes industrial development policy even more important because some short term instruments, such as devaluation of the currency to stimulate exports in times of recession, are no longer available as policy options. Longer term policy instruments that support Irish industrial activity in emerging sectors such as medical devices, software and internationally traded services, therefore, take on a greater significance to support the continued growth of exports. Industrial policy instruments can also support developments within more traditional sectors. They can, for example, support a shift towards the production of more innovative value-added products in the food sector, which helps to reduce dependence on commodity type products. Of course, EU membership also imposed limits on national state interventions to support industries and firms. Nevertheless, the potential of industrial policy deserves more focus and chapters 5 and 6 will examine support for the development of clusters and systems of innovation in the Irish economy.

A second important institutional economic development that impacted on Ireland was movement towards a single EU market. Progress towards this objective was accelerated in 1993 with the increased free movement of goods and some services across internal EU frontiers. While increasing competition on the domestic market, it opened up opportunities across Europe for indigenous firms and multinationals that had chosen Ireland as their European base. The single market benefited EU consumers through access to a greater range of more competitively priced goods. Consumers also had increased access to competing providers in a range of services including utilities, such as telecoms, electricity and gas, although state support for national utility companies resulted in a slower pace of change here than on the goods side. Consumers also gained from the liberalisation of services such as air transport (European Commission 2005, p3.), in which the Irish airline Ryanair played a major role. Further liberalisation of trade in services continued in Ireland and other EU

members, with the transposition into legislation of the EU Services directive in 2010<sup>36</sup>.

A third institutional development that had an impact during the ‘Celtic Tiger’ period was the emergence of ‘social partnership’ in Ireland. This involved agreements between government, business employers and trade unions, under which Irish economic competitiveness improved markedly. Some key features of this social partnership were agreements on wage restraint coupled with tax reductions and a substantial improvement in industrial relations. There were seven ‘social partnership’ agreements beginning with the Programme for National Recovery (1988-90) through to Towards 2016 (2006-2007). The contribution that these agreements made to Ireland’s success during that period of rapid development can be debated. At the beginning of the 1990s, Mjøset (1992) carried out a study for the National Economic and Social Council (NESC) that, from an institutional perspective, compared Irish economic development with that of a number of similar sized countries – including Denmark and Finland. He argued that consensus alone was not sufficient to turn Irish development on to a virtuous circle. He suggested a focus on inter-relationships between broader institutional arrangements and the development of a ‘national system of innovation’, which in turn would require the development of important clusters of firms (Mjøset 1992, p16). It has been argued that social partnership was a vital ingredient that became part of the fabric of Ireland’s political, economic and social life (Hastings et al 2007).

Certainly from the late 1980s, when social partnership first became a feature in Ireland, economic progress markedly improved for a prolonged period. In fact over the 16 year period 1987-2003, growth of real GNP per person in Ireland averaged 5.5 percent per year; this was easily the highest in Europe during that period and was more than twice that achieved in most other European economies (Crafts 2009, p71).

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<sup>36</sup> At the beginning of 2010, eleven member states (Denmark, the Czech Republic, Estonia, Finland, Hungary, Malta, the Netherlands, Romania, Spain, Sweden and the United Kingdom) had adopted legislation incorporating the services directive into national law. Eight others (Austria, Belgium, Cyprus, Ireland, Italy, Lithuania, Luxembourg, and Portugal) planned to finalise the national transposition process by the end of the first half of 2010. (Bulletin Quotidian Europe No. 10050, 7 January, 2010, p6).

But the success of this period of economic growth cannot be attributed to any single factor, such as social partnership. Similarly economic success cannot be attributed solely to the more open stance of industrial policy from the late 1950s. In fact the road to the economic success experienced by Ireland during the 1990s was long and difficult. For example the period 1950 to 1973, while being a ‘golden age’ of European economic growth, was one of growth failure for Ireland. Ireland sank to the bottom of the west European league in terms of the level of real GDP per person; the period to the mid-1980s was also challenging, with Ireland still at the bottom of the European income-levels league in 1987 (Crafts 2009, p64). This was despite the fact that from the 1960s, the Irish government had adopted a strategy of export led growth (ELG) to encourage FDI and remove the protection of manufacturing sectors that had been a feature of the import-substituting industrialisation (ISI) of the 1930-1950 period (Jacobson et al. 2001, p6). Therefore, Ireland’s more outward looking policies while contributing to growth cannot be the full explanation for the higher income levels achieved during the 1990s.

In reality, Irish economic success during the Celtic tiger period was due to a combination of factors coming together, influenced by the institutional changes outlined above. The remarkable economic growth of the 1990s resulted when Ireland’s outward looking policy stance was combined with the ‘social partnership’ agreements and a number of other factors: (i) The growth of FDI flows into Ireland, particularly from the US multinationals, as the single market finally emerged in the EU in 1993 was a key contributor to growth. (ii) A general upturn in international markets and global economic growth, helped by the World Trade Organisation (WTO) Uruguay Agreement in 1994, provided substantial trading opportunities for Ireland. (iii) A ready supply of labour was provided by higher female participation rates in the labour market and net immigration, as more people stayed in Ireland and people who had previously left returned to avail of opportunities at home<sup>37</sup>.

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<sup>37</sup> The high levels of foreign immigration during the early to mid-2000s were significantly linked to the unsustainable construction boom of that period, which ultimately led to a property bubble crash and the associated banking crisis. Therefore, foreign immigration is not included here as a major contributor to economic growth during the Celtic tiger period.



Therefore, these combined institutional factors contributed significantly to economic development. From the mid-1990s Ireland was seen as one of the most attractive locations in the world to do business, ranked 10<sup>th</sup> out of 82 countries in terms of favourable business environment in 2007 (Economist Intelligence Unit, 2007). Ireland was also ranked as having the 5<sup>th</sup> least restrictive product market regulation in the OECD (2006) and was ranked 2<sup>nd</sup> out of 41 countries in the European region in the 2007 index of economic freedom published by the Heritage Foundation and the Wall Street Journal<sup>38</sup>.

However, by the late 2000s, Ireland once again faced huge economic challenges exacerbated by poor policy choices. Direct tax reductions introduced in the latter years of the Celtic tiger period, while politically expedient, proved to be inappropriate. Support for the construction sector fuelled a property boom. An overemphasis on consensus resulted in a lack of critical analysis that contributed to the less than rigorous regulation of the financial sector (Regling and Watson, 2010). These factors combined to deepen the impact of the global recession, leading to a rapid increase in Irish national debt as the government struggled to deal with a property bubble crash and manage an associated banking crisis. Irish growth rates plummeted to negative figures and the government introduced a series of austerity measures including increased taxes and expenditure cuts. At the end of 2010 the government agreed a financial loan programme under which Ireland could borrow from the EU (€45bn) and the International Monetary Fund (IMF- €22.5bn)<sup>39</sup>. Austerity measures are likely to continue during the first half of the 2010s as Ireland struggles to reduce the ratio of budget deficit to GDP. At 32 percent, the ratio for 2010 was almost eleven times the 3 percent level defined under the EU's stability and growth pact. The rescue package agreed for Ireland, which was partly driven by the EU desire to protect the Euro, emphasizes the regional aspect of the economy and will lead to further EU involvement in Irish economic affairs.

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<sup>38</sup> In the 2011 index of economic freedom published by the Heritage Foundation and the Wall Street Journal, Ireland had slipped to 7<sup>th</sup> place, available at <http://www.heritage.org/index/>

<sup>39</sup> The annual average interest rate on the loan facility was set at 5.8 percent and, as part of the package; Ireland would be subject to quarterly reviews by the EU, IMF and ECB officials. The appropriateness of the interest rate became an issue of considerable debate between the troika and a new Irish government, which came to power in 2011.

## The changing nature of Irish trade

Despite these severe economic challenges, Ireland's export sector proved to be very resilient. Irish exports of goods and services grew by over 9.4 percent in 2010, supported by a better than expected recovery in export markets, favourable exchange rates with sterling and the US dollar and improved competitiveness (CSO 2011a).

The change in focus of economic policy, EU membership and the advent of the EU single market, and the WTO free trade agreement all impacted on Irish trade over the last 50 years. In the 1950s, agricultural exports to the UK were still the predominant source of Ireland's foreign earnings, which were affected by unfavourable British pricing policies, and manufactured goods were only 6 percent of total exports (Whitaker 2009, p20-21). As a result of significant industrial development, supported by Ireland's membership of the EU, dependence on the UK declined while trade with other members of the EU and the USA increased. In 2009<sup>40</sup>, the UK accounted for 16 percent of exports of goods, EU members of the euro-zone for 42 percent and the US for 21 percent (CSO 2010a). CSO figures for 2009 on exports of services provide evidence of a similar pattern, with the UK accounting for 20 percent, EU members of the euro-zone for 37 percent and the US for 6 percent (CSO 2010b).

By the late 2000s, Ireland had a much higher share of total manufacturing in high-technology sectors (17.6 percent) than EU countries on average (EU-25 6.4 percent), which have a greater concentration in medium-high and medium-low technology (LMT) sectors (Heanue and Jacobson 2008, p120). The substantial Irish high-tech exports are accounted for by a small number of sectors dominating Irish merchandise trade. Chemical, pharmaceuticals and related products account for over 55 percent of goods exported and machinery and transport equipment, the majority of which is information and computer equipment, accounts for 16 percent of exports (CSO

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<sup>40</sup> Detailed trade figures here, and in the remainder of this section, refer to 2009 because at the time of writing this was the most recent year for which a full market share and sector breakdown was available for exports of both goods and services. Published detailed trade statistics on services exports are nearly a full year behind those for goods.

2010a). Both of these sectors have attracted a substantial amount of foreign direct investment (FDI) to Ireland, particularly from the US.

The largest indigenous sector of the Irish economy on the merchandise goods side is the food and drink sector, which accounts for just less than 10 percent of exports. In the food sector, in particular, a number of Irish multinationals have emerged to support employment and drive growth. Furthermore, the relatively low import component content of food exports relative to other sectors means that the sector's share of total exports underestimates the net contribution of the sector to Irish economy. Other significant industrial manufacturing sectors of Irish economy include building materials and concrete manufacture, plastics, and corrugated products,

Over the last decade internationally traded services have become increasingly important in terms of economic development in Ireland. But international services are not as well defined or understood in economic development terms as industrial manufacturing. The value of Irish exports of services increased from €21.7 billion in 2000 to €66.6 billion in 2009; services now account for 45 percent of the total value of Irish exports (IBEC 2009). In 2009 computer related services, including software exports, accounted for 36 percent of total service exports, financial and insurance services accounted for 20 percent, and other business services account for 31 percent (CSO 2010b).

The analysis undertaken in Chapter 5 will focus on the development of the ICT and software sector and will comment on how it shifted its focus from assembly of computer components towards high-technology manufacturing and traded services. Chapter 6 will look at the development of a core subsector, the dairy industry, of the indigenous Irish food sector. It will highlight a focus on developing more innovative value-added products and reducing dependence on commodity type trading. Both empirical chapters will also examine the role of cluster initiatives, involving collaboration (between firms, the research community and government), and the development of systems of innovation approaches in these sectors. The following section will look at the development of cluster policy and comment on the historically weak system of innovation in Ireland.

## Section 4.2: The industrial cluster concept and a weak system of innovation in Ireland

### Cluster policy in Ireland

In Ireland, interest in the concept of clusters dates back to the early 1990s when discussion around policy focused on the proposition that successful industrial performance required the development of competitive advantage in clusters of interlinked industries or sectors (Clancy et al 2001). The debate began in 1992 with the 'Culliton Report', which published the findings of a review group established by the Irish government. The report concluded that the identification of areas in which to build industrial clusters should be an important element guiding interventions by state agencies (Culliton 1992). The views expressed in the Culliton Report were heavily influenced by Porter's (1990) book where the cluster concept was introduced in the context of national competitiveness (Doyle and Fanning 2007, p268). Since then the concept of clusters, and more recently the role of business networks, have been widely used by Irish policy makers (Forfas 2008).

Several cluster-based studies were carried out in Ireland as international interest in cluster policy was intensified (Doyle and Fanning 2007, p275). O'Donnellan (1994) examined the extent of clustering in Irish manufacturing and found some evidence of clustering in the food and printing industries. But he argued that there was little association between clustering and performance. In 1997, a group of cluster studies was commissioned by the NESF. These examined in detail the extent to which competitiveness achieved in a number of sectors could be explained by the presence of clusters of related or connected industries. Two of these sector studies, on which separate research papers were published, were<sup>41</sup>:

1. The indigenous software industry, a sector influenced by the presence of multi-national foreign investment in Ireland (O'Gorman et al 1997),

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<sup>41</sup> A third study looked at the music industry, as an example of the internationally traded service sector (Clancy et al 2001).

2. The Irish dairy industry sector, an indigenous traditional manufacturing sector (O'Connell et al 1997).

The first of these sector studies will be commented on further in Chapter 5, which focuses on clusters and collaboration within cluster initiatives in the ICT and software sector. The second study will form part of the analysis of cluster development in the traditional dairy sector of the Irish economy in Chapter 6.

A decade after the 1997 NESC studies, Forfás, the state agency that provides policy advice to the government, argued that Ireland can be characterised as having both a policy push and bottom-up approach to cluster formation. Forfás identified three major areas containing cluster groupings in Ireland: (i) Biotechnology and Pharmaceuticals, (ii) Information and Communications Technology (ICT) including software and (iii) Internationally Traded Services (Forfás 2008). The authors of the report maintained that a number of clusters had developed as a result of Ireland's successful foreign direct investment (FDI) policies. Such a central role for foreign direct investment runs counter to the concept of clusters developed by Porter (1990). Confusion over the role of foreign investment and MNCs in cluster development, particularly in the model proposed by Porter (1990) did not help the clarity of policy focus in Ireland.

In an effort to arrive at greater clarity, various critiques of Porter's model of the cluster concept are reviewed in section 2.1 of Chapter 2. To a degree, the original model has been adapted and developed over time, partly in response to some of these criticisms. But the diamond model cannot, and in reality should not, be expected to answer all questions on the relationship between location and competitiveness. For example, Dunning's (1998) OLI model may be better equipped to answer many questions in relation to the location of MNCs. However, the diamond model, with its four principal determinants, remains a useful framework for examining the sources of an industry's competitive advantage. It covers the range of potential significant influences on competitive advantage that need at least to be considered, particularly the role of other industries as customers affecting domestic demand conditions or as related or supporting industries (O'Malley and O'Gorman 2001, p305).

The report 'Ahead of the Curve: Ireland's place in Global Economy', by an enterprise strategy group established by the government, stimulated a policy focus on the role of networks in 2004. It also contributed to the ongoing debate around the concept of clusters. The report recommended the allocation of a budget of €20 million per annum for five years from state development agencies resources to support the creation of enterprise-led networks to foster collaboration in defined areas (Forfás 2004, pXVIII). This network approach was not entirely new. The Irish government, through local development agencies, introduced a Pilot Network Programme (PNP) in 1996. This involved 17 networks e.g. the TORC network, and a total of 31 SMEs focusing on enabling companies to work together as a team on the strategic development of new business opportunities (Jacobson et al 2001, p12).

A country report as part of the Europe INNOVA Cluster Mapping Project (Oxford Research AS 2007) concluded that, although there were no cluster programmes *per se* in Ireland, there were a number of programmes with the objective of developing networks of enterprises, academic institutes and state organisations that may over time mature into clusters. Among the examples they cited were: (a) Enterprise Ireland's Industry-led Research Network schemes and (b) Science Foundation Ireland (SFI) funded programmes aimed at developing collaboration between enterprises and third level research organisations, including the Centres for Science, Engineering and Technology (CSETs) and Strategic Research Cluster programmes (Oxford Research AS 2007, p12). The report suggested that the focus on enterprise led networks and many initiatives involving linkages between industry and academia aimed at promoting regional development could be the building blocks for cluster formation. It also suggested that national and regional cluster policies should become a more integral part of Irish enterprise development policies (Oxford Research AS 2007, p15).

Forfás (2008) did not make reference to the development of clusters in the indigenous food sector. This is despite the fact that one of the studies commissioned by NESF in the late 1990s concluded that were aspects of a cluster and a clustering process in the dairy sector, with the potential for further development of a cluster in a less supported and protected economic environment (O'Connell et al 1997, p79-80). This fact raises two questions: (i) Why does Forfás make no reference whatsoever to

the existence or otherwise of clusters in the food sector? And (ii) more than ten years after the NESC study has the process of clustering further developed in the dairy sector in Ireland? The first question is partly answered by the fact that the evolution of state agencies created a certain disconnect in terms of industrial policy and a low level of awareness in Forfás of developments in the food sector. This issue is covered in detail in Sections 4.3 and 4.4 below. The second question will be addressed in detail in Chapter 6.

Before proceeding to consider in further detail cluster initiatives and the role of collaboration and social capital in major areas of economic activity in Ireland, it is important to acknowledge that such initiatives should not be viewed as a panacea for innovation and competitive challenges. Heanue and Jacobson (2008) in a recent study involving firms from two low and medium technology (LMT) sectors, furniture and fabricated metal products, argued that a complex variety of policies are needed to ensure increased levels of innovation and competitiveness for firms. They concluded that cluster promotion may not always be the correct strategy. Depending on the stage of development of both the firm and the industry, reducing or increasing local linkages and levels of embeddedness may be appropriate. In the case of the furniture sector, the firms they studied responded to the pressures of increased global competition in different ways, but each involved fewer connections to the local rural area. Earlier research concluded that while there appeared to have been an element of causation in the relationship between state support and the development of the furniture sector in the Monaghan industrial district, the TORC network involving three furniture firms more geographically dispersed was a better example of firms being embedded in the environment (Jacobson et al 2001, p18). In contrast to the Irish furniture sector, the fabricated metal product firms studied showed deeper levels of spatial embeddedness, with very close linkages to their localities, partly linked to the role of Irish-based MNC customers – a stimulus that would change if the MNCs decided to relocate (Heanue and Jacobson 2008, p132).

### **A weak system of innovation**

International cluster policy is increasingly focused on raising levels of innovation as a means of improving competitiveness (Sölvell et al 2003). Mjøset (1992, pp5-23)

found that a weak system of innovation combined with population decline, due to high levels of emigration in Ireland, resulted in vicious circles of under-development for decades. Furthermore, Ireland's economic growth lagged behind similar countries in both difficult and dynamic phases of world growth. Building a system of innovation is a complex process and is not just about the percentage of GDP that a nation spends on R&D. Empirical evidence from the US, Europe and Japan showed that the success of innovations, their rates of diffusion and the associated productivity and competitiveness gains depended on a variety of other influences as well as formal R&D (Freeman 1995, p10)<sup>42</sup>. In Ireland, consensus building among the different players in the economy, such as government, employers and trade unions, known as social partnership has received much attention. But, Mjøset (1992) warned that consensus alone would not be sufficient to turn Irish development onto a virtuous circle in the long term:

If a general formula is needed concerning relations between institutions and growth, it should focus on the inter-relationships between the broader institutional arrangements and the “national system of innovation” surrounding the “development blocks” – the clusters of important firms – of a particular economy (Mjøset 1992, p16).

In a review of social capital Field (2008, p150) points out that ‘partnership- based approaches have been widely cited as a way of promoting social capital’. The social partnership process in Ireland, which Mjøset (1992) referred to as consensus, certainly used the resources within the community, with government working with business and trade union organisations to reach agreement, particularly on general pay and income taxation levels. Later agreements, from 1997 until the process collapsed in the late 2000s, also attempted to expand the agenda of partnership beyond the core pay issues to broader areas such as environment and social policy. However despite the growth in policy areas covered:

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<sup>42</sup> Freeman (1995) provides an interesting discussion and summary of some empirical evidence on innovation systems not only from US, Europe, and Japan but also from Brazil, South Korea and Russia.



[Agreements] were still based upon the primacy of the central trinity of the Government, Employers and Trade Unions agreeing parameters on pay and other relevant central issues. It is only at the latter stages of any draft agreement formalisation that the other two pillars (the Farming and Social Pillars) become involved and it is questionable whether any deal would be possible without having the central pay agreement (Smyth 2010, p121).

In terms of social capital Ireland's 'social partnership' process established certain structures that facilitated collective action, particularly in the areas of pay and industrial relations, for the mutual benefit of many in society. But critics of the Celtic Tiger economic model, of which social partnership was a key element, argued that it resulted in social deprivation and exclusion for other communities (O'Malley 2008, p8, Kirby et al 2006). The divergence between Irish institutional development and the corporatist model was very clear when the partnership process extended beyond national wage deals to try to deal with broader societal issues such as social exclusion, rural development, incorporation of the community and voluntary sector (Ó'Riain 2006, p312). This thesis will not attempt to reach a conclusion on the merits or otherwise of the social partnership model, but it is clear that the model did not survive the Irish economic crisis of the late 2000s and that Mjøset (1992) was correct in pointing out that consensus alone would not be sufficient to ensure a virtuous circle of development in the long term.

This thesis will consider whether progress has been made in Ireland in establishing the system of innovations approach, based on clusters of important firms, promoted by Mjøset (1992). In the latter years of the social partnership process it did attempt to address issues in some areas related to building such a system, for example in education and technology. This resulted in government agencies supporting a number of initiatives involving collaboration between firms and research institutes. Ó'Riain (2006, p316) commenting on the need to better understand alternatives to hierarchical systems pointed out that important questions remain regarding the dynamics of network forms of organisation and the conditions under which they are most effective. This thesis will focus on better understanding the dynamics of

collaboration within a range of organisational structures that have emerged in Ireland around the area of innovation.

### **Section 4.3: State agencies for industrial development - the evolution of organisational structure in Ireland**

This thesis explores the process of collaboration within clusters and cluster initiatives involving different economic actors, including state agencies, with the social capital concept used to add depth to the analysis. Drawing on Irish legislation and other sources, this section outlines for the first time in a systematic way the evolution of state agencies focused on industrial development in Ireland. How these organisations report to government is also discussed. This highlights a lack of coordination between agencies focused on development of the ‘modern economy’ and those focused on development of more traditional sectors. The overall role of each agency is broad, including promoting Ireland as a location for investment and the allocation of state and EU funds for industrial development. In the context of this thesis, when state agencies are engaged in or encourage collaboration in cluster initiatives they can be viewed as social capital assets of the economy.

Originally established in 1950, the Industrial Development Authority (IDA) is the oldest of Irish state agencies supporting enterprise development (see Table 4.1). In addition to the IDA, the Irish government also established two other state agencies focused on enterprise development in the early 1950s. Bord Iascaigh Mhara (BIM), with responsibility for developing the sea fishing and aquaculture industries, was established in 1952 under the Sea Fisheries Act. BIM continues to provide a range of services including advisory, financial, technical, marketing and training supports to all sectors of the seafood industry. Its current three year plan entitled ‘Delivering the Potential of the Irish Seafood 2010-2012’ is built around four key themes: Business Development and Innovation, Knowledge and Technology Transfer, Skills Development, and Environment and Sustainability. Bord Fáilte was also established in 1952 and was only replaced by Fáilte Ireland under the Tourism Development Authority Act in 2003.

**Table 4.1 – Evolution of state agencies supporting enterprise development at national level in Ireland**

	State Agency – National Level	Date of establishment
1	Industrial Development Authority	1950
2	Bord Iascaigh Mhara (BIM)	1952
3	Bord Fáilte	1952
4	Agricultural Institute (Foras Taluntais)	1958
5	Córas Tráchtála (Export Promotion Board)	1959
6	Institute for Industrial Research and Standards	1961
7	CBF (Irish Meat and Livestock Board)	1969
8	ACOT (Agriculture Advisory & Training Institute)	1980
9	Eolas (Irish Science and Technology Agency) – <i>replaced 6 above</i>	1987
10	Teagasc (Agriculture and Food Development Authority) – <i>amalgamation of 4 and 8 above</i>	1988
11	Irish Trade Board (An Bord Tráchtála) – <i>replaced 5 above</i>	1991
12	Forfás (National Policy Advisory Agency)	1994
13	Forbairt - <i>replaced 9 above plus new functions</i>	1994
14	IDA Ireland – <i>effectively replaced 1 above</i>	1994
15	Bord Bia – <i>amalgamation of 7 above and food elements of 11 above</i>	1994
16	Enterprise Ireland – <i>amalgamation of non-food elements of 11 above and 13 above</i>	1998
17	Science Foundation Ireland (SFI)	2003
18	Fáilte Ireland	2003

Source: Author's table

Fáilte Ireland provides a range of support services to tourism professionals and service providers at local, regional and national levels. In addition to supporting enterprise development, the organisation also works to develop Ireland as a tourist destination by engaging in overseas promotion including supporting business tourism, sporting and culture events. Neither the fishing nor tourism sectors are examined in this thesis. Chapter 5 focuses on the development of the ICT sector, where the IDA played a key role in attracting FDI to Ireland.

The IDA reports to the Minister of Jobs, Enterprise and Innovation<sup>43</sup>. The IDA's original mandate was both the development of existing Irish industry and the establishment of new industries in Ireland (Industrial Development Act 1950). From 1958 onwards, the agency played a critical role in moving Irish industrial policy away from a largely protectionist stance towards a more open and outward looking approach. A key factor in this change in focus was the then Secretary General of the Department of Finance, TK Whitaker's landmark publication 'Economic Development' and the accompanying First Programme for Economic Expansion. Ireland's protectionist policy stance of the early 1930s should not be seen as an aberration. It reflected a view formulated against a backdrop of world depression, with the economist Keynes speaking in Dublin in 1933 appearing to endorse the outlook of the Irish government towards self-sufficiency (Whitaker 2009, p20).

By the late 1950s, a new policy stance was required if Ireland was to move beyond the industrial development constraints imposed by (i) an over-reliance on agriculture as a source of exports and employment and (ii) the UK market as the single primary destination for Irish goods. Consequently, in addition to the change in IDA focus, Córas Tráchtála (CT) was established in 1959 to promote the export of Irish goods and services on European and international markets. CT performed this role for three decades until it was replaced in 1991 by the Irish Trade Board (An Bord Tráchtála), which was given wider powers to promote, assist and develop the marketing of Irish goods and services in international markets. The trade board was subsequently broken up and its functions transferred to new agencies in the late 1990s, described below.

The IDA played a substantial role in the necessary expansion of the industrial base in Ireland; especially into the areas of pharmaceuticals and information and communication technology. The key overriding success of the organisation was in helping to attract foreign direct investment into the Irish economy, particularly by USA multinational corporations. For example, in 1990, supported by historically high IDA grants, Intel located its European manufacturing facility for computer

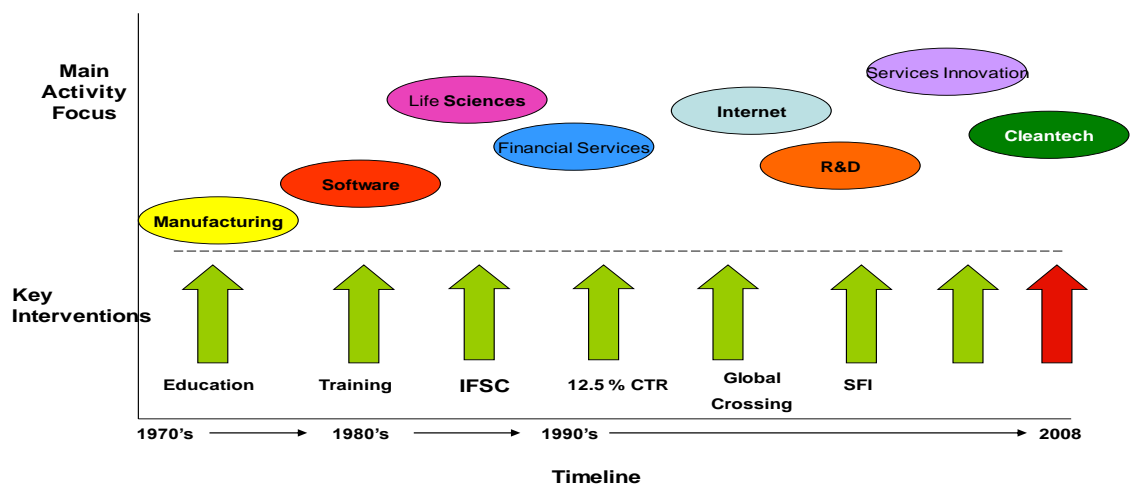
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<sup>43</sup> Prior to 2010, the Minister for Enterprise, Trade and Employment. The IDA now also reports to the Minister for Foreign Affairs and Trade, on matters relating to promoting Ireland abroad.

chips near Dublin. But the IDA was not just attracting Intel – nearly every other major global player in the computer industry followed Intel to Ireland (O’Hearn 2001, p82). Indeed, the IDA, with this ability to attract foreign investment projects to Ireland has been widely acclaimed as one of the most sophisticated industrial development agencies in the world (Cassidy et al 2009, p16).

**Figure 4.1: IDA strategic focus 1970-2010**

## History of Strategic Interventions...



Source: IDA, 2010

Figure 4.1 outlines the focus of strategic interventions by the IDA over the period 1970 to the late 2000s. It provides an interesting illustration of how the agency adjusted its target industry focus over time in order to continue to attract foreign investment into the Irish economy. It also provides a graphical indication that attracting FDI is not simply a matter of low corporate tax rates, but is a much more complex combination of key interventions and strategic focus.

With a far lower international profile than the IDA, the state agency Teagasc was established under the Agriculture Act in 1988. Its remit is to provide integrated research, advisory and training services to the agriculture and food industry. Teagasc reports to the Minister for Agriculture, Fisheries and Food. Teagasc amalgamated the national advisory and training body ACOT, which was set up in 1980, and the much longer established Agricultural Institute (An Forus Tálunatas),

which was set up in 1958. In the commitment to a more open and less protectionist stance than that of the 1950s, the Irish government was keen not to ignore the needs of the agricultural sector. The establishment of the Agricultural Institute and its subsequent evolution into Teagasc reflects a long held commitment by the Irish state to productive investment in agricultural development (DOF 2008). As part of this commitment, applied research centres were established in five locations throughout Ireland during the late 1950s and early 1960s. Teagasc Moorepark, in Cork, focuses on research in the milk and dairy sector; it will feature in the consideration of collaboration between business and state agencies in the indigenous dairy sector in Chapter 6.

On the industrial development side while the IDA was undoubtedly successful in attracting foreign investment, some argued that support for indigenous industry was less wholehearted. According to O’Hearn (1989, p581), the IDA went ‘out of its way to attract large foreign companies rather than nurturing new Irish enterprises that may or may not succeed. Capital grants for foreign firms [were] much higher on average than grants to domestic industry’. From the mid-1990s the Irish government began to focus on the needs of indigenous enterprise in a more targeted way and ‘it was only when a new development regime emerged that emphasized local structures of innovation that the conditions for indigenous upgrading and employment growth were put in place’ (O’Riain 2004a, p233). The Industrial Development Act of 1993 established a new state agency structure for industrial development. From a legal perspective, three new bodies were established from the 1 January 1994 under the auspices of the Department of Jobs, Enterprise and Innovation<sup>44</sup>: IDA (Ireland), Forfás and Forbairt. The original IDA and Eolas, the state science and technology agency, were dissolved. Although, in effect, the main core of IDA’s work of attracting FDI continued unabated. The establishment of Forfás and Forbairt, which reflected a new emphasis on science and technology, will be discussed in the section below on the foundations of a national system of innovation. This new emphasis was particularly important for certain sectors, for example indigenous software, where

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<sup>44</sup> In 1993, the Department of Enterprise, Trade and Employment and, between 1994 and 2010, the Department of Enterprise, Trade and Innovation..

these new 'state agencies played a key role in promoting R&D, business development and the growth of indigenous firms in the 1990s' (Ó'Riain 2004c, p41).

In response to the evolution of the Irish food sector, the government also established An Bord Bia, the Irish Food Board, in 1994. Bord Bia brought together the former CBF (Coras Beostoic and Feola – the Irish Meat and Livestock Board) and the food promotion activities of the Irish Trade Board. The functions of Bord Bia are to promote, assist and develop the marketing of Irish food and livestock (Bord Bia Act, 1994), including beef, pigmeat, poultry, sheepmeat, dairy products, prepared consumer foods and beverages. In 2004, responsibility for the development of the horticultural industry in Ireland, which formerly rested with Bord Glas, was integrated into Bord Bia, extending the responsibilities of the agency. Horticulture is divided into two main sectors – the food sector, including fruit and vegetables such as mushrooms, potatoes and glasshouse crops, and the amenity sector e.g. trees, shrubs, flowers and bulbs. Bord Bia reports to the Minister for Agriculture, Fisheries and Food, whose government department is responsible for policy, development and regulation of the food industries. It is also responsible for monitoring the strategic direction of all state agencies focused on the needs of the food sector.

Despite the significant review in the early 1990s, the fragmented development of state agency structure continued throughout the decade. State–society alliances facilitated by these agencies had upgraded industry capabilities and laid the foundations for a national system of innovation, but they were never able to overcome the dominance of the IDA-led emphasis on foreign investment (Ó'Riain 2004c, p41). A review of industrial policy in 1998 led to the creation of Enterprise Ireland to focus on the development and promotion of the indigenous business sector. The establishment of Enterprise Ireland involved the amalgamation and restructuring of the services to business functions of Forbairt and the remainder of the Irish Trade Board (An Bord Trachtála). It reflected an institutional support and legitimizing of the focus on developing indigenous industry and its export potential. The mission of Enterprise Ireland is to help client companies, comprising manufacturing and internationally traded companies that are '*genuinely Irish-based*', to develop sustainable competitive advantage, leading to profitable sales, exports and

employment (DOF 1998). Forfás retained responsibility for ensuring the coherence of policies across the development agencies supporting enterprise, which now included Enterprise Ireland and the Industrial Development Authority of Ireland (IDA). All three of these state organisations are currently agencies of the Department of Jobs, Enterprise and Innovation.

The food promotion activities of the trade board, originally transferred in 1994, were left with Bord Bia rather than transferred to Enterprise Ireland. This created confusion as to which agency was ultimately responsible for the development of the food sector. The lack of clarity was contributed to by the fact that the allocation of government and EU funds for investment in food sector development projects were controlled by Enterprise Ireland. On the other hand, the promotion of food exports abroad was still under the remit of Bord Bia. The end result was competition rather than cooperation between the two state organisations in terms of supporting and promotion of Irish food companies.

### **The foundations of a 'national innovation systems' approach**

In his study of the Irish economy Mjøset (1992) warned against an over dependence on social partnership and recommended a greater focus on the inter-relationships between broader institutional arrangements and the development of a national system of innovation. He concluded that in the post-war period Ireland had failed to address its weak national system of innovation, which was compounded by high levels of emigration and a low state capacity for policy implementation to create such a system (Mjøset 1992, p13).

As mentioned above, as part of the establishment of a new state agency structure for industrial development in 1993, two new agencies were established, Forfás and Forbairt. The science and technology agency Eolas, which in 1987 had replaced the Institute for Industrial Research and Standards (IIRS), was dissolved. The remit of Eolas and its predecessor was to undertake, encourage and foster scientific research to promote the utilisation of natural resources of the state, other than those covered by the Agriculture Institute. A key role for Eolas was to facilitate the expansion of existing or new industries, in areas other than agriculture and food. Under the new



structure, the functions of Forfás included the provision of research and advice to the government in the areas of enterprise and science policy. It also has a role in evaluating enterprise policy interventions. Forbairt was established as an agency of Forfás to support and help develop industry by strengthening the technological base and the capacity to innovate. It also made investments in industry, including the administration of EU funds. Ó'Riain (2004c, p42) provided evidence of the importance of this state intervention in supplying finance and stimulating investment in indigenous firms in computer related sectors, electronics, 'other manufacturing' and communications in the late 1990s. Forfás provided research and administrative support to various independent advisory groups established by government. For example Forfás provided the secretariat for the National Competitiveness Council, which was set up in 1997 as part of the 'Partnership 2000' social partnership agreement. As outlined above, Enterprise Ireland assumed responsibility for the services to business functions of Forbairt in 1998 e.g. allocating EU investment funds to firms and making equity investments in early-stage firms.

As Ireland reached higher levels of economic development and could no longer be viewed as a location for low-labour-cost type manufacturing, Ireland's international competitiveness came under pressure. Confirming the view expressed by Mjøset (1992), it became increasingly clear that relying on a consensus around wage restraint and on one of the lowest corporation tax rates (12.5 percent) in the world would not be sufficient to sustain economic growth into the future. Consequently both government and business were keen to emphasise a commitment to building an innovation based economy.

A significant policy intervention in this regard was the establishment of Science Foundation Ireland (SFI) under the Industrial Development (SFI) Act of 2003. Prior to this, the SFI had operated for the period since 2000 as a sub-board of Forfás to administer Ireland's Technology Foresight Fund. In April 1999, the Irish Council for Science, Technology and Innovation (ICSTI), which was established by the government and Forfás, published an overview of the findings and recommendations of a technology foresight exercise carried out in Ireland. The foresight time horizon for the exercise was set at 2015 and the exercise was completed over the twelve

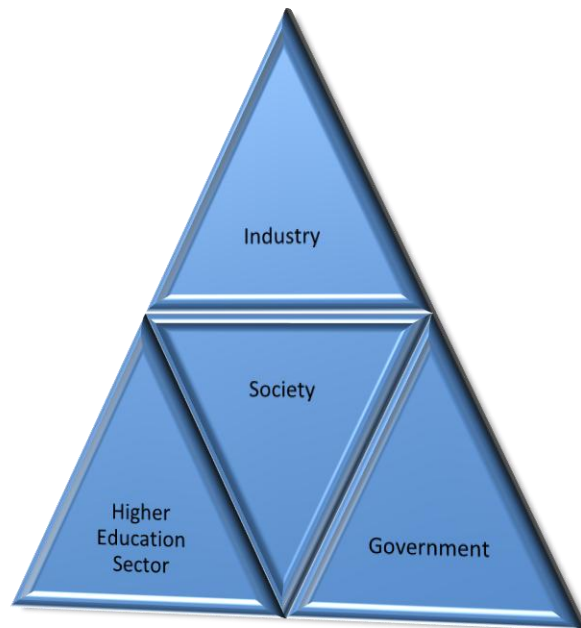
month period March 1998 to April 1999. The Foresight process involved significant collaboration between industry, Government departments and state agencies, and the science and engineering research communities who worked together in eight individual panels in the following industry sector areas:

- Chemicals and Pharmaceuticals
- Information and Communication Technologies
- Materials and Manufacturing Processes
- Health and Life Sciences
- Natural Resources (Agri-food, Marine, Forestry)
- Energy
- Transport and Logistics
- Construction and Infrastructure

The foresight exercise concluded that: (i) Under globalisation, economic competitiveness would increasingly be achieved through knowledge-based technological innovation and (ii) Ireland needed to reposition the economy and ‘to evolve rapidly to a knowledge society’ (ICSTI 1999, p4). As figure 4.2 illustrates, it emphasised that the knowledge framework could be visualised as ‘a pyramid – where industry, the higher education sector, Government and society are the four interlinked faces forming a partnership at all levels’ (ICSTI 1999, p5).

The Council also identified a relatively small number of areas where they felt knowledge societies would best exploit the potential of new technologies. These included information and communications technology (ICT), biotechnology, medical systems and nanotechnology. This had the advantage that Science Foundation Ireland (SFI) could focus on the development of these areas in the Irish economy. The effectiveness of this strategy in the case of the ICT and software sector will be discussed in Chapter 5. But it also meant that certain industrial sectors, including the large indigenous food and drink sector, were effectively excluded from receiving state support via the SFI. The consequences of this and an emerging cluster initiative that addresses this gap will be discussed in Chapter 6.

**Figure 4.2: The four interlinked faces of the knowledge framework pyramid**



Source: Author's diagram

In the late 2000s, Irish government policy reiterated its commitment to an innovation driven economy by stating that 'Ireland by 2013 will be internationally renowned for the excellence of its research, and will be at the forefront in generating and using new knowledge for economic and social progress, within an innovation-driven culture.' Part of the strategy to achieve this objective was an emphasis on 'interconnectivity and convergence' between all the participants in the economy such as Government, state funding agencies, regulatory authorities, academia and industry (Forfas 2008, p3).

#### **Section 4.4: An assessment of organisational structure and enterprise supports for industry**

The evolution of the organisational structure of industrial development agencies, particularly since the mid-1990s, brought together certain functions of state support in a more targeted and focused way. For example, the establishment of SFI in 2003

indicated a renewed government intention to build a national system of innovation. The earlier agency, Forbairt, had also focused on this objective but in a less defined way, although Ó'Riain (2004a, 2004c) concluded that state intervention during the late 1990s did support the development of indigenous technology based firms, in areas such as software. Chapter 5 will examine whether SFI has helped to move Ireland closer to establishing a genuine system of innovation.

The evolution of agency structure also created a certain disconnect in terms of Irish industrial policy. Each agency has its own board, CEO and management structure. This indicated a significant level of, and indeed desire for, organisational independence. But it also suggested the potential for overlap and duplication of activities in certain areas. The IDA is Ireland's inward investment promotion agency responsible for the attraction and development of foreign investment in Ireland. Consequently, IDA interaction is essentially with foreign owned multinational corporations. Enterprise Ireland's client base is primarily indigenous Irish companies, many of whom are small and medium sized enterprises. Enterprise Ireland has limited contact with foreign owned multinationals, as support for these MNCs is seen as the mandate of the IDA. In turn, IDA has no role in the development of Irish owned MNCs. As mentioned above, Forfás is responsible for the policy coherence of both the IDA and Enterprise Ireland. The CEO of IDA Ireland and Enterprise Ireland both sit on the board of Forfás. But the CEO of Forfás is not a member of the board of either organisation. Therefore, Forfás could not be described as being directly involved at the highest organisational level in setting the strategy of either organisation, even though it is responsible for industrial policy coherence. The Secretary General of the Department of Enterprise, Trade and Innovation is a member of the board of Forfás. Senior civil servants from that department are members of the board of both IDA Ireland and Enterprise Ireland. But, no individual state official with responsibility for industrial policy sits on the board of all three organisations.

The CEO of Bord Bia and the Secretary General of the Department of Agriculture, Fisheries and Food are not on the board of Forfás, nor are any senior civil servants from that Department. Therefore, the top state officials with responsibility for the

development of the food sector do not have a formal link into the agency accredited with the responsibility of advising government on policy for enterprise support and development. Neither do Bord Bia or the Department of Agriculture, Fisheries and Food sit on the boards of IDA Ireland or Enterprise Ireland. This reflects the fact that Forfás, IDA and Enterprise Ireland were all established by, and report to, the Minister for Jobs, Enterprise and Innovation. Forfás is also not represented on the board of Bord Bia.

This state organisation structure suggests a low level of interaction and relationship between Forfás, the government advisory agency in relation to industrial policy, and Ireland's largest indigenous manufacturing sector – the food sector. Forfás reported to the Minister for Jobs, Enterprise and Innovation along with the IDA, Enterprise Ireland and Science Foundation Ireland (SFI). This focused the work of these agencies on the government priorities to develop the high-technology sectors, for example the ICT, software and biotechnology sectors which came under the responsibility of that Minister. The development of the food sector was the responsibility of the Minister for Agriculture and Food and Bord Bia. In such a situation it is perhaps not surprising that Forfás (2008) made no reference to the existence or potential development of clusters in the food and drink sector in its reports. However, this is despite the fact that in recent years Enterprise Ireland has been actively involved in the development, support and promotion of a significant cluster initiative for innovation in the food sector, which will be discussed in detail in Chapter 6.

The Irish state faced significant challenges as a result of the global economic recession of the late 2000s. But the depth of the crisis facing Ireland was in crucial ways 'home made'. Inappropriate fiscal and budgetary policies 'heightened the vulnerability of the economy' instead of dampening 'the powerful monetary and liquidity impulses that were stimulating the economy' (Regling and Watson 2010, p5). In part response, the Irish government of the time announced, in its statement on 'Transforming Public Services' (DOT 2008a), the establishment of a Special

Group<sup>45</sup> to review public expenditure and numbers employed in the public service. The Special Group was tasked to undertake its work with a view to sustaining public finances in the years ahead. It recommended that enterprise supports for indigenous industry should be delivered through a single agency, operating under a well-defined oversight mechanism (DOF 2009, pp15-16). The Group made the following observations in relation to the existing agency structure:

- ‘expenditure and staffing levels have risen over the period 2003 to 2008 with no obvious associated increase in output;
- there is a high degree of overlap across the services delivered by the agencies (e.g. training, grant assistance);
- there is significant duplication of overseas representation with Enterprise Ireland, the IDA, and An Bord Bia (and Tourism Ireland) operating independent overseas office networks; and
- there is a lack of consistency in reporting what is achieved in terms of cost effectiveness (estimated grant per job). Based on the available information, there are significant variations between the agencies in the estimated average grant cost per job suggesting that some agencies are less cost effective than others.’

The board structure of the various state organisations described in this section and the lack of coherence implied by this governance structure contributed to the problems outlined above by the Special Review Group. No single top level state official was responsible for, or even involved in, decisions in relation to staff levels, overseas representation or indeed cost effectiveness of the different state organisations. Individual agencies had different boards and reported to different Ministers, leading to a lack of coherence in Irish industrial policy and a significant degree of inter-agency rivalry.

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<sup>45</sup> The Minister for Finance, Brian Lenihan T.D. appointed Colm McCarthy, from the School of Economics in University College Dublin as the Chair of the Special Group. Its report was sometimes referred to as ‘the McCarthy Report’. In the media the group was often referred to as ‘An Bord Snip Nua’.

In essence, the Special Group was critical of the fragmented nature of the organisation agency structure that had evolved in Ireland, particularly since the mid-1990s, and which is outlined in section 4.2 in detail for the first time. The Special Group Report proposed that ‘a re-constituted Enterprise Ireland’ should subsume and consolidate all indigenous enterprise support and sector marketing functions. Those organisations losing functions would be rationalised as appropriate. The proposal encompassed the relevant enterprise and marketing support functions of Údaras na Gaeltachta, Shannon Development (two agencies focused on enterprise development in the Western region of Ireland), Bord Iascaigh Mhara and Bord Bia (DOF 2009, p27). The Special Group estimated that the rationalisation that it proposed would save the Irish exchequer approximately €10 million per annum. In addition the enterprise functions of Teagasc and the activities of County and City Enterprise Boards, the Business Innovation Centres and the Western Development Commission would also be merged (an estimated saving of €2.2 m) within the ‘re-constituted Enterprise Ireland’ (DOF 2009, p16). In making these proposals on rationalisation of state agencies, the report emphasized that ‘decisions should be cognisant of duplication, overlapping and similarities of functions and roles of agencies, and the synergies from bringing together separate bodies within cognate areas’ (DOF 2009, p 24).

The proposals of the Special Group to merge the enterprise support and marketing functions of agencies such as Bord Bia (food) and Bord Iascaigh Mhara (fish and seafood) into Enterprise Ireland would certainly help address the disconnect in industrial development policy referred to above. It seems to make sense for one state agency to be responsible for the development and promotion abroad of the indigenous industry of a small open economy such as Ireland. The combined agency should also report to the Minister for Jobs, Enterprise and Innovation, which would also contribute to industrial policy coherence.

However, caution would need to be used in merging all regional and city enterprise support and development functions into one super agency. Enterprise Ireland’s primary focus is on the important task of helping companies internationalise their businesses. By doing so, the agency strives to increase Irish exports and employment

in the indigenous manufacturing and services sectors of the economy. In contrast, regional and city development agencies are focused on enterprises where the main area of activity is the domestic economy. Ireland has also been criticised in the past by the European Commission for its economic development policy being too centrally focused and not providing enough of a regional focus. Considerations other than the cost efficiencies that will flow from rationalisation of state agencies should be included in decisions. For example, the objectives of regional and spatial development need to be taken on board and the benefits of supporting city agglomeration need also to be considered carefully. Otherwise, in the drive for the albeit recognised and needed increased cost efficiencies in organisational structure of state agencies, the longer term industrial development objectives of the Irish economy could be damaged.

#### **Section 4.5: Industrial and business representation – the evolution of organisation structure in Ireland**

The structure of the organisations representing industry interests evolved significantly during the 1990s and early 2000s. These groups facilitate information flows among firms and interaction between firms and government, fitting into the category of Organisations for Collaboration (OFCs) described in detail in section 2.3 of Chapter 2. New business sectors emerged during this period of rapid economic development and organisations adapted to represent the views of these sectors.

In 1993, the Irish Business and Employers Confederation (IBEC) was established through the merger of the Confederation of Irish Industry (CII) and the Federation of Irish Employers (FIE). The CII and the FIE traced their roots back to industry organisations founded during the early years of the Irish state. The CII traced its history back to an organisation called the Federation of Irish Industries (FII), which was founded in 1932.<sup>46</sup> Despite a number of name changes before settling on CII in

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<sup>46</sup> One of the oldest business associations in Europe is Irish and can trace its origins back to a marine insurance issue in the late 17<sup>th</sup> century, linking in with North's (1990, 1991) description of the evolution of institutions in Europe. In 1695 a vessel 'Ouzel Galley' owned by a Dublin shipping company went missing on a trading journey in the near Eastern seas. When the vessel did not appear for three years, the insurance policy was cashed in; two years after the ship (footnote cont. p108)



1969, the evolution of the organisation could be seen in many ways as a mirror image of Irish industrial development (O'Hagan and Foley 1982, p7). In the period from 1932 to the late 1950s, the organisation adopted quite a protectionist stance reflecting Irish economic policy of that time. By 1969, when a bigger and strategically improved organisation adopted the name CII, the organisation took a much more outward looking approach.<sup>47</sup> The overall objective of the CII was to represent the whole of the business community, with its articles of association giving formal recognition to industrial sector organisations and trade associations (O'Hagan and Foley 1982). The Federated Union of Employers was founded in 1942 in response to the Trade Union Act 1941, which required both trade unions and employer organisations to hold a negotiation licence (Chubb 1992, p3). FUE continued under this name until 1990 when it became the Federation of Irish Employers (FIE).<sup>48</sup>

With the establishment of IBEC, for the first time in Ireland business representation on both labour and economic affairs was brought together under the direction of one organisation. The organisation was headquartered in Dublin, with six regional IBEC offices in Ireland and an office in Brussels, the administrative centre of the EU. IBEC's stated mission is to promote the interests of business and employers in Ireland by working to foster the continuing development of a competitive environment that encourages sustainable growth, and within which both enterprise and people can flourish (IBEC 2006).<sup>49</sup> The FUE and CII were both involved in the 'social partnership' process that was a feature of the Celtic tiger period of economic

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reappeared with the Captain claiming that the vessel had been commandeered by pirates. In 1705, the Ouzel Galley Society was set up to sort out the issue. Its success in providing a forum for discussion on business issues led to a change of name to the Dublin Chamber of Commerce in 1783, which continues to represent the interests of business in Ireland's capital city today (Cullen 1983).

<sup>47</sup> This international focus was emphasised when the CII hosted the annual conference of the Council of European Industrial Federations (CEIF) in 1970 (O'Hagan and Foley 1982).

<sup>48</sup> Ireland joined the International Labour Organisation (ILO) in Geneva in 1923. From the beginning, Irish employers through the FIE and then the FUE played an active part in the ILO gaining from the opportunities to view their approach to business in a wider international context and also from the relationships built up with other members of the Irish delegation, with senior trade union and public sector officials (Chubb 1992, p173).

<sup>49</sup> IBEC continues to take an international outward looking focus, actively participating in Business Europe, the pan European organisation for employers, and hosting a meeting of their governing council of Presidents in Dublin, and also continuing its long commitment to the ILO. IBEC also took leadership roles on behalf of business in promoting an open and outward looking stance in referenda on the Lisbon and Nice Treaties of the Europe Union.

growth, from the first agreement in 1987 but employers really became ‘full partners’ in the process with the formation of IBEC<sup>50</sup> (Hastings et al, 2007, p51).

By the late 2000s, IBEC had 7,500 members and there were approximately 60 business sector federations and associations within the organisation.<sup>51</sup> This organisation structure, combining direct membership and affiliated associations, strengthened the ties that bound the business community together and also facilitated information flow and exchange. Membership mirrored the developments in the economy covering a broad range of manufacturing and services areas. The traditional manufacturing sectors continued to play a major role in the work of the organisation. These included organisations for collaboration (OFCs) in the areas of food, alcohol beverage and industrial products such as plastics, paper and packaging. The role of one of these OFCs will be commented on further in analysis of clusters and cluster initiatives in the dairy sector in Chapter 6. New sectoral OFCs also emerged, focused on the development of the modern economy and covering areas such as pharmaceuticals, health and life sciences, and ICT (information and communications technology). The emergence of ICT Ireland and the role of the Irish Software Association (ISA) will be discussed further in Chapter 5. Mirroring global trends as Ireland achieved higher levels of economic development; the provision of services became a more important part of the economy. The evolution of IBEC also reflected this trend towards domestic and international traded services. OFCs in the areas of

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<sup>50</sup> Paddy Teahon, the former Secretary General of Department of the Taoiseach maintained that employers only became ‘full partners’ in social partnership process in the ‘John Dunne period’, John Dunne was the first Director General of IBEC from 1993 until 2000 and was instrumental in the forming of the organisation. (Hastings et al, 2007, p51).

<sup>51</sup> The signing of the Belfast Agreement in 1998 between the Irish and UK Governments, and the endorsement of that agreement by the political parties in Northern Ireland, led to greater political, economic and social cooperation between the Republic of Ireland and Northern Ireland (Forfas 2008, p4). Following this agreement, a new all-island agency ‘Intertrade Ireland’ was established to support trade between the two parts of the island.

Intertrade Ireland identified 110 business ‘networks and clusters’ (their definition of clusters, in particular, is rather loose) involving 9,860 primarily Small and Medium Sized Enterprises (SMEs). It broke these down into three main categories i.e. business networks (74), development networks (18) and regional business clusters (18) (InterTrade Ireland 2005). Forty percent of the 110 networks were supported by a programme called ‘Skillnets’, which was a joint initiative involving government, IBEC and trade unions, to enhance people skills in employment, funded from the Irish National Training Fund. Some of these Skillnets programmes were led by business and sector associations. While such networks can make a valuable contribution to firm development e.g. in the human resource training area, the question arises as to whether these networks will continue to exist once the substantial public funding, €55 million for the period 2005-2010 in the case of Skillnets, is no longer available to the network.

retail services, financial services and computer related and software services played a more significant role in the organisation.<sup>52</sup> In addition to representing the interests of large firms, IBEC also established the small firms association (SFA) to focus on the development of small and medium sized business in Ireland.<sup>53</sup>

The organisation also provided social capital bridges to government, with IBEC seeing its role in representing business being enhanced by inputs from the different sectors of the economy and their industry groups. The National Council of the organisation, made up of CEOs and senior executives of member firms, meets at least quarterly to review developments in the economy. Government ministers and senior civil servants meet with this IBEC council on a regular basis for an exchange of views on business and economic policy. The organisation has five divisions covering (1) sectors associations, (2) industrial relations and human resources, (3) finance, internal HR and IT, (4) corporate affairs and (5) policy. The policy division is broken into a number of units focused on policy development in the areas of (i) economics and taxation, (ii) environment, energy and climate change, (iii) international relations, trade and transport and (iv) innovation, education and social policy. Policy documents produced benefit from a combination of expert business insights from the individual firm executives who participate in IBEC policy committees, inputs from the various sector groups affiliated to IBEC and the expertise of IBEC policy executives.

The organisation also facilitates international connectivity for firms on business and policy issues. IBEC is a member of Business Europe, the confederation based in Brussels, which brings together employers and business organisations from the

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<sup>52</sup> A full list of IBEC business sectors and associations is available on the organisations website [www.ibec.ie/businessgroups](http://www.ibec.ie/businessgroups)

<sup>53</sup> Not a part of IBEC and in fact the second largest industry representative organisation in Ireland is the Construction Industry Federation (CIF). The CIF was founded in 1935 and by the late 2000s represented over 3,000 members covering businesses in all areas of the Irish construction industry. The CIF has 37 different affiliated associations that are grouped in four key categories: (i) General building and engineering contractors, (ii) Home Builders, (iii) Mechanical and Electrical Contractors, and (iv) Specialist Contractors e.g. roof, floor and tiling. The organisation and its members were particularly badly affected by the economic downturn and the collapse in the property market in Ireland at the end of the 2000s.

Also not a part of IBEC, ISME is an independent organisation for the Irish small and medium business sector, with over 8,500 members nationwide.

different countries of Europe. Senior IBEC executives participate in the key policy committees of the European confederation covering all major area of economic and social policy. This facilitates contact with the EU Commission and Parliament, and enables IBEC to bring Irish business concerns to the attention of political leaders and key officials within these organisations. For example, in April 2011 IBEC facilitated meetings between business leaders and the EU/IMF/ECB troika, to discuss Ireland's progress under the loan agreement and give the view of Irish business on the economic challenges that the country faces. Issues covered included the level of corporation tax, restructuring of the banking sector, labour market issues, public sector reform and job creation programmes (IBEC 2011a). Many individual sector OFCs within IBEC are also members of their respective European industry associations and executives working for these Irish associations participate in the work of these pan European groups. This delivers similar bridging social capital benefits for firms involved in the OFCs affiliated to IBEC at the sectoral level.

Finally IBEC represents the views of Irish business to the wider public through its website and in the media. IBEC's Director General and senior executives regularly speak at national and international conferences to promote Ireland as good place to do business. Individual sector OFCs, also communicate industry views for members via websites, print media, radio and television.

### **Concluding comments**

In the late 2000s, Ireland is a far more complex economy than it was 50 years ago, as the economy has been transformed from one highly dependent on agriculture to one that is much more broadly based, both in terms of economic activities and market focus. Organisational support for industry has also changed dramatically during that period. State agencies and business representative groups have evolved to service the perceived needs of the economy at different periods of development. This chapter has provided a new perspective on the evolution of these organisations with particular reference to the fragmented nature of the structure of state agencies. Like many evolutionary processes, learning is embodied in different stages of development and the path forward may require adjustments from time to time. The Report of the Special Group on Public Service Numbers and Expenditure

Programmes, published in mid-2009, supports the case for further rationalisation of the organisational structure of the state agencies. This should be done not only to increase cost efficiency but also to improve effectiveness of the supports for industrial development. The organisations representing business, encompassing business and trade associations, referred to as ‘institutions for collaborations’ by Porter and Emmons (2003) but better described as ‘organisations for collaboration’<sup>54</sup>, have also evolved in the Irish context as the economy has changed. In many instances, business sector federations and associations have evolved and emerged to match the needs of the economy, reflecting, for example, the evolution of the Irish economy from one based on agriculture to a much broader based economy.

This chapter also highlighted the need for a better understanding of clusters in Ireland and the contribution that cluster initiatives can make to building up systems of innovation in the Irish economy. Chapter 5 takes a closer look at the role of some business federations and associations within the ‘new modern Irish economy’ sectors of ICT and software, and considers collaboration with state agencies in clusters initiatives. Chapter 6 will explore this topic in the case of one of the more traditional indigenous sectors of the Irish economy – the dairy food and ingredients sector – and also consider an emerging cluster initiative involving industry, universities / research centres and a state agency.

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<sup>54</sup> See Chapter 2 for a detailed discussion on this point.

## **Chapter 5 Clusters, social capital and the building blocks of a national innovation system in the modern economy of Ireland**

Chapter 2 provided an overview of academic writing on the ‘cluster’ concept and proposed a framework and theoretical basis for understanding clusters initiatives and collaboration between firms and other actors in the economy. It drew on certain insights from institutional economics, with particular reference to the emerging ‘social capital’ concept. Chapter 4 outlined the economic context for this thesis and examined the evolution of state agencies, focused on industrial development, and business organisations for collaboration (OFCs) as examples of the potential social capital assets.

This chapter will look at the development of the cluster concept in the modern economy with particular reference to the ICT sector in Ireland. It will examine the role of OFCs in the building of social capital, of both a bonding and bridging nature, in the ICT and software sector. It will also explore social capital within state funded research cluster initiatives involving industry and the research community. Cluster initiatives involve different actors in the economy but they are not clusters in themselves, although they may support or help build clusters. Finally, it will examine a cluster initiative in the software sector that involved an OFC, the Irish state agency responsible for the development of indigenous industry and an internationally renowned university. In five case studies outlined in this chapter, the social capital concept and interviews were used to add depth to the analysis. A number of the case studies can be viewed in the context of the building blocks of a national innovation system in Ireland.

### **Section 5.1: The modern economy - Irish ICT and software clusters**

Ireland’s economic development since the late 1950s has been greatly assisted by the decisions of multinational corporations to locate the country. This, in turn, has been influenced by a range of factors including a favourable tax regime, e.g. the 12.5

percent corporation tax rate, and a highly skilled workforce. Access to European markets, which is greatly enhanced by Ireland's membership of the EU and the euro zone, is also an important factor. While these factors will continue to be important, government and business in Ireland are placing increasing emphasis on building a knowledge based economy. As section 4.2 of Chapter 4 outlined, a key focus of recent industrial development policy is developing science and technology capabilities. The role of SFI and its programmes in developing collaboration between enterprise and research organisations, referred to above, is evidence of a building block towards a 'national system of innovation' approach. A robust legal system and modern business culture are other institutional factors that enhance Ireland's reputation as a good location for the exploitation and protection of intellectual property. An effective legal system gives companies the confidence to invest in R&D type activities, with the knowledge that other companies will respect intellectual property rights not only for legal reasons but because they are also focused on innovation. The education system and support for creativity in general also contribute to the national system of innovation.

Two sectors in particular have been the focus of this science and technology focused industrial policy. The first is the pharmaceutical sector, much of which is located in the Munster and Leinster regions. In recent years, activity in this area has expanded into sub-sectors of bio-technology and medical devices, extending the geographical reach to the Connaught region. The second major area of focus is the information and communication technology (ICT) sector. Originally the ICT sector in Ireland focused on hardware manufacture and assembly, but increasingly the sector has developed in the direction of software and services provision. This chapter will focus primarily on the development of the ICT and software 'clusters' in Ireland, although one of the case studies in section 5.4 will examine collaboration in a state funded cluster initiative in the biotechnology sector. It will also take an in depth look at collaboration between the indigenous industry and Enterprise Ireland in a cluster initiative designed to enhance the competitiveness of Irish software SMEs.

In so far as an ICT cluster exists – and this issue is addressed below – it owes a significant part of its origin to the IDA's continuing success in attracting leading global computer companies to locate substantial manufacturing and services

operations in Ireland. In many cases these MNCs have established their headquarters in Ireland for their activity in European, Middle East and Africa (EMEA) regions. IBM and Ericssons established operations in Ireland in the mid-1950s. Hewlett-Packard (*hp*) and Analog Devices Inc first invested in Ireland in the mid 1970s. Microsoft, Intel and Oracle all set up operations in the mid- to late 1980s and Dell established an Irish base in 1990. Over the years many of these companies have expanded their investments in Ireland with a greater focus on R&D and services provision, rather than basic manufacturing. Success continued in the 21<sup>st</sup> century, with Google establishing its EMEA headquarters in Ireland in 2004. Facebook also decided Ireland was the best place to establish its new headquarters for the EMEA in 2008.

Green (2000) argued that, primarily due to the impetus provided by this globalised and sophisticated ICT sector, Ireland had recorded an average increase in export volumes of more than 12 percent per annum and a trade surplus in excess of 10 percent of GNP during the 1990s. This overstates the influence of the ICT sector, failing to give due credit to the pharmaceuticals and life science sector that has also attracted FDI to Ireland. The following facts from the Central Statistics Office (CSO) report on the information society and telecommunications (CSO 2009) indicate that the importance of the ICT sector to the economy is nevertheless very substantial:

1. The ICT sector total turnover was valued at €75.6 billion, which accounted for 24 percent of total industry and services turnover in Ireland. Almost 51 percent of this turnover was generated in manufacturing and 49 percent in services.
2. At €15.5 billion, value added in ICT accounted for 19 percent of the total for industry and services in Ireland.
3. The ICT sector in Ireland represented 8 percent of total persons engaged in industry and services. Approximately one third of these workers were employed in ICT manufacturing, while two-thirds were employed in ICT services.

During the 1970s and 1980s, ICT activity in Ireland was characterised by manufacture and assembly of electronic hardware. By the late 1990s a more complex



integration of manufacturing and software operations was beginning to emerge, evidenced by facts (CSO 2009) outlined above. The role played by the indigenous software industry in the 2000s is growing in significance, although the multinational ICT and software corporations continue to make a major contribution.

### **Electronic hardware and the decline of microcomputer assembly**

The manufacture of micro-computer and mainframe assembly began in Ireland during the 1970s. An analysis by Barry and van Egeraat (2008, p53) of the relative decline of this hardware sector and how Ireland responded to that challenge, revealed an extensive change of both firms and activities since the 1970s. Early firms, such as Digital and Amdahl, were replaced by new PC assembly firms in the mid-1980s and 1990s, such as Apple, Dell and Gateway (Barry and van Egeraat 2008, p45). By 1998, the Irish microcomputer assembly sector had reached its peak in employment terms of 6,719 jobs (van Egeraat and Jacobson 2004, p813). In the 2000s the PC assembly firms were coming under intense competitive pressure from lower cost locations in Eastern Europe and elsewhere. In 2001, Gateway closed its European manufacturing headquarters, which had been established in 1993, with the loss of 900 jobs in Dublin. Further evidence of the decline of the hardware assembly sector was provided by the Dell decision in 2009 to move production of computer systems for customers in the EMEA region from Limerick to its Polish facility. This resulted in the loss of 1,900 jobs to the Limerick region. These decisions by Gateway and Dell support the view that the concentration of micro-computer assembly plants in Ireland was more to do with low wages and fiscal incentives rather than being part of a genuine industrial cluster (van Egeraat and Jacobson 2006, p415).

### **An embedded ICT sector — the potential for cluster initiatives**

However, other firms have stayed in Ireland and adapted their business strategies to meet the new challenges. Decisions by these firms to expand high value-added functions, including in some case local R&D, provided evidence of a deeper level of embeddedness. It suggested that a change in Irish industrial strategy towards a ‘technology innovation’ route to cluster development might lead to ‘stickier’ or more

enduring industrial clusters (van Egeraat and Jacobson 2006, p415). From the mid-1990s onwards, companies like Apple, IBM, Compaq and Sun increasingly added functions to local operations. These included sales call centres and higher-end activities such as technical support call centres, shared services and software development (van Egeraat and Jacobson 2004, p828). By 2001, Apple's operations in Cork had been transformed from a manufacturing base to a services campus, with approximately 66 percent of the 1,200 workforce involved in customer support services, finance functions and logistics (Barry and van Egeraat 2008, p48). IBM during the course of the 1990s also moved towards an increasing focus on services. One-third of IBM staff worked on sales and support for the EMEA region with most of the remainder employed in its technology campus just outside Dublin (Cassidy et al 2009). As a result as many jobs were created in computer services and Business Process Services Export (BPSE) activities as were lost in the hardware sector during the early 2000s (Barry and van Egeraat 2008, p53). Many of these services jobs are higher-skilled, and not as dependent on low wages as the computer assembly type jobs of earlier decades, which may support more enduring cluster development in the ICT sector.

The production of electronic components, such as microchips, is also more highly skilled than computer assembly and represented a growing share of ICT activity in Ireland. The performance of Intel's Irish operation in the context of process development also provided evidence of embeddedness in the economy. Intel's decision to invest €2.5 billion in a new FAB 24 fabrication facility in Ireland, involving advanced 300 millimetre wafers on both 90 and 65-nanometer process technologies, provided a vote of confidence in Ireland as a location in the 21<sup>st</sup> century (Barry and Curran 2004, p911)<sup>55</sup>. However, the extent to which increased investment by Intel and other multinationals will lead to clustering, particularly with indigenous firms, is debatable. Görg and Ruane (2000) used econometric methodology to study backward linkages between firms and domestic sub-suppliers in the electronic sector. The Forfás definition they used is broad, effectively covering the whole ICT sector. Using data for the period 1982 to 1995 they found that foreign

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<sup>55</sup> Barry and Curran (2004) also pointed out Scotland, the other major location for the FDI in ICT in Europe, did not attract any new investment of a similar scale to the Intel investment in the Ireland at this time.

firms had lower linkages than indigenous firms. Their research also suggested that both foreign and indigenous firms increased their material linkages over time, the gap between them narrowing, and that linkages were stronger in the case of services firms than for manufacturing (Görg and Ruane 2000, p233). However, the limitations of the econometric study based on sample panel data meant that it could not be regarded as representative of the total population of firms in the electronic sector. Indigenous firms were underrepresented in the study (foreign firms made up 75 percent of the sample compared to 43 percent of the population), the exclusion of small firms led to an over-representation of large firms and the sample's coverage in terms of employment differed widely by sub-sector (Görg and Ruane 2000, p222). Furthermore, while the study commented on the level of linkages and their growth over time, the data available did not allow Görg and Ruane (2000, p222) to 'distinguish between linkages with domestically based Irish-owned firms and domestically based foreign-owned firms'. Supplementing the econometrics with a qualitative methodology, which focused on small firms and the distinctions between sub-sectors, could have provided richer and more definite evidence on the linkages between indigenous and foreign firms in the electronic industry in Ireland.

A second point to note is that multinational high-tech firms are not immune to economic recessions and, in July 2009, Intel announced the implementation of 294 compulsory redundancies at its older Fab Operations (IFO) facility in Leixlip, Co Kildare. This reflected a decline in demand for the less technologically advanced products produced at that facility. The Intel announcement attracted significant media coverage and raised concerns at both government and society level as to how embedded the company really was in Ireland. But Intel was keen to point out that the company remained strongly committed to Ireland, having invested more than €6 billion over 20 years and employed 4,500 at its Leixlip plant and a further 300 at its Shannon facility (RTE 2009). Intel management argued that reduced numbers employed in Ireland needed to be viewed in the context of the global economic recession of the late 2000s, and the closure of six Intel factories in the USA, China, Malaysia and the Philippines with a total loss of up to 6,000 jobs. Furthermore, in an interview in the Irish Times (Collins 2009), Jim O'Hara, General Manager of Intel suggested an increased focus on research activity in Ireland:

“Picture a scenario in five to ten years time where we have 600 or 800 people [in Shannon] doing research and development in the core of Intel’s road map, and we have thousands of people delivering the latest generation technology here. The combination of that really puts Ireland on the map for Intel Corporation as a really strategic piece of its core competency. I don’t see any reason why we can’t do that.”

This increased focus on R&D in Ireland by ICT multinationals is also supporting the development of research cluster initiatives in Ireland. The extent to which foreign owned ICT corporations have added R&D functions to their investments in Ireland, as they make the shift from manufacturing to internationally traded services, was examined by Grimes and Collins (2009). They concluded that there was evidence to suggest that foreign-owned ICT companies were interested in tapping into the knowledge resources of local economies. In Ireland this process was facilitated by the state through SFI developing focused research clusters involving linkages between both foreign and Irish companies and third level institutes (Grimes and Collins 2009, p64). As already outlined in Chapter 4, few sectors are within the remit of the SFI, namely ICT, biotechnology, medical devices and nanotechnology. Other major indigenous sectors, such as the food sector, are effectively excluded from receiving state support via SFI.

Grimes and Collins (2009, pp62-63) provided several examples of firms deeply embedded in the economy engaging in more R&D activities in Ireland. Nortel Networks evolved from manufacturing to an almost complete focus on R&D. In the case of IBM, a relatively small R&D operation in Ireland resulted not only in important collaboration with other companies and universities but also in important linkages with IBM labs in other countries. Within Ireland, R&D activity in the ICT sector is heavily concentrated in and around the Dublin region, but the potential of collaboration with universities and research institutes outside the capital is also important to recognise. For example, the Tyndall National Institute<sup>56</sup> played an

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<sup>56</sup> The Tyndall National Institute was founded in 2004 by the Department of Enterprise, Trade and Employment, which established SFI, University College Cork and the Cork Institute of Technology. Its focused areas of research include photonics, electronics, material and nanotechnologies.

important role in attracting investment in R&D to the Cork/Munster region, where both Xilinx and Analog Devices established design centres near the institute. These examples suggested economic benefit at regional and national level from collaboration. Section 5.4 below explores in greater detail the nature and benefit of social capital from collaboration between industry and universities in state supported research centres.

The microcomputer/PC assembly subsector relied substantially on low cost labour and could not survive in the long term in Ireland, as people became better educated and demanded higher wages. But, the research evidence above suggested that, other parts of the ICT sector became more embedded over time as companies moved towards the provision of traded services and a greater focus on R&D capabilities in Ireland. These higher-tech subsectors provided opportunities for higher skilled people and were not as sensitive to labour cost pressures as the computer assembly subsector. The research also suggested a positive role for collaboration between firms and research institutes, which as outlined in section 5.4 below, in a number of cases took place in cluster initiatives supported by the state organisation SFI.

### **Clustering in the ICT Software and services subsectors**

The decision of leading multinational corporations to locate in Ireland has been a key factor in the development of indigenous ICT services and the software subsectors. Green (2000) estimated that indigenous software firms achieved per annum growth rates of 11 percent in employment, 25 percent in the value of sales and almost 40 percent in the value of exports during the 1990s. An expert group report on future skill needs for the ICT sector confirmed that total employment in the sector increased rapidly during the 1990s, peaking at over 80,000 in 2000, declining in the early years of the 21<sup>st</sup> century before resuming growth in the mid-2000s (Forfás 2008, p20)<sup>57</sup>. The global recession of the late 2000s caused employment growth to decline once more.

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<sup>57</sup> The CSO in their Information Society and Telecommunications report (CSO 2009) estimate that the ICT sector in Ireland employed almost 87,200 people in 2006 representing 8% of total persons engaged in industry and services. Approximately one third of these workers are employed in ICT manufacturing, while two-thirds are employed in ICT services. This figure is nearly 25% higher than the Forfás figure of 70,000 people. Forfas comment that their estimates looks at individual companies

At the beginning of the 2000s, O'Malley and O'Gorman (2001, pp 318-319) concluded that the Irish indigenous software industry can be regarded at least as 'part of something rather like a 'cluster', in the sense used by Porter (1990)'. Their cluster study made a number of interesting findings. The 'seed' role, suggested by Porter for FDI in establishing a cluster, had a real significance in the case of the Irish software industry. Irish software firms were geographically concentrated in urban centres, particularly in Dublin but also around other cities such as Cork and Galway. All four elements of the diamond model had impacted on the competitive performance of Irish software firms. Factor conditions such as the Irish education system and companies' own staff training and development (supported by state agencies) had been important. Domestic demand conditions were a positive influence in developing competitive advantage for the majority of software firms, although for a minority of software firms with a strong export focus from the start, domestic demand was of little or no relevance. Significant related industries, such as foreign owned computer and telecommunications subsectors, provided help in developing labour skills and, at times, valuable work experience. For some indigenous software firms, related industries actually provided a formal business relationship. In the areas of strategy, structure and rivalry, most indigenous Irish software firms had 'appropriate strategies of specializing and developing expertise in market niches, which appears to give them a sustainable position' (O'Malley and O'Gorman 2001, p318).

Table 5.1 breaks down ICT employment by both subsector and whether the companies covered were Irish or overseas owned. The table is based on analysis of employment data compiled by Forfás (2008), which estimated the total employment in ICT at just fewer than 70,000 in 2006.

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and assess whether or not they are part of the ICT, rather than including all employment within a particular NASC code.

**Table 5.1: ICT employment by sub-sector and company ownership**

<b>Sub-sector</b>	<b>Irish Owned</b>	<b>Overseas Owned</b>	<b>Total</b>	<b>Sub-sector Share of Total</b>	<b>Irish Owned Share of Subsector</b>	<b>Overseas Owned Share of Subsector</b>
				Percent	Percent	Percent
<b>Software</b>	11,545	15,866	27,411	39.6	42.1	57.9
<b>IT Services</b>	1,119	1,803	2,922	4.2	38.3	61.7
<b>Web</b>	316	3,404	3,720	5.4	8.5	91.5
<b>Electronic IC Design</b>	494	1,881	2,375	3.4	20.8	79.2
<b>ICT Storage Media</b>	0	329	329	0.5	0.0	100.0
<b>Electronic Hardware</b>	3,011	18,087	21,098	30.5	14.3	85.7
<b>Semiconductor Production</b>	164	5,884	6,048	8.7	2.7	97.3
<b>Automation / Control Services</b>	1,393	128	1,521	2.2	91.6	8.4
<b>ICT Distribution</b>	987	1,081	2,068	3.0	47.7	52.3
<b>Financial Service Unit of ICT Company</b>	0	544	544	0.8	0.0	100.0
<b>Business Process Outsourcing</b>	154	399	553	0.8	27.8	72.2
<b>Shared Services of ICT Company</b>	0	622	622	0.9	0.0	100.0
<b>Total</b>	19,183	50,028	69,211	100.0	27.7	72.3

Source: Based on Forfás, 2008, p24.

The data provided further evidence of the importance of the software sector and the Irish ownership of that subsector. By 2006, software companies accounted for 39.6 percent of total employment in the ICT sector compared to 30.5 percent in electronic hardware and 8.7 percent in semiconductor production. Employment in Irish owned software companies accounted for 42.1 percent of employment in the subsector versus 57.9 percent in foreign owned companies. This employment pattern was a

significant contrast to the electronic hardware subsector, where Irish owned companies accounted for 14.3 percent of employment while foreign owned companies accounted for 85.7 percent.

The contrast was even more pronounced in the case of the semiconductor subsector, where Irish owned companies accounted for a very modest 2.7 percent of employment versus 97.3 percent in foreign owned companies. Table 5.1 also illustrates that significant numbers of Irish people were employed in the provision of a range of ICT services.

Furthermore, in the case of ICT services, while the gap in productivity between foreign and Irish owned was still substantial, it was far less so than for ICT manufacturing. Average GVA (gross value added) per person engaged in foreign owned services enterprises was €190,800, approximately 2.6 times that in Irish owned enterprises at €72,340 (CSO 2009a, p10).

In addition to the importance of software and ICT services for employment, these subsectors also played an increasingly important role in terms of exports. The value of Irish exports of internationally traded services increased from €21.5 billion in 2000 to €66.6 billion in 2009, and accounted for 45% of total Irish exports. Exports of computer related services, including software, valued at €24.2 billion in 2009 by the CSO, accounted for the single biggest category (IBEC 2009, p2).<sup>58</sup> This increase in exports of computer related services was important, not least because of the decline in merchandise exports of ICT at the end of the 2000s with the closure of the Dell plant in Limerick.

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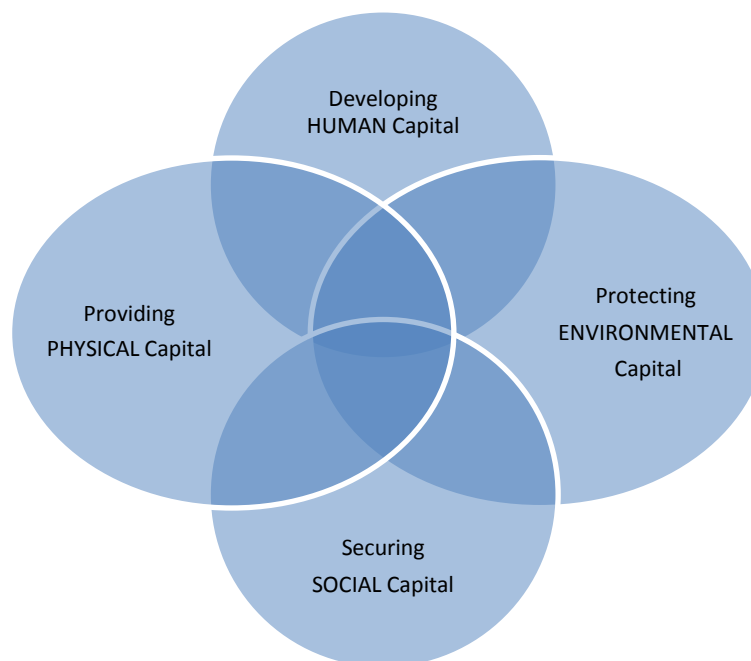
<sup>58</sup> Other key export categories in 2009 included Financial (€5.7 billion), insurance (€7.6 billion) and business (€20.5 billion) services.



## Section 5.2: Social capital and Organisations for Collaboration (OFCs): ICT Ireland and the Irish Software Association

By the end of the 2000s, all sectors of the Irish economy, including ICT and software, faced significant challenges due to the economic recession and the collapse of the Irish banking system. In December 2008, the Irish government, in part response to the economic downturn at that time, published a framework for sustainable economic renewal entitled ‘Building Ireland’s Smart Economy’. The smart economy is described as combining ‘the successful elements of the enterprise economy and the innovation or ‘ideas’ economy, while promoting a high-quality environment, improving energy security and promoting social cohesion’ (DOT 2008, p7). The primary objective of the document was to outline a pathway, which acknowledged the severe challenges facing the economy, to return to sustainable economic growth in the medium term (DOT 2008).

**Figure 5.1 Accumulated capital in a Smart Economy**



Source: DOT 2008, p33.

The framework (Figure 5.1) outlined that ‘smart economic growth recognises the interdependence between four forms of capital accumulation that drive the economic

and social progress of a nation' (DOT 2008, pp32-33). Despite the inclusion of social capital as one of four types of capital accumulated in order to drive economic growth, the document exhibited only a partial understanding of the concept.

It defined social capital in an all encompassing way as 'the networks, connections, mutual trust and shared values and behaviours of the population' (DOT 2008, p32) but failed to elaborate on what this actually means. The document set down objectives to 'increase significantly the capital and business networks for start-up research-intensive enterprises' (DOT 2008, p61) and argued that 'networks are key drivers for turning research and innovation into valuable commercialised products and services' (DOT 2008, p62). It stated that:

'Smart Capital' can be defined as (a) adequate levels of early stage funds for SMEs; (b) providing value-added networks to key decision-makers; and (c) experienced investment managers. (DOT 2008, p64).

But no consideration is given to how such value-added networks can be created or supported. No distinction is made between bonding and bridging social capital or between structural and cognitive forms of social capital. In fact in the 104 page document, there is essentially no discussion of how social capital works in the business or any other context. Apart from the all encompassing definition above, the only other reference to social capital is that Ireland as an attractive place to live and work is 'supported by recent investment in social and cultural infrastructure as well as historic social capital in voluntary (e.g. sports and cultural) organisations' (DOT 2008, p63). The framework document will do little to support the development of the value-added networks it defines as an integral part of 'smart capital.

Chapter 2 reviewed key literature streams on the emerging social capital concept and the analysis undertaken in this and subsequent sections will apply learning from this literature to understanding collaboration in the modern economy.

Throughout the economic challenges of the late 2000s, the ICT sector remained a key sector of the Irish economy. Sections 5.1 provided evidence of an evolving sector, with a significant number of multinational and indigenous firms becoming

more embedded in the economy. The multinational subsector had evolved from an initial focus on microcomputer assembly to a more complex combination of high tech production and services. Indigenous software firms were also becoming embedded in clusters concentrated in urban centres.

In order to understand the role of social capital in the ICT sector in Ireland, one has to go back to the beginning of the 2000s when industry representation in the ICT sector was rather fragmented, with several OFCs representing different ICT subsectors. The American Chamber of Commerce represented the interests of US multinational corporations, including ICT corporations. The Irish Software Association (ISA) represented the interests of multinationals and indigenous software firms. There were also a number of other associations representing a range of areas connected to the ICT sector. But there was no one organisation focused on the needs of the ICT sector as whole. Consequently, in 2001, the Irish Business Employers Confederation (IBEC) formed a new OFC, ICT Ireland, to represent the interests of the overall ICT sector. In this case IBEC acted as a broker between the different ICT subsectors to bridge what Burt (1997, 2004) might describe as the structural gaps that characterised business representation in the sector.

### **Case study 1: ICT Ireland and ISA - bonding social capital**

Coleman (1994, p302) saw social capital as building up ‘social structural resources’. This case study illustrates that structure can be an important aspect of building ties between firms in organisations for collaboration (OFCs) and facilitating bonding social capital, where reciprocity is inherent in the relationships developed. However, it also suggests that structure alone is not sufficient; shared norms and values, such as the recognition of the importance of reciprocity and belief in the network, described by Krishna and Uphoff (1999, p7) as cognitive social capital, is also important.

ICT Ireland comprised over 300 foreign-owned and indigenous companies from the hardware, software and telecommunications subsectors. Six industry associations affiliated to the new umbrella organisation. These covered areas such as software,

telecoms and the internet, cellular phones, the audio visual industry and consumer electronics. ICT Ireland was made up of a large number of firms, some who directly competed with each other in the marketplace and others who complemented each other in the supply chain of technology. There were also differences in terms of market focus, for example telecommunication companies mainly focused on the domestic Irish market while the ICT multinationals focused on Europe, the Middle East and African (EMEA) markets. In a sector with such large numbers of companies focused on different aspects of technology and different markets, companies' knowledge of each other and relationships of trust varied quite considerably. In effect, the information necessary to facilitate cooperation for mutual benefit and the norms of reciprocity inherent in social networks (Putnam 1995, Woolcock 1998) were underdeveloped in the sector.

Chapter 2 discussed the distinction between structural and cognitive social capital. Structural capital facilitates mutually beneficial collective action (MBCA) through social networks supplemented by rules, procedures and precedents, while cognitive social capital predisposes people toward MBCA on the basis of shared norms, values, attitudes and beliefs (Krishna and Uphoff 1999, p7). The structure of the new ICT Ireland organisation (Figure 5.2) was important in strengthening the bonds between firms that would facilitate coordinated action to achieve desired goals for the sector. A governing council of ICT Ireland was formed, composed of CEOs who represented multinational and indigenous members and their various subsector groups. An ICT Chairman was appointed from among the membership of this council, which would meet twice a year to review and agree overall policy and the progress of the organisation.

The strengthening of bonds was most successful between ICT multinationals and the software subsector, which was represented by the Irish Software Association (ISA). These firms were focused on delivering sales internationally, although the market penetration of the indigenous software sector was far less developed than that of the ICT multinationals. However, the ICT Ireland objective of strengthening bonds was not equally successful in all cases. For the telecommunication subsector, major companies maintained their seats on the governing council of ICT Ireland but social

capital ties with the other subsectors remained relatively weak. As Interviewee 5A commented:

“Vodafone and O2 here are predominately serving the Irish market. The guys in Microsoft, Google etc. are serving the Irish market, but also the EMEA markets and even some global markets. Therefore the issues for the multinationals who are the IT part of ICT are different to the telecoms...When an issue comes up that is interesting to them they will take part but their agenda is ...covered through the TIF structure, but the Director of TIF and a lot of the CEOs are still on the governing council of ICT Ireland.”

Therefore, the telecoms companies largely focused on developing the Irish market and preferred to maintain a higher level of independence from ICT Ireland than other sub-sectors, through their Telecommunication and Internet Federation (TIF) organisation. TIF maintained its organisational structure quite separately from ICT Ireland, serviced by a different team of executives. Two additional affiliates of ICT Ireland, the cellular phone and audio visual groups, were also run by TIF’s Executive Director and his team.

There was a far higher degree of integration between the two organisations ICT Ireland and the ISA, with both serviced by the same Executive Director and executive team. The structures of ICT Ireland and the ISA were similar (see Figure 5.2 and 5.3 below), with a governing or executive council at the top of each organisation, to which working groups reported. The working groups of the two organisations were important in building bonds between members, with each group comprising industry specialists from ICT and software companies. The working groups, in each case supported by the appointment of a chairperson and the recording of minutes and action points, facilitated substantial information sharing and collective action in a range of different areas. For example, the ICT Ireland organisation established a public affairs group to work with the governing council in preparing for high level meetings and to coordinate the organisation’s interaction with third parties.

Figure 5.2: ICT Ireland: OFC council and working group structure - bonding social capital

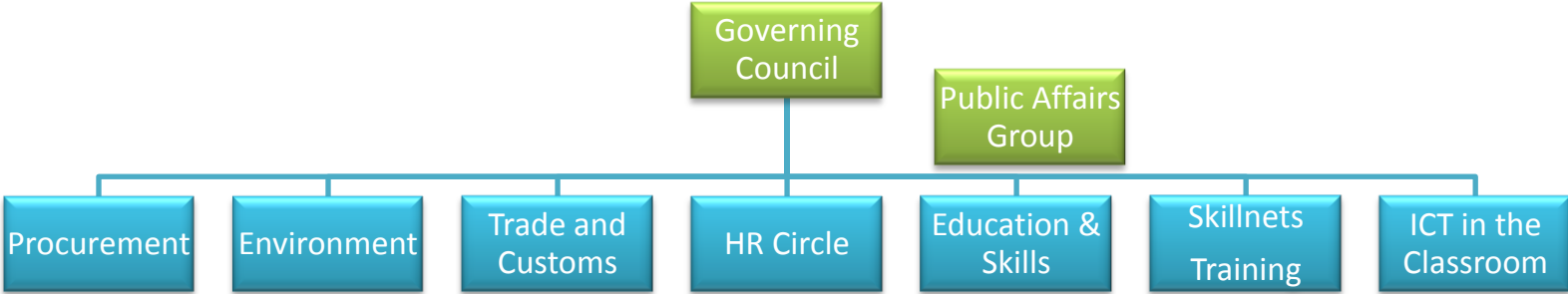
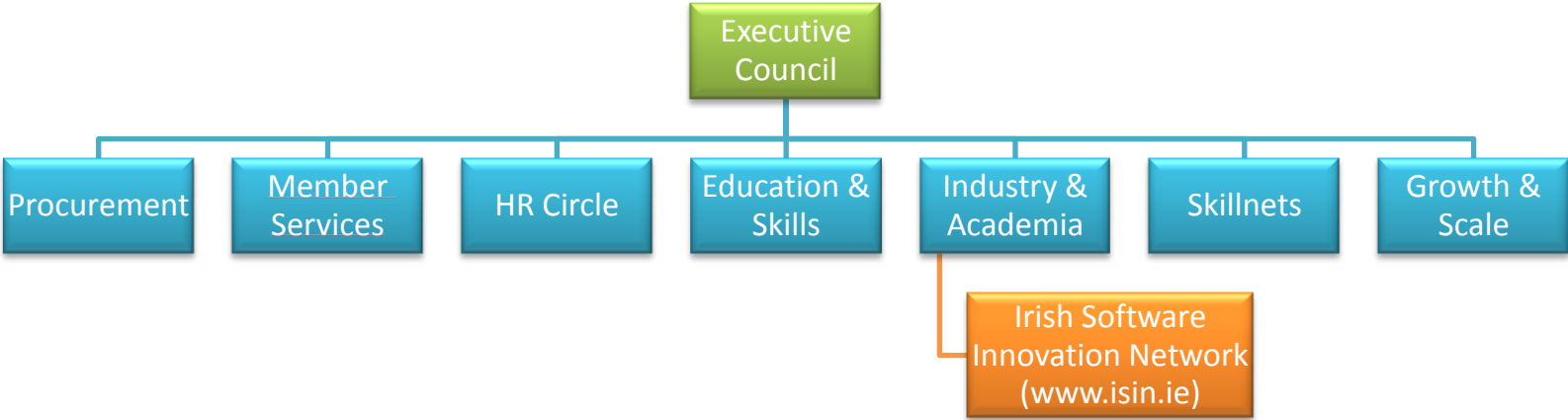


Figure 5.3: ISA Ireland: OFC council and working group structure - bonding social capital

Source: ICT Ireland



Interviewee 5A outlined that:

“We set up the public affairs group to serve two purposes. One is to help us prepare for our clearing house meetings<sup>59</sup>, where we deal with a lot of the current issues with the Department of Enterprise, Trade and Innovation. The second is to act as a coordinating body for our engagement with high profile external bodies such as parliamentarians, government departments, agencies etc. They try to capture the main themes that the Governing Council discuss and guide us in terms of public affairs action in relation to those themes.”

The ICT Ireland governing council wished to encourage more students and graduates to consider a career in the ICT sector. So the public affairs group prepared a position paper that outlined the skills needed, the number of jobs available etc and met with key education journalists to encourage them to cover the issue in media articles targeted at students. According to Interviewee 5A, the group proved to be a significant asset to the ICT Ireland organisation, leveraging off the substantial knowledge and skills of public affairs managers from major multinational corporations such as IBM, HP and Intel.

The working groups also made a significant contribution in terms of building ties and social capital bonds between ICT Ireland members in a range of areas. For example, members of the trade and customs working group included both ICT multinationals and software providers. It focused on understanding and implementation of new electronic custom procedures developed at EU level. Members worked together to influence how these new procedures were introduced in Ireland to replace the paper based export and imports control systems. The group elected its own Chairman who, together with an ICT Ireland executive, prepared agendas and working papers for meetings. One benefit for group members was coming together with industry peers to interpret new EU legislation and customs rules, instead of trying to interpret new procedures in isolation. Interviewee 5B, a

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<sup>59</sup> The clearing house structure between ICT Ireland and Department of Jobs, Enterprise and Innovation is explored in details in the next section.

working group member and chairperson, commented in this regard that:

“This provides cross fertilisation of ideas and potential concerns. In one instance where a new export control SI [Statutory Instrument] was being drafted, ICT Ireland was able to ensure a potential unintended catch-all was refocused to the primary target and [would] not side swipe other exports. It was much easier to do this at inception rather than by a introducing a clean-up amendment [to the SI at a later date].”

Therefore, members of the trade and customs working group were able to learn about these new rules as they were being developed, which placed their firms in a strong position to be at the forefront of introducing new electronic procedures. This yielded benefits for the firms themselves in terms of their own export and import procedures. It also meant that indigenous software firms, who had been involved in the ICT Ireland working group, were in a stronger position than their non-group competitors to develop new software packages and services in the customs area. They could then sell these packages and services to client companies across Irish industry, who would need to introduce the electronic export and import controls in order to comply with new EU legislation.

Discussions with Interviewee 5A indicated that other ICT and ISA working groups operated in a similar way to that described above and helped to strengthen membership bonds in areas such as procurement and environment. Coleman (1988, pS98) defined a bonding form of social capital by its functions and the ICT Ireland structure facilitated information sharing, discussion and collective action on issues of a highly technical nature through its working groups. In effect, the ICT working groups strengthened bonds between the different individuals and firms involved and yielded both private and public social capital benefits. Further evidence of the close bonds built up within the ICT and ISA structures was that the two organisations shared certain working groups on HR and Education and Skills. This facilitated a significant level of joint activity when collaborating with other actors such as government. Discussions with both Interviewee 5A and 5B emphasised the importance of achieving the commitment of a number of firms in committees and working groups. If one firm dominated, in terms of input or control, or if different



group members did not feel that there was a genuine level of reciprocity, then the committee or working group was unlikely to be effective in the medium to long term. This suggested that structure alone was not sufficient. Shared norms and values, such as the importance of reciprocity and belief in the network, described by Krishna and Uphoff (1999, p7) as cognitive social capital, were also important.

Before concluding this section, it is appropriate to focus briefly on the Irish Software Association (ISA), which was founded in the 1970s. The ISA chose to work closely with ICT Ireland and benefited significantly from social capital interaction within the latter organisation's structure. For example, ISA member collaboration with the multinational members in ICT Ireland committees and working groups increased their access to top level government officials. ISA members also benefited from the opportunity to collaborate with companies at different points along the ICT supply chain, strengthening the bonds that tied the combined ICT and software sector together. However, the ISA organisation also maintained its own identity and continued to service the needs of around 200 software company members. The ISA has its own Council, Chairperson and working group structure (Figure 5.3) to work on issues of concern and advance the specific interests of their subsector. In the case of the ISA, the mix between multinational software corporations and indigenous software SMEs was an important characteristic of the organisation, as Interviewee 5A commented:

“Google, Microsoft and Oracle are on our ISA Executive Council, so it is made up of a mix of multinationals and [indigenous] SMEs. In the software community, everything is inextricably linked in the software ecosystem in Ireland. So you require both, they both gain mutual benefit off each other.”

Strong ties bind a network together and motivate people to help others and to work together (Granovetter 1973, 1983). This case study indicated that ICT and software firms worked together effectively to strengthen ties within their sector. The ICT Ireland structure, with its governing council, public affairs and working groups, facilitated coordinated action to achieve desired goals for the firms involved. The ISA organisation structure facilitated a focus on issues of specific interest to software entrepreneurs. Field argued that ‘social capital may be termed capital insofar as it

gives rise to resources that can be deployed in order to enable actors – both individual and groups – to pursue their goals more effectively than they could without it (Field 2008, p159). The bonding social capital achieved by ICT Ireland and the ISA choosing to work closely together, yielded benefits for multinational and indigenous information technology and software firms, satisfying the criterion outlined by Field. The same cannot be said in the case of telecommunications firms who maintained weaker ties with ICT Ireland and largely pursued their sub-sector interests within their own organisation, TIF.

## **Case Study 2: ICT Ireland and the ISA – bridging social capital**

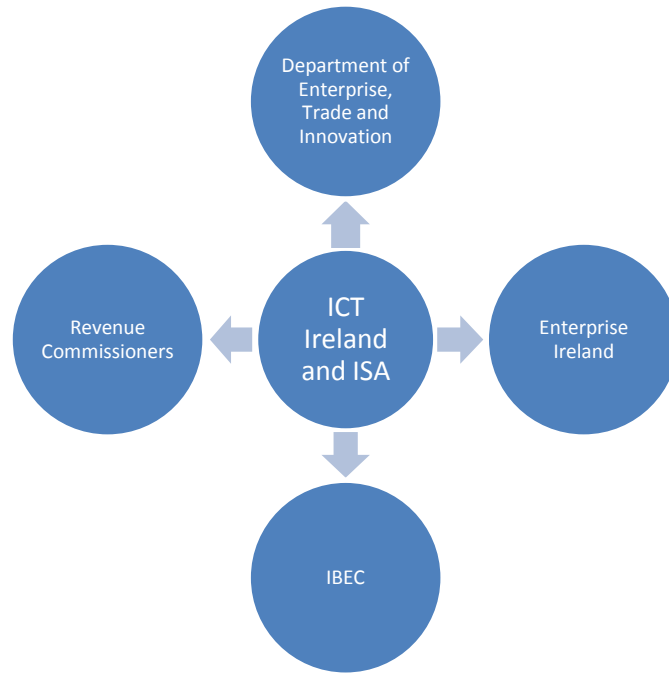
This second case study shows that the OFCs ICT Ireland and ISA also facilitated bridging social capital (Figure 5.4). Chapter 2 discussed the distinction between bonding and bridging social capital, with the former providing denser networks and the latter creating larger networks (Putnam 2001, Sobel 2002). Bourdieu's (1986) conceptualisation of social capital focused on the benefit of external relations and equated the volume of social capital possessed by any given actor as depending on the size and extent of network connections. Nooteboom (2007) emphasised the relationship between groups, rather than within groups, as the most relevant relationship in social capital terms. This case will provide examples of how ICT Ireland and the ISA extended their network of relations and connections beyond their own industry sector. Putnam (1995) saw an integral role for trust among networks that facilitate coordination and cooperation for mutual benefit in his definition of social capital, while Burt (1997) highlighted the advantage of being the broker in relations between people otherwise disconnected in social structures. This case illustrates that, at least in one instance, the respect gained by ICT Ireland and the ISA as organisations for collaboration that could be trusted by government and its agencies helped deliver that broker advantage. However, in other instances, trust was seen as something developed within a bridging social capital relationship.

### **The Customs Consultative Committee (CCC)**

This first example of ICT Ireland engaging in extending its network of connections involved the trade and customs working group referred in case study 1 above. The

group selected its Chairman, who came from an ICT multinational, an indigenous software firm member and an ICT Ireland executive to represent their interests on the national Customs Consultative Committee (CCC) established by government.

**Figure 5.4: ICT Ireland and ISA: broker advantage – bridging social capital**



Source: Author's diagram

The CCC was chaired by an assistant secretary general of the Irish Revenue Commissioners and there was active industry participation in the committee. The CCC structure gave ICT Ireland<sup>60</sup> regular access to such high-level officials who were not only influential in a national context but who also represented Ireland at EU Commission meetings, where new customs rules were developed. This aligns, at the group level, with Bourdieu's (1986) idea that an actor's social capital is extended by the volume of capital possessed by those to whom the actor is connected. As highlighted in case study 1 above, social capital benefits for group members were

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<sup>60</sup> The author was IBEC's representative on the CCC between 2007 and 2010, and worked closely with the ICT Ireland representatives on the committee.

enhanced by increased understanding of new customs rules. The bridge that the CCC created with the revenue commissioners facilitated this with ICT Ireland bringing back information to their working group members and bringing forward industry concerns to the CCC. There were also broader bridging social capital benefits from the ICT Ireland involvement in the CCC, spanning the gap between industry managers and the network of customs officials responsible for introducing new procedures. Interviewee 5B, an ICT Ireland working group chairman and member of the CCC, commented that:

“The fundamental benefit of ICT [Ireland] is our ability to develop trusting relationships at an executive level with customs and trade enforcement agencies, where each party gets to understand the other to a degree not otherwise possible.”

This facilitated the dissemination of information on customs procedures to industry in general, helped to prepare firms to meet these new challenges, helped custom officials to understand the challenges that new procedures would present to firms and helped to resolve differences between the two groups when they arose. The quotation above suggests that trust was an outcome of engagement in the CCC structure, or at least developed within it, rather than a precursor of it. It also aligns with Woolcock’s (2001, p9) assertion that we invest in the social capital networks that produce trust, rather than trust in and of itself.

### **The ICT Clearing House**

A second higher level example of bridging social capital was the ‘clearing house’ established in the late 2000s by the Department of Enterprise, Trade and Innovation (DETI)<sup>61</sup> and ICT Ireland. Under this structure the DETI Secretary General met with a high level delegation from ICT Ireland on a quarterly basis to help solve problems facing the sector. The Secretary General invited senior officials from his own department or from other government departments depending on the items on the agenda for discussion e.g. education, tax credits and accounting rules for R&D, procurement (DETI 2010). The ICT Ireland delegation comprised the Chairman and

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<sup>61</sup> In 2011, the name of the department changed to the Department of Jobs, Enterprise and Innovation (DJEI). The change had no immediate impact on the clearing house or the way it operated.

CEO members of ICT Ireland's governing council, including the ISA Chairman, and senior company managers from the organisation's Public Affairs Group.

When asked why the interaction between the DETI and ICT Ireland in this clearing house structure was valuable, Interviewee 5A from the industry side commented:

“Because things get actioned and completed very quickly. The set up is there to deal with crucial issues that come up. The relationship has been built up over time, they trust us and understand quickly what the issues are ... It's a very open debate as to what might work, what won't work and identifying solutions. It is an open discussion, open engagement that works quickly and is also very pragmatic.”

This view of an open engagement built on trust was also reflected in an interview with a high level civil servant covering the clearing house structure and other processes of collaboration with industry. Interviewee 5C from the state side commented:

“Trust is a huge aspect of collaboration ..; very often we are taken into spaces that are quite sensitive. ... being able to trust people..that [sic] will respect confidences, that [sic] will not run off issuing press releases in the middle of a process. ...If trust is solid and maintained, it allows people...to be much more open, constructive and prepared to go into areas... that they might otherwise be nervous of. Where trust is strained or begins to break down, I would say that it would seriously impair the capacity of the government side to be as open and engaged in these kind of collaborative environments as they ideally should be.”

Therefore, in the context of the clearing house, trust could be seen as a cause of social capital rather than an outcome, which aligns with Putnam's definition (1995) that trust facilitates cooperation for mutual benefit. This contrasts with the social capital of ICT Ireland where the structure of the organisation (Figure 5.2) strengthened bonds, with increased levels of trust between firms being an outcome. However, the quotation from Interviewee 5B above in relation to the ICT Ireland

working group involvement in the CCC committee suggested that, in certain instances, bridging forms of social capital can build relations of trust as well as being based on such relationships. Nooteboom (2007, p33) emphasised that social capital requires investment in terms of effort and sacrifice and that trust cannot be bought and installed, which suggests in many instances trust may need to develop over time.

Furthermore, the clearing house structure certainly enabled the trust that existed between ICT Ireland and the DETI to be secured and enhanced. ICT Ireland could raise industry concerns at the highest level with the government department most closely aligned to the development of their sector. Once an issue was discussed with the Secretary General, further lower level meetings were set up with relevant officials and ICT Ireland to work on solving the problem identified or advancing a particular item (DETI 2010). This had distinct bridging social capital benefits for ICT Ireland members because not only were industry issues discussed at the highest level but also follow up action was taken with the endorsement of the DETI Secretary General. As Interviewee 5A from the industry side commented:

“Then we can have further meetings [with other officials] but the important point is that we are not going to these individuals as a cold call. Essentially the Secretary General has said to these people, be they Assistant Secretaries or Principal Officers in the DETI or other departments, this is a key issue for the department and a key issue for the ICT Sector. That tends to get things done more quickly.”

Woolcock (1998), in his definition of social capital, emphasised that norms of reciprocity inherent in one’s social network were important. The above comment by a senior organisation executive indicates that industry gained significant value from the clearing house relationship. The ICT clearing house and other collaborative processes were also valued by the state side, as Interview 5C commented:

“We see, from the state side, collaboration as absolutely intrinsic and essential to develop the business environment in which we are trying to create growth, whether it is in the research space or with a sector such as ICT or Pharma or Financial Services. It is absolutely imperative that there is

collaboration, an interaction, cross fertilisation and understanding of where business is coming from. I think it is terribly important for business to understand where the state is coming from. ....but it would be a fatal mistake for the state to stand in some form of isolation and decide what is good for business unilaterally.”

The above quotation also illustrates once again, similar to case study 1, that structure on its own is not sufficient to create bridging social capital. Cognitive social capital predisposes people towards mutually beneficial collective action on the basis of shared norms, values, attitudes and beliefs (Krishna and Uphoff 1999, p7). The attitudes to collaboration and the value placed on developing such relationships expressed by Interviewee 5C from the state side, and shared by the industry side (see below) were important in achieving the bridging social capital within the ICT clearing house structure. The shared nature of these attitudes and values, between state and industry actors, once again suggests the importance of reciprocity in such bridging social capital relations.

In addition to benefits to companies in the sector, this bridging social capital interaction between the government department and ICT Ireland also had broader societal benefits. The education area is an example of how private and public social capital benefits can at times converge. From the ICT Ireland perspective, a world class education system was a key strategic objective in ensuring that Ireland remained a competitive location for investment by both foreign and Irish owned firms. A better education system would not only address the skills needs of the sector and further embed the ICT and software clusters in Ireland, but could also contribute to building a national system of innovation. Interviewee 5A added:

“There is an understanding that achieving economic goals allows us to achieve social goals. There is a real collegiality in the room that both sides see it as honest discussion in order to improve Ireland’s prosperity.... From the companies’ perspective, improving Ireland’s education system would be the biggest social goal, which is important for whatever sector or part of society you are coming from. For the ICT sector, a ‘world class’ education system is an incredibly strong competitive advantage. It attracts and holds

companies here. From a social perspective a well educated society is very important for a whole range of different reasons.”

The above quotation from Interviewee 5A, from the industry side, provides further evidence of the importance of cognitive social capital and reciprocity, here reflected in shared values and beliefs in improving Ireland’s prosperity and education system, with benefits not only for the sector but for broader society. At times, ICT Ireland member firms have been outspoken critics of the Irish educational system, second and third level, with the objective of keeping standards achieved at the level required of an innovation driven economy. Jim O’Hara, Vice President of Intel Corporation and Intel Ireland General Manager in an interview with the Business & Finance magazine emphasised that it should be the policy to make the Irish education system among the best in the world and stated that:

The other aspiration we should have is that enough bright young students are pursuing disciplines, science, engineering and technology, that are strategically important to the country. Industry can play more of a role here by showing students what the future can look like in areas like pharma, information technology and engineering (Walsh 2009).

In this context, ICT Ireland worked in collaboration with a number of schools and member firm executives to inform students of career opportunities in the ICT sector. Putnam (2001) argued that, at least in some instances, social capital results in ‘demonstrable externalities’ or public goods, in addition to benefits to the people involved in the networks. ICT Ireland’s commitment to improving educational standards and its work with schools is evidence of a bridging social capital that extends far beyond the industry sector itself. The organisation was a strong advocate for a focus on maths and science in second level education. ICT Ireland, bridging social capital linkage with the broader business group IBEC (discussed below), was also important in pursuing this objective. Both IBEC and ICT Ireland welcomed the decision by the Irish government to award an additional 25 points to honours maths in the leaving cert from 2014 onwards.



The DETI clearing house structure is an example of how the state worked with the ICT and software community to advance ideas and address problems to the benefit of both sides, with reciprocity inherent in the relationship. Interviewee 5C referred to further examples of this form of bridging social capital involving both the state and industry in Ireland such as the Company Law Review Group and various task forces set up for a defined period of time to address a particular issue and produce recommendations for government e.g. Innovation Task Force. There was no standard model for choosing partners for these various initiatives. One of the strengths of social capital is that it emphasises resources that communities already have and encourages the state to work with, and build on, this potential (Woolcock 2001, p15, Field 2008, p141). Sometimes the state side worked with organisations for collaboration such as in the ICT and Financial Services Clearing House structures. At other times, for various task forces, the state chooses specific public and private sector partners depending on the item being addressed e.g. innovation, taxation, company law etc. Coleman (1994) and Woolcock (2001) both saw social capital, which resides in relationships, as complementary to human capital, which resides in individuals. In the various social capital relationships outlined by Interviewee 5C there was evidence that the state side saw benefit from working with, and leveraging off, the human capital resources in the business community:

“We are leveraging off the knowledge, the expertise, and the intellectual capital of the people who are out there. The state side brings its offering and capacity to the table, to legislate, to develop policy, to adapt the taxation system or whatever it might be. We try to use the cutting edge expertise of the people who are closer to the market, the people who live the challenge everyday of making decisions on major investments, trying to gain export sales, trying to compete themselves with competitors around the globe.”

The clearing house operated in a different way to organisations for collaboration such as ICT Ireland and the ISA. The clearing house model did not involve the formal establishment of working groups, although items discussed were advanced at follow-up meetings at a lower level between industry and the state. For the clearing house, interviewee 5C viewed structure as relevant in terms of getting the right people involved, an appropriate balance between public and private sector, getting

the right working methodology and timelines to ensure effective outputs.

Interviewees from both the state and industry side emphasised flexibility to enable different participants and experts to attend meetings, to share specialist knowledge in areas such as taxation or education, depending on the agenda. Trust was seen as an important precursor of this bridging social capital, with any breakdown in trust between partners seen as limiting the openness and potential benefits of the collaborative engagement.

### **ISA and Enterprise Ireland**

A third example of bridging social capital involved the ISA, the organisation for collaboration for the software industry, working with Enterprise Ireland, the state agency responsible for the development of indigenous SMEs. This collaboration with the state goes back many years with the ISA organising trade missions with the National Software Directorate, a state body that preceded the establishment of Enterprise Ireland, in order to build linkages with US companies (Ó’Riain 1997, p202). Given the large number of SME members, the ISA was keen to help companies build scale and gain access to funding from state agencies and government programmes. Cooke (2007a, p83 and p104), in his regional analysis of social capital in the UK, emphasised the importance for SME development of developing close linkages to programme executives responsible for government funding support and investment grants. Interviewee 5A, commenting on the importance for the ISA of developing its relationship with the state agency, said:

“It is one of the platforms for the executive, the council and the chair of the ISA to develop linkages with Enterprise Ireland. So, for example, every couple of months we meet with the head of the software division in Enterprise Ireland and run through our agendas together etc. ... Collaboration is not just something that can be picked up easily, it is all about relationships. From an ISA point of view, and I have seen this because we have had a number of chairs, that its about having a chair that is respected by the agencies – then they will engage with you much more readily. So we have built good relationships from the CEO right down to the development officers that sign off on company grants.”

Cooke (2007a, p100) found that social capital was a key ingredient for successful SME performance and was the very nature of most SME businesses. Interviewee 5A also emphasised the importance for the ISA, from an industry development perspective, of building strong relations with the state agency:

“If you want to create a community of software companies, that requires a lot of networking, a lot of engagement and discussions with different agencies. Enterprise Ireland provided support for high potential start ups and other groups of companies, they also held sessions on technical issues etc. So there are a lot of support mechanisms that Enterprise Ireland provided, almost like an arm of the software company community.”

In addition to the benefit of regular one to one meetings with the state agency, the ISA gained bridging social capital benefits from frequent engagement between IBEC sector organisations as a group, which included the ISA, and Enterprise Ireland. This brought industry concerns right up to the CEO and board level of the state agency and the broader business organisation.

One good example of the benefit to software companies of the close relationship built up with the state agency is an ISA project supported under Enterprise Ireland’s Enterprise Innovation Networks initiative. Under this initiative, the ISA applied for, and successfully secured, funding for two and half years for the development of a software innovation network. Interviewee 5A outlined that:

“We set up the ‘Irish Software Innovation Network’, which employs Michael Martin on a full time basis. He works within the ISA and his whole objective is to achieve engagement between the software community and the research community. To try to commercialise research that is taking place, he works with the indigenous software community and with software multinationals – again all about trying to develop a community. It is a practical element to fulfil the discussions that have been taking place about how do we get more research commercialised out of our universities and institutes of technology. All the stories we hear about companies like Google emerging from a strong

link with Stanford University, how do we get that type of business going here in Ireland?”

The organisation structure of the ISA contributed to this initiative with their Industries and Academia working group acting as a steering committee for the network. The ISA saw this as very positive because, instead of simply looking at policy, the group was now actively engaged in delivering an innovation based initiative for the software community. The executive employed under the network initiative acted as a broker between software companies and the research community. He reported to the Steering Committee with his performance measured against a matrix of deliverables, for example, the number of collaborations facilitated during this year, his input to these initiatives, and so on.

The ISA also provided subsidised training for firms through a government supported ‘Software Skillnet’ programme and developed an ‘All-Island Software Network’, together with software firms in Northern Ireland with the support of the cross border agency Intertrade Ireland. A cluster initiative involving the ISA, Enterprise Ireland and a world class university is outlined and discussed in greater detail in section 5.4 below. These various examples highlight the potential bridging social capital benefits of state agencies, such as Enterprise Ireland, working with established and well structured organisations, such as the ISA, in cluster initiatives. As Fukuyama (2001, p18) has pointed out, governments and their agencies can negatively impact social capital if they seek to undertake activities that are better left to the private sector. In this case, Enterprise Ireland by collaborating with the ISA, an organisation established more than twenty years prior to the state agency, leveraged off the social capital bonds already in existence and developed in the software community. It also accords with the idea (Woolcock 2001, p15, Field 2008, p141) that one of the strengths of social capital is that it emphasises resources that communities already have and encourages agencies to work with and build on this potential. Cooke (2007a, p82-83) argued that where state agencies run programmes, social capital linkages nearly always involve rent seeking. It is certainly true that a substantial part of the motivation for the ISA in building a relationship with the state agency was gaining access to funding i.e. rent seeking. But this should not be viewed negatively if the social capital benefits support the objectives of the state and industry to build a

stronger software community. Cooke and Willis (1999, p233) concluded that policies focused on innovation that succeeded in building up social capital for SMEs, through supporting collaboration and networking, produced positive results for a significant portion of SMEs in terms of business performance, innovation and knowledge exploitation. However, Fukuyama (2001, p18) warned against supporting organisations that simply spring up to write proposals and gain access to state funds. By working with the ISA, Enterprise Ireland was engaging with an OFC that had existed for approximately forty years and was involved in a wide range of social capital activity. This also meant that the state agency was using a resource available in the community as recommended by Woolcock (1998).

### **ICT Ireland and IBEC**

A fourth example of bridging social capital benefits arose from the decision to set up ICT Ireland within the business group, IBEC. Woolcock (1998, 2001) defined social capital in terms of the norms of reciprocity inhering in social networks that facilitate collective action. ICT Ireland became part of a broader network of sector groups from a diverse range of industrial areas within IBEC. The chair of ICT Ireland automatically got a seat on the IBEC national council and the organisation nominated a number of CEOs of member companies to sit on the council<sup>62</sup>. This meant that CEOs from ICT Ireland sat around the table with other business leaders of the day to share information on and discuss economic and business developments. This had social capital benefits for both the ICT multinationals and the other business groups represented on the council. Granovetter (1992) emphasised the strength of weak ties while Grabher (1993) warned of the danger of an over reliance on a narrow range of contacts, described as ‘lock-in’ of relationships. By linking into the broader business network, ICT multinationals were exposed to the challenges faced by low and medium technology sectors, which at times are very different to the high-technology sector, and vice versa. This, to an extent, counteracted Grabher’s warning regarding lock-in of relationships.

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<sup>62</sup> In 2011, Regina Moran, CEO of Fujitsu Ireland took over the Chair of ICT Ireland. Other IBEC national council members from the ICT sector included Paul O’Riordan, Oracle, Lionel Alexander, HP, Peter O’Neill, IBM and John Hennessy, Ericssons.

Another social capital benefit was that representation on the national council gave the ICT sector a strong voice at the table when IBEC met with the Taoiseach, Ministers and senior civil servants to discuss the development of key government policies. This had benefits for both ICT Ireland and for IBEC. For example in the area of taxation, ICT Ireland's involvement in IBEC helped secure the commitment of both the Irish government and its agencies, such as the IDA, to maintaining a 12.5 percent corporation tax rate and the introduction of tax credits for R&D. Paul Rellis CEO of Microsoft in Ireland will become IBEC President in 2013 for a year, securing the commitment of such a high profile business executive to this role has reciprocal benefits for the both the ICT sector and the broader business group.

In the area of trade, ICT Ireland involvement in IBEC was important in raising awareness at government level of the increasing importance of internationally traded services. This in turn impacted on the position taken by the Irish government at EU level in relation to multilateral (WTO) and bilateral trade negotiations, where previously Irish Ministers had focused almost exclusively on the needs of the agricultural sector. ICT Ireland, through its affiliation with IBEC, also gained access to the IBEC office in Brussels, which helped organise meetings for the organisation with the EU Commission and Parliament, and to the confederation of European employers, Business Europe. Consequently, there were significant bridging social capital benefits for ICT Ireland operating within the broader IBEC structure. Of course, the engagement of the key ICT companies and their CEO within the IBEC structure also yielded many benefits for IBEC. Burt (1997, p340) points to the information and control advantage of being the broker in relations between people otherwise disconnected in the social structure. IBEC, by establishing ICT Ireland, not only helped bridge the gap between government and the ICT sector it also strengthened IBEC's own position as a business organisation for collaboration. ICT multinationals and the other members of IBEC, from Pharmaceuticals, food and other sectors, effectively strengthened their ability to take collective action to influence government policy.

The case studies (1 and 2) in this section both involved industry OFCs, privately funded by industry members. Case study 1 provided evidence of the generation of social capital within an OFC in terms of building bonds and strengthening ties

between firms. Case study 2 provided examples of the generation of bridging social capital, with OFCs facilitating interaction between industry firms and other economic actors such as government and state agencies.

### **Section 5.3: SFI and CSETs – social capital within the building blocks of a national innovation system**

This section will look at collaboration in the ICT sector between universities and industry in state supported cluster initiatives focused on raising levels of innovation in the Irish economy. The case studies (3 and 4) explored in this section differ from those covered in section 5.2 in that here, firms collaborate in initiatives outside of their involvement with their industry OFCs. This shows that engaging firms in collaborative initiatives does not necessarily involve an industry OFC. However, even though the initiatives explored in case studies 3 and 4 may have listed more than one firm as partners, the collaboration that takes place is mainly between individual firms (rather than groups of firms) and research institutes.

#### **Science Foundation Ireland**

As outlined in section 4.2 of Chapter 4, the establishment of Science Foundation Ireland (SFI) by the Irish government in 2003 can be viewed as part of the building blocks for a national innovation system. Since 2007, an annual census of holders of SFI's major grant categories has been completed, which provides data on research outputs, team compositions, collaboration and funding (SFI 2009). In 2009, SFI supported 3,225 team members under 666 actively funded initiatives. This was a 15 percent increase on the previous year and in line with the target set for building human capital in the then government's Strategy for Science, Technology and Innovation (SSTI) 2006-2013.

SFI measured both academic and 'pre-commercial' output in their annual census. Peer reviewed publications were up 26 percent to 4,057 in 2009. This, and previous increases, contributed to Ireland's relative volume of scientific publications growing from below EU average levels to average OECD levels (SFI 2009, p6). This also

assisted Ireland moving into the top 20 ranked countries for international scientific quality, up from 36<sup>th</sup> position in 2003. These developments were important from an academic and international reputation perspective for Ireland. But what progress was made in relation to pre-commercial research and initiatives involving industry? Had SFI funding contributed to building social capital as well as human capital?

Table 5.2 presents data on pre-commercial outputs from SFI funded initiatives for 2008 and 2009. One third of the invention disclosures and one quarter of the patents filed in 2009 arose from Centres for Science, Engineering & Technology (CSETs). In addition 5 of the 13 standards contributed to arose from CSETs.

**Table 5.2: SFI Summary of Pre-Commercial Outputs 2008 and 2009**

Type of Output	2008	2009
Invention Disclosures	135	136
Patents Filed	97	108
Patents Awarded	13	10
Standards Contributed To	6	13
Spin-Offs Reported	3	6
Licensed Technologies	22	20

Source: SFI 2009, p.7.

Chapter 2 reviewed the theory and conceptualisation of the systems of innovation (SI) approach, which Lundvall (1998, 2005) advocated should be used for analyzing economic development. In his taxonomy of innovation, Edquist (2001) outlined that, among other elements, innovation involves an organisational process (see Figure 2.2) and that ‘innovations are normally seen as based on learning that is interactive between organisations in the SI approach; firms do not generally innovate in isolation’ (Edquist 1997, pp20-22). The interaction, between research institutes and firms, in the CSETS supported by SFI can be viewed as part of the building blocks for systems of innovation, at national and regional level, in Ireland. The following section will look at the structure of the CSETs which involves such interaction, provide two case studies of CSETs and consider whether these CSETS contributed to building social capital. In line with broader SFI objectives, grant funding of CSET

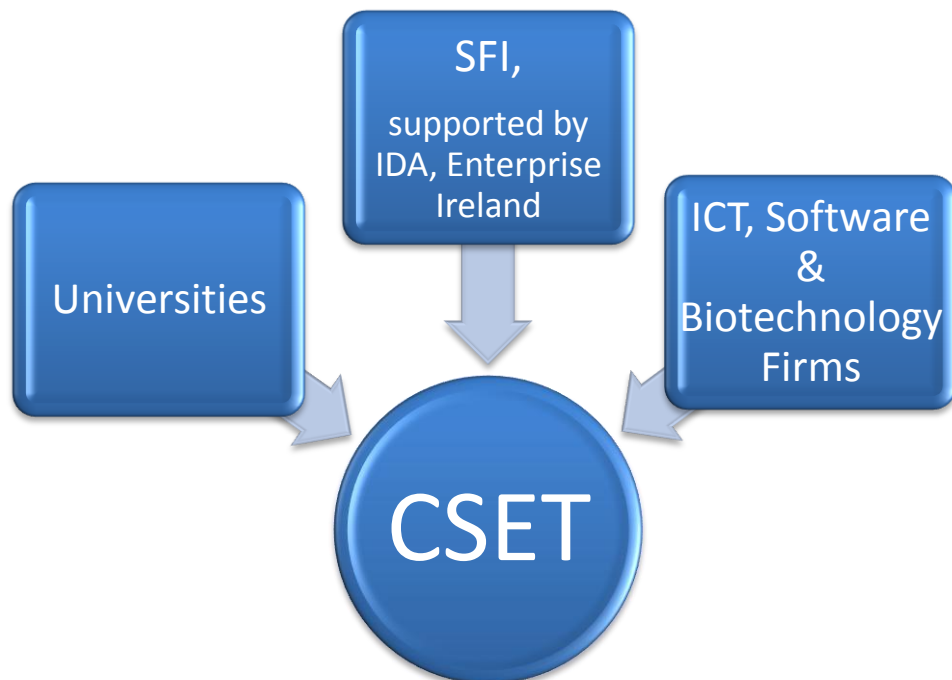


is focused on the high technology sectors of economy. A significant number of CSETS involved collaboration in the ICT and software sector and some of these are outlined below. One specific example of a biotechnology based CSET, operating in the interface between food and health and well-being, is provided. Chapter 6 will provide further new research evidence of a cluster initiative operating in the interface between dairy food and health and well-being.

### **Centres for Science, Engineering & Technology (CSETs) - social capital in cluster initiatives**

Figure 5.5 provides a diagrammatic representation of a CSET in the ICT and software sector. It includes three of the five actors that Sölvell et al (2003, p.18) suggest compose a cluster. In this case, SFI and the state development agencies, IDA and Enterprise Ireland, represent the government actor, universities play the role of the research community actor and ICT and software firms are the company actors. However, two further actors from the Sölvell et al (2003) model are omitted from the configuration presented here.

**Figure 5.5: Centres for Science, Engineering & Technology — cluster initiatives**



Source: Author's diagram

The first of the Sölvell et al (2003) actors to be omitted is ‘financial institutions’. Banks, business angels or venture capitalists were not involved in these CSET initiatives (although they may have indirect involvement through their role in the development of any spin-off companies generated from the cluster initiatives). Initially, CSETS were funded by grant awards from SFI, often supplemented by funding from other state agencies such as the IDA and Enterprise Ireland. Industry partners also part funded the CSETs by way of the scientific and technical expertise they provided at no cost to the initiative. An innovation taskforce established by the previous government identified the need for a ‘transformation in the scale and nature of the Irish venture capital environment’ in order to successfully support the growth and scaling up of innovative companies (DOT 2010).

This taskforce recommended that Ireland should nurture a national portfolio of business angel funds, due to the under-developed nature of the venture capital sector in Ireland. Furthermore, it recommended that while this was being developed, the State, on a temporary basis, should provide a new Seed Capital scheme. The taskforce also identified a set of tax initiatives to incentivize start-ups and angel funding activity. While Enterprise Ireland is active in this space, the taskforce criticized the broad focus of the agency and recommended instead a more targeted focus on start-ups and early stage activities in order to support job creation. This recommendation should be viewed with caution because it is important to recognize that innovation can also take place in established companies and is not solely the preserve of start-up companies. If the venture capital market develops in Ireland then there may be a possibility for involvement in CSET type initiatives, particularly if public funding is reduced or is no longer available, which appears likely given the budgetary constraints facing Ireland. However, regardless of the presence of venture capitalists or other financial organisations, collaboration between firms, universities and state agencies can generate social capital as the case studies presented in this section will illustrate.

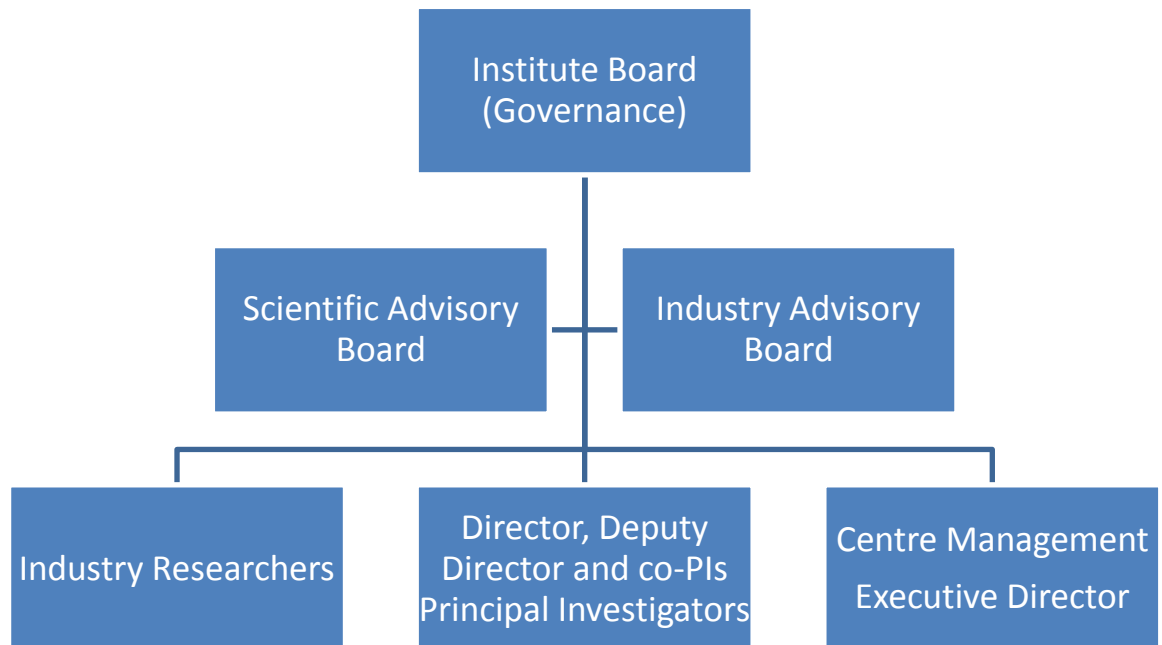
The second of Sölvell et al (2003) actors to be omitted from Figure 5.5 are ‘institutions for collaboration’ (IFCs). IFCs are not included here because of the lack of definitional clarity of the IFC concept already discussed in Section 2.4 of Chapter 2. This thesis has provided an alternative and more robustly defined concept of

“organisations for collaboration” (OFC). Sölvell et al (2003, p.18) place IFCs at the centre of their five cluster actors. The diagram above does not place the alternative concept OFC at the centre of the three actors in a CSET as OFCs in this case were not directly involved in the initiatives. However, they may have made a significant contribution in an indirect way through their central role in the development of an industry norm of collaboration. The majority of the firms that participated in CSETs were active in ICT Ireland and the ISA. As such, they were used to working with other organisations to achieve shared objectives, yielding social capital benefits from their involvement in embedded networks.

While the industry OFCs are not directly involved in the CSETs, the SFI itself might be seen as performing a public OFC role in this instance. But again, the SFI could not be placed at the centre, because its role was essentially assessing the suitability of the cluster initiative for funding, providing the grant award and monitoring the results of the initiatives. The SFI was not directly involved in the day-to-day research that the CSET carried out and therefore it would not be accurate to describe it as being at the centre of the initiative.

Several writers (Coleman 1988, Grootaert 1998 and Krishna and Uphoff 1999) emphasize structure in their definitions of social capital. Figure 5.6 outlines the governance and operating structure of a CSET. Each CSET is required to have an institute board, which is responsible for oversight of the CSET. This governing board is comprised of the lead research institutes, the major industry partners, and the Director, Deputy Director and Executive Director of the CSET. The board is chaired by an independent chairperson drawn from outside the research institutes and industry partners. It is advised by a scientific board, comprised of international researchers whose expertise largely represents the scientific activities being pursued by the CSET but who are not directly involved in the initiative. In recent years, SFI has also required the establishment of an industry board, comprised of each industry partner in the CSET. The role of the industry board is to provide industry feedback and input to the CSET board and management team.

**Figure 5.6: Structural Social Capital in an SFI funded CSET**



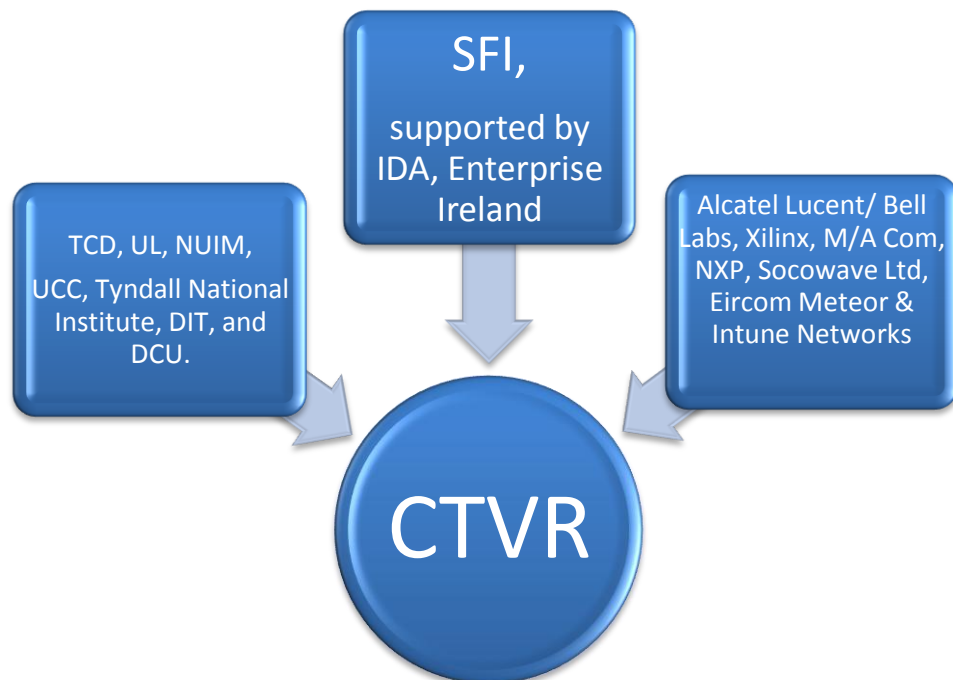
Source: Author's diagram

The following two brief case studies examine the role of this structure in the generation, accumulation and circulation of social capital. The case study evidence includes two interviews with individual actors in the CSETs, one with an industry background and the other with an academic research background.

### **Case Study 3: Centre for Telecommunications Value Chain Driven Research**

This case study provides an example of a complex bridging social capital initiative, involving seven research partners, seven industry partners and the support of three state agencies. In terms of collaboration it differs from case studies 1 and 2 above, as the initiative does not involve an industry organisation for collaboration, such as TIF or the ISA. It is a national initiative rather than a regional one, with the partners spread across the country. This is a contrast to case study 4 below, which is a smaller regional CSET based in Munster.

**Figure 5.7: CTVR -an example of a specific CSET cluster initiative**



CTVR is a dynamic cluster initiative focusing on the development of wireless and optical networks, with a strong emphasis on the technologies that underpin such networks. It is Ireland's largest telecommunications research centre. The Director of CTVR is based in Trinity College Dublin (TCD), where the initiative is headquartered. However, the bridging social capital potential of the initiative is highlighted by the fact that the other Principal Investigators (PIs) are spread across a range of universities situated in different locations. The Deputy Director of CTVR is based in the University of Limerick, with the remaining five PIs based in the National University of Ireland Maynooth (NUIM), the Tyndall National Institute, University College Cork (UCC) and TCD. The research teams led by these PIs are also spread throughout these universities and research institutes, with some researchers also based in Dublin City University and the Dublin Institute of Technology (DIT).

An in-depth interview with a leading Irish software entrepreneur involved in CTVR provided evidence that SFI involvement had changed the landscape for collaboration

in this case. Interviewee 5D commented (firms names have been removed from quote for confidentiality):

“I think it (SFI) achieved two things in the context of CTVR. One is the very strong inter-university collaboration, amongst the academics themselves in different locations. It is really very strong. And secondly...there is actually quite a lot happening in terms of combined research with industry. Industry partner ‘X’ shared absolutely trade secrets with some of the academic researchers, facts that were extremely commercially valuable. Also [with the sharing [of] the cost of equipment in the field, there is a lot of collaboration in terms of developing the working model to predict failure. Industry partner ‘Y’ also indicated to the IDA that one of the reasons they came to Ireland was because of SFI”.

When asked whether the motivation for university involvement in the CSET could be viewed purely as a way of gaining access to SFI research funds, that is, purely for rent seeking, Interviewee 5D commented:

“It is because of the scale of the research they are doing, research that no single university or research group could do on their own. It is very much cross-disciplinary research and I think if it was not so cross disciplinary then you would not need a CSET, you could fund them separately as groups of projects.”

Hence, one of the key contributions that the SFI funded CSET structure made in this case was encouraging social capital bridges between university researchers working in different disciplines based in different locations. This was a departure from the previous tendency for university researchers to work on individual research projects, rather than in collaborative initiatives with researchers in other universities. But the fact that universities collaborate together does not of itself exclude the possibility that alliances could be formed with the intention of rent-seeking. Cooke argued that contact with state agencies who implement programmes is almost always rent-seeking practice in the sense of a direct bid for government funding (Cooke 2007a, pp82-83). However, from the perspective of building national systems of innovation,

such collaboration had the positive benefit of enhancing the ability of Irish universities, working in teams, to compete better with larger international universities.

The CTVR initiative also encouraged collaboration between academic researchers and specific industry partners. Collaboration took the form of teams of researchers in universities working with industry researchers based in company R&D teams, with frequent, even daily, electronic contact supplemented by regular meetings to advance the research objectives. This was further evidence of social capital of a bridging nature, this time between universities and individual companies. However, inter-firm collaboration was not a significant feature of the CTVR initiative, Interviewee 5C commented that:

“It is primarily collaboration between the company and the universities, rather than inter-company. The companies meet in the context of the research setting rather than actually working with each other on specific research.”

This was a contrast to case studies 1 and 2, where the industry organisation for collaboration (OFCs) involved substantial inter-firm collaboration. In this case study, firms involved in the CSET protected their own commercial interests from other industry actors but gained access to interdisciplinary teams of researchers spread across the universities involved in the cluster initiative. Therefore, the social capital generated in the CTVR initiative was firstly among the universities involved and secondly between these universities and individual firm partners.

Some writers emphasised trust in their definitions of social capital (Putnam 1995, Lundvall 2005, Cooke 2007), others chose not to. Woolcock (1998) included trust in his initial definition of social capital but in a later paper (Woolcock 2001) argued trust is better understood not as social capital *per se*, but as a measure of it. When Interviewee 5C was asked whether he felt the experience of the CSET had build up trust between the people involved, he replied:

“Trust was not the issue. It was perhaps the lack of a common vocabulary and understanding. Looking beyond one’s own context perhaps.....They did

not always use the same words or the same concepts because of their different backgrounds. There was a learning to work together.”

This suggests that one of the features of the CTVR was a generation and accumulation of cognitive social capital (Krishna and Uphoff 1999) with the initiative helping to build shared norms, values and attitudes that would encourage people to work together. It seems reasonable to assume that trust might well develop over time between the actors involved in the CTVR, as shared norms, values and attitudes are achieved.

Part of the learning in the CTVR initiative was of also of a structural social capital nature (Coleman 1988, Grootaert 1998, Krishna and Uphoff 1999). The involvement of one multinational firm in particular brought greater discipline and structure to the recording of research findings. According to Interviewee 5D, the multinational firm “brought professionalism to the research procedures that were not there before” in report filing and invention disclosures. This exposure to procedures developed by a successful multinational firm, in effect, strengthened the research procedures of teams in the universities involved in the CTVR. For relatively young members of the research teams, this learning opportunity would be particularly beneficial. This accords with Staber’s (2007, p 509) suggestion that knowledge-based firms, in this case a successful MNC, may have the capacity to contribute more to the building social capital than other firms.

However, the overall structure of the CSET was viewed by Interviewee 5C as having both positive and negative social capital potential. On the positive side, the structure of the CTVR facilitated inter-disciplinary research across a number of institutes and deep collaboration with individual industry partners. The CTVR scientific advisory board comprised two Professors of Computer Science from the USA, a Professor of Physics and Astronomy from Scotland (who was also chief scientific advisor to the Scottish Executive), an Irish entrepreneur and venture capitalist (who in 2007 was named the ISA technology person of the year) and an independent engineering management consultant. This provided high level international and Irish advice to the CTVR board, which further strengthened the positive bridging social capital potential of the initiative and emphasised the strength of weak ties. But the CSET



structure had the potential to become too cumbersome and bureaucratic. The SFI requirement for three boards with a complex structure of meetings and reporting procedures increased the cost of management overheads. In addition the presence of a separate SFI scientific review panel which, at times, over-turned the advice of the scientific advisory board resulted in some members of this CTVR board feeling they had wasted their time and leaving the initiative.

The outcomes of the CTVR cluster initiative are significant, with a focus on identifying medium term opportunities that have commercial potential. When asked if the initiative had produced applied industry outputs, in addition to the peer reviewed academic papers, Interviewee 5C replied:

“There have been invention disclosures and patents in addition to academic papers. But there have also been licenses to industry and also [one major multinational] in a review relatively recently said they had put an extraordinary number, something like 30 things from CTVR, into commercial application. They were a full participant in the project, had shared the research procedures with the academic researchers and developed it jointly. So they had the rights to use the technology in their organisation”

In addition, there were some spin-off campus companies from the CTVR cluster initiative. For example, Socowave Limited is a wireless systems technology company creating radio access systems and products for high-speed cellular and wireless broadband networks. As a consequence of CTVR, it pioneered a new class of intelligent Active Antenna System that uses innovative beam forming techniques to significantly increase wireless link quality to mobile users.

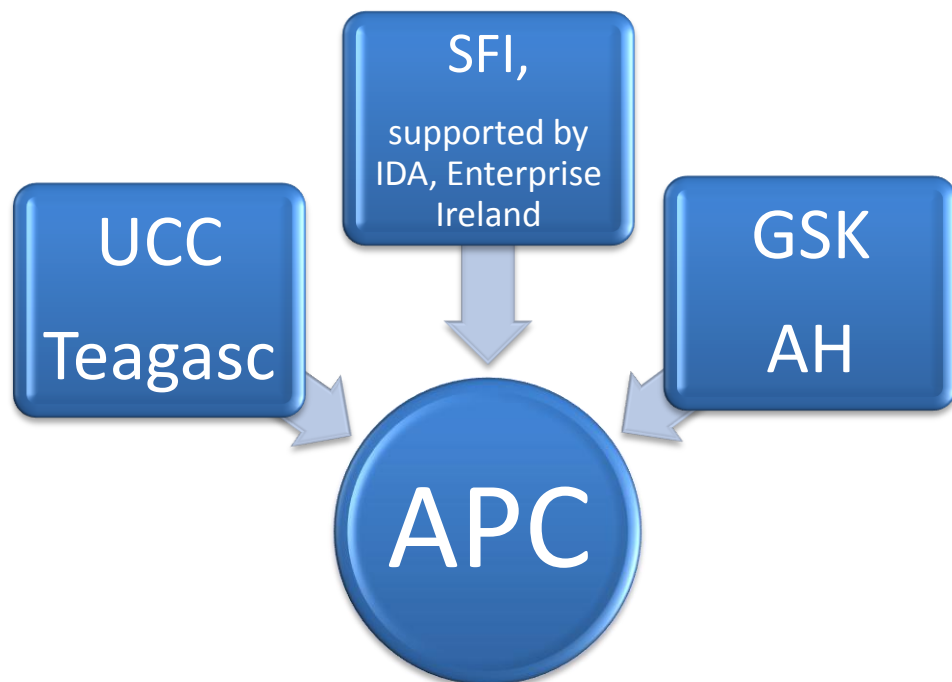
#### **Case Study 4: The Alimentary Pharmabiotic Centre (APC)**

The case study of the CSET outlined below involved collaboration between industry and two institutes with research strength in the areas of biotechnology and food. This example is interesting because SFI does not, as such, support initiatives in the food sector. However, this initiative gained support because of its biotechnology capabilities, which does fall within the remit of SFI. It shows the potential of

research with applications in the food and health and well being sector. Chapter 6 will provide a further in depth case study of a research initiative focused on food and health and well being, but which is not funded by SFI.

The Alimentary Pharmabiotic Centre (APC) is a CSET cluster initiative (Figure 5.8) based in University College Cork (UCC), which operated in the interface between food and health and well-being. Both the research and industry actors are all based in the Munster region. The research actors in APC are UCC and Teagasc. The industry actors are the multinational pharmaceutical company Glaxo Smith Kline (GSK), with manufacturing bases in Cork and Waterford, and the indigenous company Alimentary Health (AH). AH is a development stage speciality biotechnology company based on the campus in UCC. APC was founded in 2003 through funding from SFI, with the later involvement of GSK in the initiative supported through additional funding from IDA Ireland. Both funding sources are based on the principle of high quality research involving collaboration between universities / research centres and industry.

**Figure 5.8: APC —an example of a specific CSET cluster initiative**



Source: Author's diagram

In contrast to case study 3 above, there was a significant level of trust between the research partners prior to the establishment of the APC cluster initiative; one of the industry partners was also a spin-off campus company based in UCC. Therefore, in this instance, trust between these three partners could be viewed as a precursor, rather than an outcome, of the bridging social capital initiative. The campus company, AH, expressed concerns in relation to the protection of its intellectual property when the second, much larger, industry partner entered the relationship. These concerns were dealt with by establishing the rules of the game under a legal agreement, rather than allowing the lack of trust between the two partners to create a barrier to the initiative.

The APC mission is to link Irish science with industry and society through excellence in research, education and outreach in gastrointestinal health. Six research themes, focused on understanding the gastrointestinal tract and its microbial community, are led by 22 Principal Investigators (PIs). The Director and Deputy Director of APC are based in UCC, with the remaining PIs and their research teams based in UCC and the Teagasc Moorepark Food Research Centre. These two research institutes are located approximately 35 kilometres apart in County Cork and have a long history of collaboration. They exhibit evidence of what Cooke (2002, p135) would describe as proximity social capital of a bonding nature. An in-depth interview with one of the research leaders in the APC initiative placed great importance on the relationship between the two institutes, Interviewee 5E outlined:

“UCC and Teagasc have been very close for a long period of time, even to the point of cross appointments with some Teagasc people from Moorepark, for example, holding Professorships in the University, supervising graduate students, doing some teaching and so on and so forth. I also have had some students down in Moorepark, so we have had very close interactions and that has been there for a long time, [and] predates this initiative by decades.”

This collaborative relationship, built up over decades, reflects the development of strong ties between the two institutes. Therefore, in contrast to the CTVR (case study 3), the APC initiative did not broker a new bridge between the research institutes involved. The long established ties that exist between UCC and Teagasc does leave

the two institutes open to the criticism that rent-seeking was a key motivation for their interaction with SFI in setting up the APC. Cooke argued that the capability to link to state bodies who implement policy and run government programmes is almost always rent-seeking practice in the sense of a direct bid for government funding (Cooke 2007a, pp82-83). However, even if rent-seeking was a key motivation, one substantial social capital benefit from the initiative is that the scale of the APC, involving 22 PIs and a 120 strong multidisciplinary research team, brought the development of specialist knowledge in the area of food technology and microbiology research in the Munster region to a new level.

The second issue to consider is whether the state intervention in the APC initiative made a difference to collaboration between industry and the research institutes. The multinational firm GSK became an industry partner in the APC in 2006, with a 5 year collaborative project to investigate inflammatory conditions that involved an investment of €10.2 million supported by the IDA. A quote on the APC website from Dr Kevin Lee, Vice President of GSK, indicated that scientific expertise, the right collaborative approach and the scale of APC were all factors in deciding to become a partner in the initiative.

“In a lengthy worldwide search of GI industrial and academic institutions conducted by GSK in an attempt to identify the most appropriate body for partnership, the APC emerged as the clear leader, based on scientific expertise, complementary technology, track record of successful industrial collaboration, access to clinical populations, productivity and availability of critical mass.”

GSK participation in the APC initiative is based on their belief that screening platforms, developed by UCC and Teagasc, could reduce the costs of bringing new therapeutic molecule business innovations to the market. There are 21 researchers based at the APC involved in the collaboration, including 4 GSK scientists. This APC research team collaborates closely with scientists at GSK’s EpiNova Discovery Performance Unit (DPU) in the UK, which in turn has linkages to leading universities in the UK, Cambridge and Oxford, and in the USA, Harvard and Rockefeller. This provides the opportunity for UCC and Teagasc scientists to

develop both strong and weak ties through their collaboration with GSK. Using Burt's (1997) terminology, the APC centre acted as a brokerage, bridging the structural hole between the knowledge available in the research institutes, UCC and Teagasc, and the knowledge available in GSK, with a view to reducing costs. The support of SFI in establishing a research centre of the scale of APC, and the additional support of the IDA, helped UCC and Teagasc form a partnership with GSK.

The other industry partner in the APC is the much smaller indigenous firm, Alimentary Health (AH). AH is focused on the discovery, development and commercialisation of proprietary probiotic and pharmabiotic treatments for gastrointestinal disorders and other inflammatory conditions. Both industry partners, GSK and AH, draw off research within APC for different market applications. Consequently, the structure of the social capital arrangements within the APC cluster initiative is important. This is particularly the case in the area of intellectual property (IP), because the development and protection of IP is one of the key factors in the successful exploitation of research. The two industry actors did not know each other prior to their involvement in APC and so it was important that each industry actor understood the rules of the game. Interviewee 5E, who in addition to being a leading researcher in APC is also a shareholder in AH, commented:

“AH had to concede something in the intellectual property arena to allow GSK in, and they did ... what GSK do is described in an agreement and what AH do is described in an agreement, and both have mutually agreed that this is what each does”.

The APC has a dedicated Intellectual Property Co-ordinator and a Commercialisation and IP Committee (CIPC) to protect and facilitate the exploitation of all APC IP. Nooteboom (2007, p37) argued that relationship reliance is always a part of social capital but that trust, which goes beyond control and self interest, may not be. Both AH and GSK relied on the relationships within APC to deliver reciprocal social capital benefits. By managing access to intellectual property, the APC was able to prevent the lack of trust between the two industry partners becoming a barrier to the initiative.

However, Interviewee 5E also pointed out that, while IP arising from APC was important to protect, the initiative has the potential to deliver cognitive social capital (Krishna and Uphoff 1999) benefits:

“You have AH scientists and GSK scientists, and around 20 additional people doing R&D in partnership within APC. So you have those sets of scientists mixing and working in a common space. They also have their own space with certain interests. ...Because they are talking to each other you do not know what flash will happen, that new idea that either on their own would never come up with, generated by virtue of the fact that they are working in the same centre.”

These principal industry related benefits of APC indicate the generation of bridging social capital. Bridging social capital has the potential to expose network members to new ideas generated by members of other networks. GSK wanted to reduce the costs of bringing small molecule innovations to the marketplace. They realised that they had to go outside their own organisation and network to look for new ways to achieve this goal. The APC initiative bridged the structural gap between the scientists in GSK and the scientists working in UCC, Teagasc (Moorpark) and the campus company AH.

The APC initiative enabled GSK to gain access to the screening platforms, developed by UCC and Teagasc (Moorepark), and this collaboration in turn enabled GSK to pursue its goal of reducing costs. In addition to the financial benefit of collaborating within the APC structure, UCC and Teagasc (Moorepark) also gained by extending its network of research collaboration to GSK scientists working in the APC centre and the EpiNova Centre in the UK. These benefits accord with Field's assertion that social capital may be termed capital when it gives rise to resources that can be deployed in order to enable actors to pursue their goals more effectively than they could without it (Field 2008, p159).

The small indigenous company, AH, was concerned that through involvement in APC it might lose intellectual property to a large multinational. However, at the outset of the APC initiative, UCC sat down with the two companies and mutually

agreed the rules on how they would work within the CSET. The small closed structure supported by this agreement could help bonding among the individual scientists who, by working together on common themes, get to know each other and have the opportunity to build relationships. Coleman argued that closure of a social structure can help create trustworthiness (Coleman 1988, pS107). Therefore, despite its absence prior to the initiative, there may be the potential over time to develop trust within the APC. This potential for building social capital of a bonding nature could also contribute to the secondary objective of generating more new ideas by virtue of these individual scientists working together, as described by Interviewee 5D above.

UCC and AH were also involved in collaboration with other firms outside the CSET. UCC were keen to keep certain intellectual property within AH and then to work with various industry partners, e.g. Procter and Gamble, to bring products to the market. This further social capital of a bridging nature, spanned the gap between the technological expertise of AH and the consumer product marketing expertise of Procter and Gamble. It had certain benefits to the Irish economy, as Interviewee 5E commented:

“By doing it that way, we would argue you are keeping the core research investment that has been made in Ireland. You are creating jobs in Ireland. An alternative model, which I like less, is that we stay as university researchers and as such simply licence the technology to companies like Procter and Gamble and say right, off you go, and then it is out in Cincinnati that all the action takes place.”

One tangible success of this approach was the launch by Procter and Gamble of an AH product called ‘Align’ on the US market, making the product available nationally in Wal-Mart and other stores around the US. Align is a probiotic supplement that helps build and maintain a strong and healthy digestive system. The product contains a probiotic ingredient Bifantis (*Bifiobacterium infantis* 35624), developed and clinically demonstrated by scientists in UCC and AH, to promote normal digestive health when taken regularly. One can clearly argue that the collaboration with Procter and Gamble is a success from a commercial perspective,

bringing a product using AH technology from the research stage to the marketplace. But the social capital from this initiative may be less than the social capital potential of the CSET involving UCC, Teagasc, AH and GSK. The CSET brings scientists from the different organisation together in a research centre, suggesting the potential for deeper collaboration over time.

### **CSETs a rich area of potential research and analysis**

Ten CSETs received funding from SFI<sup>63</sup> and they provide a rich topic for research and analysis. Collaboration within two of these was examined, using the social capital concept to add depth to the analysis, in case studies 3 and 4 above. In order to qualify for funding, the CSETs did not only have to exhibit outstanding research quality and intellectual breadth but also had to show active collaboration between research institutes and industry. This aligned with emphasis on interaction between organisations in the systems innovation approach (Lundvall 1998, Edquist 2001). The SFI funding requirements for the CSETs is an example of government policy in the innovation area encouraging structural social capital interaction, mainly of a bridging nature. Using Burt's (1997) terminology, SFI effectively acted as a broker bridging the structural hole between the knowledge available in research institutes and the knowledge available in multinational and indigenous firms.

The detailed CSET case studies (3 and 4 above) provided evidence of social capital arising from cluster initiatives involving collaboration between universities (research institutes) and firms. Each CSET yielded social capital benefits for both the researchers and the firms involved in the initiative, while at the same time contributing towards building an innovation system at regional and national level. This supports Putnam's (2001) contention that, at least in some instances, there are

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<sup>63</sup> The ten CSETS that received SFI funding in 2009 were:

- Alimentary Pharmabiotics Centre, UCC
- Digital Enterprise Research Institute, NUIG
- Centre for Research on Adaptive Nanostructure & Nanodevices, TCD
- Regenerative Medicine Institute, NUIG
- Centre for Telecommunications Value-Chain-Driven Research, TCD
- Lero – Irish Software Engineering Research Centre, UL
- Biomedical Diagnostic Institute (BDI), DCU
- Next Generation Localisation, DCU
- CLARITY, UCD
- Systems Biology Ireland (SBI)



‘demonstrable externalities’ to social capital, public goods, as well as private benefits, to those involved in the networks. The public research institutes benefited in two specific ways. Firstly they gained access to funding by collaborating with other universities and secondly they benefited from the opportunity to further develop their research in collaboration with companies who were active in the market place. When these two aspects are taken together the scale of these research cluster initiatives is far greater than achieved previously in Ireland. The competitiveness benefits gained by firms involved in the CSETs were examples of private benefit. The strengthening of research methods and capabilities in universities was a public good. Each CSET was required to have an education and outreach programme e.g. which included presentations and engagement with primary and second level schools. An SFI Grant reviewer concluded that the APC (case study 4) website for school age children, [microbemagic.ucc.ie](http://microbemagic.ucc.ie), showed a real commitment to educating the next generation of Irish scientific investigators. These various benefits from CSET initiatives contributed to building systems of innovation on both a regional and national basis. The two detailed case studies above also provide evidence that the CSETs impacted on social capital in Ireland in a largely positive way. Although a leading industry figure interviewed in case study 3 warned that the development of an overly complex structure could result in the loss of social capital potential. This aligned with Field’s observation that policy decisions can impact on social capital in a positive or negative way (Field 2008, p139).

CSETs can be described as cluster initiatives as defined by Sölvell et al (2003), with state support targeted at the development of the ICT, software and biotechnology sectors. The CSETs involved significant levels of collaboration between firms and universities with both public and private social capital benefits. The knowledge difference between organisations may be a problem, for mutual understanding and agreement, but it is also an opportunity for learning (Nooteboom 2007, p34).

Lundvall (2005) defined social capital in terms of the willingness and capabilities of people to make commitments to each other and to collaborate with each other in the process of exchange and interactive learning. In this sense, the CSETs, defined here as structural social capital, provided an opportunity for universities and firms to work together, share knowledge and experience and, by making informed collective decisions, advance ideas and innovation. The CSETs also provided opportunities for

the individuals involved in the cluster initiatives to build relationships and increase learning. This has the potential over time to yield cognitive social capital (Krishna and Uphoff 1999), altering the value and belief that the individuals in the different organisations have in each others' knowledge and work.

The two case studies (3 and 4) in this section provided evidence that trust was not paramount to the development of social capital. In case study 4, a lack of trust between actors over who would have access to intellectual property arising from the collaboration was overcome by formal agreement between the industry partners. In this sense, the formal structures within the CSET helped ensure that a lack of trust was not a barrier to the generation of social capital. In case study 3, the structure of the CSET was important in helping people to get to know each other and to better understand each other's work, suggesting that through achieving shared norms, values and attitudes (cognitive social capital) that trust might well be built up over time and be an outcome, rather than a necessary precursor, of social capital. Lundvall (1998, p410) correctly observed that 'trust is a multidimensional and complex concept' and he saw dimensions of trust, such as 'consistency in behaviour and full, truthful revelation of relevant information', as crucial for interactive learning and innovation. This suggests that a lack of trust must be dealt with, as evidenced by case study 4, if interactive learning has a chance, and that the development of trust within such relationships will surely increase the possibility of innovation taking place.

Other CSETS provide further potential for case study work to explore the development of social capital and collaboration within these cluster initiatives. CRANN is a large SFI-funded research centre at TCD and UCC that collaborates with both indigenous firms and MNCs to harness nanoscience research. The initiative involves 17 principal investigators and 250 researchers based across multiple disciplines including physics, chemistry, medicine, engineering and pharmacology. CRANN has ten industry partners, including multinationals (Hewlett-Packard, Intel and Boston Scientific) and a number of indigenous SMEs (e.g. Creganna, Elena Photonics). An innovation task force established by the Irish government concluded that not only did the CRANN project aid the attraction of new FDI to Ireland but also further embedded existing industry and the associated jobs (DOT 2010). A second example, the Centre for Next Generation Localisation

(CNGL) in DCU, is a dynamic academia-industry initiative involving over 100 researchers developing novel technologies addressing key ‘localisation’ challenges. Localisation refers to the process of adapting digital content to culture, locale and linguistic environments at high-quality and speed. Industry partners in CNGL include both MNCs e.g. IBM and Microsoft, and indigenous Irish firms e.g. Alchemy Software Development and Traslán. A third example of a CSET encouraging structural social capital in the ICT and software sector is the Digital Enterprise Research Institute (DERI) based in NUI Galway, which has become an internationally recognised for semantic web research, education and technology transfer. DERI industry partners again include both MNCs e.g. CISCO and indigenous firms e.g. Storm Technology. DERI has been successful in attracting software companies to establish subsidiaries in Galway e.g. Cyntelix.

While the SFI policy can be viewed as positive in terms of the generation of social capital, the question is: will CSETs continue to exist if public funding dries up? The case studies, examined here, suggest that it will be challenging to maintain these initiatives if public funding dries up. The amount of money put into these initiatives, by the SFI, and often supplemented by the IDA in the case of multinationals, is substantial. The case studies also suggest that access to such funds, in other words rent-seeking, is a key motivation for both university and industry actors. Exploring the potential role of business angels and venture capital in such initiatives in Ireland could be an interesting area of research in this regard.

In addition to the CSETs, other SFI award categories may result in some collaboration with industry. At the end of 2009, SFI funded 149 PIs. Three of these PIs<sup>64</sup> conducted research in the Neonatal Brain Research Group (NBRG) in UCC, which developed innovative software to detect seizures in newborn babies with a view to preventing long term brain injury. However, here the collaboration took place more at the output stage as opposed to during the process stage. For example the NBRG research team collaborated with a global healthcare company, Cardinal

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<sup>64</sup> Dr. Geraldine Boylan, Dr. Gordon Lightfoot, and Dr. Liam Marnane.

Health<sup>65</sup>, to bring their novel technology to the market (DOT 2010, p9). This is another example of social capital of a bridging nature, spanning the gap between technological and marketing expertise. This innovative research-based collaborative initiative is also an example of convergence technology, with technology from the software sector being applied in the health care sector as a medical device. But similar to the example above of collaboration between AH and Procter and Gamble, the social capital benefit from the collaboration between the NBRG and Cardinal Health is more limited than the potential of social capital within a CSET cluster initiative. Another example of collaboration in the ICT sector is the multi-disciplinary research and education institute Innovation Value Institute (IVI), established in 2006 by Intel and the National University of Ireland Maynooth (NUIM). IVI is designed to help achieve sustainable economic value from IT and strategic IT investments. By 2009, IVI had over forty members including Google, Microsoft, SAP and BP. Research at IVI is carried out in an open innovation, collaborative fashion involving industry members, leading academics and OFCs in the sector, including ICT Ireland.

#### **Section 5.4: Leadership 4 Growth –social capital in a cluster initiative in the software sector**

Case study 5, the final one of this chapter, will examine the development of the Leadership 4 Growth programme, which was a cluster initiative that fits in the centre of the framework presented in Figure 2.4 of Chapter 2. The number of actors involved here is greater than in case studies 1 to 4, with case study 5 involving four of the five cluster actors put forward by Sölvell et al (2003). Their cluster initiative performance model (CIPM), presented in Figure 2.3 in Chapter 2, is used here to assess the L4G programme, with the analysis presented under headings taken from that framework. The social capital aspects and benefits of the initiative are also drawn out and the analysis is supported by in-depth case study interviews with the various actors involved in establishment of the cluster initiative.

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<sup>65</sup> Cardinal Health is a global medical devices corporation who, for a number of years, owned a manufacturing facility in Gort, Co. Galway. In 2009, Carefusion, a new company formed through a spinoff of Cardinal Health's clinical and medical products business, took over the Gort factory.

## Case Study 5: Leadership 4 Growth (L4G)

Four of the five actors that Sölvell et al (2003) suggested form a cluster were involved in the design and delivery of the original L4G programme (Figure 5.9). The government actor in this case was the state agency, Enterprise Ireland. The industry side provided two actors: the OFC, the Irish Software Association (ISA), and a number of Irish software firms who participated in the programme. The fourth actor was the internationally renowned Graduate School of Business at Stanford University, which represented the research community. The fifth of Sölvell et al (2003) actors – financial institutions once again – is absent from the initiative.

**Figure 5.9: Leadership 4 Growth -an example of collaboration in a cluster initiative**



Source: Author's diagram

## Setting and Objectives of the Leadership 4 Growth Cluster Initiative

Staber (2007) argued that situational context is important in understanding how social capital evolves and how the social capital existing in a cluster can make a significant difference to the performance of cluster firms. The context for the establishment of the L4G programme was the software sector, which involves significant investment by, and interaction between, US multinationals and indigenous firms. Section 5.1 provided evidence of a sector deeply embedded in the Irish economy, with O'Malley and O'Gorman (2001, pp. 318-319) concluding that the Irish indigenous software industry can be regarded at least as 'part of something rather like a 'cluster', in the sense used by Porter (1990)'. Sections 5.2 and 5.3 provided evidence of initiatives within the sector generating both bonding and bridging social capital. Chapter 4 summarised Mjøset's (1992, pp5-23) finding that a weak system of innovation combined with population decline, due to high levels of emigration in Ireland, resulted in vicious circles of underdevelopment for decades. The vast majority of firms that participated in the first Leadership 4 Growth programme were part of the indigenous software sector, development of which is a key element of the government policy of building a national innovation system in Ireland.

The aim of the Leadership 4 Growth programme was to develop and enhance leadership ambition and the management capabilities of Irish firms. Essentially, L4G sought to help the CEOs of Irish SMEs, together with their senior management teams, to grow their firms to a more sustainable international scale. This placed the initiative within the list of objectives for cluster initiatives outlined in the CIPM model (see Figure 2.3), that is policy action to educate and train senior management of SMEs in order to expand cluster development. This was an ambitious objective and it took a significant amount of effort to convince software CEOs who had already exhibited significant leadership abilities in establishing their firms to agree to do the programme. As Interviewee 5F from the state agency side of the initiative commented:

“Enterprise Ireland and the people from the software side who designed the programme had to say “Here is our proposition, trust us”. CEOs effectively had to buy into a new product and typically CEOs, certainly entrepreneur type CEOs, don’t do leadership programmes. So the first thirty [participants] were quite the group of pioneers.”

The quote above also suggests that trust was, to an extent, a precursor to engaging the software CEOs in the cluster initiative. In this context, the bonding social capital ties built up over decades between software firms, partly through their involvement in their OFC the Irish Software Association (ISA), were important.

### **Process and design**

In fact the idea for the programme originated from an informal discussion, following an ISA event, between two CEO members of the association. One of the CEOs was the incoming chair of the ISA and the second CEO was a senior member who had led some ISA initiatives in the past. According to Interviewee 5G from the industry side:

“One characteristic of the indigenous software sector in Ireland was a large number of small companies who rarely got beyond €5million turnover. We were having some debate around why was that. Is it because of lack of ambition to create companies larger than that, in essence undertaking these roles as lifestyle choices, or is it because the CEO and firms didn’t know the way to scale up? ...I said maybe it’s that we don’t know the way and let’s work on that basis”

The two CEOs had built up a relationship of mutual respect and trust for each other’s judgement, strengthened by their involvement in the ISA. They agreed that a leadership programme for CEOs of small software firms would help address the challenge outlined above. They also agreed that if a programme was to have any chance of success, it would have to be of world class standard and, because of the size of companies likely to be involved, would require state support. Interviewee 5G commented further that:

“This should be about giving people two things (i) a roadmap, in so far as that can be done, to show CEOs how to achieve scale and (ii) the confidence for people to say yes, I can do this. This was probably the biggest single thing in many respects – yes, I can do this.”

When one of the two CEOs became ISA Chairperson, she discussed the idea with the Executive Director of the association. They agreed to bring the idea for the leadership programme to members of the ISA Council where, following further discussion, the idea gained wider industry support. In this way, the structural social capital (Krishna and Uphoff 1999, Grootaert and van Bastelaer, 2001, p5) within the ISA facilitated decision making and collective action. The idea that had originated in informal discussion could now be brought forward by the ISA Chairperson and Executive Director as a formal ISA proposal to the state development agency.

A small ISA delegation then met with the CEO of Enterprise Ireland to seek support for developing and implementing a ‘world class’ leadership programme for CEOs of software SMEs. This was confirmed by Interviewee 5F from the agency side of the initiative:

“A couple of people at the top of the software association at that time took a view that the barrier to scaling in the sector could be part of the solution too, which is the ability to compete and grow to scale. So if you like they took a view ... based on their own experience and then based on the view of a cohort of colleague companies. This view married with the view of the CEO of Enterprise Ireland.”

The ability of the ISA to gain access to the CEO of Enterprise Ireland to discuss their idea was facilitated by bridging social capital previously established by the ISA, which is outlined above in case study 2, section 5.2. The agency’s software division manager, with whom the ISA had built up a relationship over a number of years, also participated in the meeting.



Several social capital theorists have emphasised norms that facilitate coordination and cooperation for mutual benefit (Putnam 1995, Krishna and Uphoff 1999, Woolcock 2001) and norms of reciprocity (Woolcock 1998, Cooke 2007a). The ISA and EI had built up such norms over time, which were important in the achieving the subsequent joint action that took place in this initiative. The ISA and the EI manager had developed a number of other successful initiatives together, so both sides knew and respected each other; they could feel confident of the norms of reciprocity inherent in their social network relationship.

The response from Enterprise Ireland CEO was positive and the head of human resource development at the agency was assigned to work with the ISA delegation to design the programme. Woolcock (1998, 2001) saw social capital as complementary to human capital and he emphasised leveraging off the resources within a community. Over a period of around seven months, the ISA and EI group meet with various consultants with experience of developing and implementing human resource programmes for the software sector. The two sides eventually settled on a team that brought different expertise to the design process. Hence, even at this early stage in the initiative, the OFC and state agency, in generating social capital, were leveraging off the human capital resources within the community. The ISA brought in a senior industry figure with over a decade of management experience and a strong track record of leadership within the Irish software industry. Enterprise Ireland brought on board a consultant with over 30 years of human resources development experience, who had previously worked on projects with the agency and knew the university business school environment in both Ireland and the US. Putnam (2001) emphasised that bridging social capital could create larger networks and extend one's social capital reach. The benefits of bridging social capital were apparent here, with the ISA and Enterprise Ireland bringing different experience and skills to developing the initiative from their separate extensive network of contacts.

However, there was some false starts and substantial tension between the ISA and Enterprise Ireland in the process of agreeing the make-up of the team to design the programme. In resolving these differences, higher levels of trust and understanding of each other's goals and aims for the programme were achieved. This required a significant level of commitment, in terms of both time involved and flexibility to see

each others' points of view. Interviewee 5G from industry side indicated significant challenges in agreeing the design team and getting work on the initiative off the ground, and concluded:

“Trust, if that is not there you are going nowhere and that can take time to build.”

As Interviewee 5E from the state agency side commented:

“There were many rows as there are in the best of design teams. I remember one day in particular that was difficult, but out of it came a flip chart with a diagram which is still shown in various parts of the world. So the industry expertise they brought to the design was, again, a critical part of it.”

The in-depth interviews for this case study, as supported by the quotations above, indicated that the trust was necessary in this case to gain the value of reciprocity (Putnam 1995, Cooke 2007a) from the bridging social capital. But this case study highlighted that such trust cannot be assumed to be straightforward. It is not just a case of organisations knowing and respecting each other, the individuals involved also matter. The development of the Leadership 4 Growth programme brought together two strong minded individuals with significant individual human capital who did not know each other. This created tensions that had to be worked through in order to arrive at necessary levels of trust to bring the initiative forward. This aligns with Nooteboom's (2007, p33) view that 'trust as a feature of social capital cannot be bought and installed'. If it is not present then it may need to develop over time.

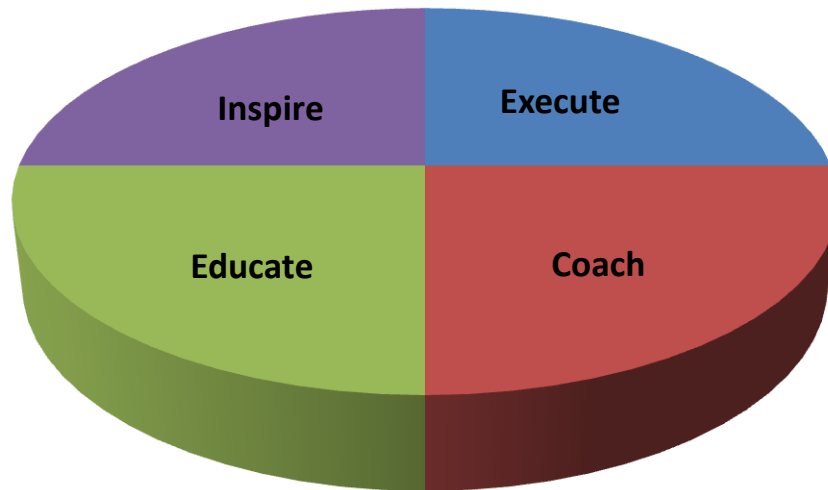
Once the team was agreed, the ISA, EI and their two advisors worked together on a detailed Request for Proposal (RFP) document, which was completed by end March 2006. The group then set about persuading a number of Irish and US institutions to consider bidding for the project. The EI consultant made preliminary calls, informing various institutes about the proposal. A number indicated immediately that they did not do industry programmes of this nature, others agreed to review the detailed RFP. The Chair of the ISA, during business trips to the US visited a number of the universities who had expressed interest in the RFP. She was one of the CEOs who

had come up with the original idea and a key driver behind the initiative. These meetings strengthened her ability to explain the concept of the programme face to face.

### **Framework consensus**

Leveraging off their substantial combined human capital and experience, the ISA and Enterprise Ireland team designed the Leadership 4 Growth programme around the following four pillars (Figure 5.10): (1) Inspire: the idea here was to tap into people who had achieved scale, to see how they had done it and how one could relate to them. Participants were given the opportunity to learn directly from world class CEOs who described how they developed their vision and strategy, what challenges they overcame and how their companies achieved leading market positions. (2) Educate: Participants studied entrepreneurial leadership theory and case studies. They were also given practical tools and techniques for creating and communicating company vision, devising and executing company strategy and developing personal leadership skills. (3) Coach: related to the understanding and addressing individual behaviour in relation to their position as the leader of the firm. Each participant was assigned his or her own leadership coach who worked with them throughout the programme to encourage, challenge and assist him/her in implementing the core concepts learned. The focus was on strengthening and enhancing the CEO's individual characteristics and attributes as a leader, within the context of the CEO's ambition for the company. This turned out to be the most controversial element of the social capital initiative and will be dealt with in greater detail below. (4) Execute: was about giving the CEOs support when they returned to their firm on how to implement what was learned. CEO participants were expected to take the core concepts learned and apply them to the leadership of their own companies. A mentor was appointed to smaller groups of around 6 companies to provide support during the taught modules and to help implement what was learned. Between modules, each CEO was given assignments to be completed, both individually and with their senior management team, to encourage and assist CEOs to put theory they were learning into practice.

**Figure 5.10: The four pillars of Leadership 4 Growth**



Krishna and Uphoff (1999) emphasised that structural capital facilities were mutually beneficial to collective action through established roles and social networks, supplemented by rules, procedures and precedents. In addition to the design of the actual programme outlined above, structure was also important in assessing bids to deliver the programme, with the ISA and Enterprise Ireland both involved in the process. Four world class universities and business schools, three US-based and one Irish, applied for the tender. Once a formal bid was made for the project, the process became quite interactive. Each university business school provided a number of workshops, including how they would perform their role in a class room situation and how they saw themselves working with the coaching body that they had nominated for that part of the programme. The ISA and EI also visited short listed candidates to further refine the proposals. The bids were evaluated by looking at both the education and the coaching elements separately, and assessing which bid combination would suit the Irish context best. One bid in particular fell down following a presentation by the coaching organisation involved. Interviewee 5G outlined that the assessment team felt that the organisation's approach was too distant from Irish cultural norms and would simply not work for the Irish CEOs who would participate in the programme. This aligns with Staber's (2007) assertion that

context matters in terms of leveraging social capital benefits to improve firm performance in business clusters.

The ISA and EI team spent close to a year designing the structure and identifying, and evaluating university business schools who could potentially deliver the programme. The team put a huge amount of effort into getting the project to this stage, in the process building what Woolcock (1998, 2001, p5-6) would describe as relationships of trust, leveraging off the human capital of team members to arrive at norms of reciprocity within a social capital network. The following sections will outline the benefits to ISA and Enterprise Ireland from the cluster initiative and the reciprocity inherent in the social capital interaction.

### **Governance and Financing**

In early June 2006, a detailed and refined proposal, recommended by the ISA/EI project team with the support of the Enterprise Ireland CEO, went before the board of Enterprise Ireland for approval. In making the recommendation to the board, the scoring mechanism used was strongly linked to the four pillars of the programme – inspire, educate, coach and execute. Following detailed discussion at Enterprise Ireland board level, Stanford University’s Graduate School of Business, who teamed with a US based coaching organisation specialised in organisation and leadership behavioural change, emerged as the successful bidder to provide the leadership programme.

Interviewee 5G, from the industry side, commenting on the successful bidder said:

“The Stanford people totally got what we were trying to do, create the leadership knowledge to create a company of scale and give people the confidence to do it”

Interviewee 5H, an industry mentor on the programme, commented on the specific fit of Stanford for the software industry:

“Right in the middle of Silicon Valley, Stanford University and its Professors and alumni had been responsible for the development of quite a number of businesses, growing them, spinning them off and making their mark in the whole ICT area. There was also, which was very important to the software companies, a very strong private equity venture capital base in California.”

Interviewee 5I, a second industry mentor, confirmed this view of Stanford as the right choice, with reference to the case studies that formed a key part of the programme:

“In my view it worked extremely well by being in Stanford. Not just because it was Stanford, but also because it was in the Valley and you kept meeting the Valley people, the real people behind the case studies”

Interviewee 5F, from the state agency side, emphasised that Stanford proved to be flexible in tailoring the programme to the needs of both the state agency and industry:

“Stanford has been good, even if a bit sticky on price. They have changed part of their programme and have worked well with us, both Enterprise Ireland and the industry side, to tailor it to our needs”

One of the challenging aspects of the process was this decision to go with an American rather than Irish university partner for the initiative. Members of the Enterprise Board would have liked to have chosen an Irish university, if possible. This would have seemed more obvious in the context of a cluster initiative and would also align with the view that social capital should leverage off the resources within the community (Field 2008, Woolcock 2001). But the focus on the software sector made it difficult for Irish universities to compete with the bid from Stanford. The Stanford business school was in the heart of Silicon Valley, viewed by many as a global centre of software firm development with a mature venture capital market. The decision to go with Stanford was influenced by the belief that it would be beneficial to expose the Irish CEOs to this environment, particularly given the under-developed nature of the venture capital market in Ireland. Once again, this aligns

with Staber's (2007) contention that context matters in terms of leveraging social capital benefits to support firm performance in business clusters. If the programme was designed to support the development of a different sector of the Irish economy, for example a low and medium technology sector, then a different university and location would probably be a better fit.

Given the quality and scale of the initiative when all the different elements were taken into account, particularly Stanford and the coaching elements, the cost of the programme was very substantial. Enterprise Ireland provided up to 70 percent of the funding and firms who participated provided the other 30 percent of costs to send their CEO on the programme. Hence the initiative involved substantial financial commitments from both the state agency and the SMEs who participated in the programme. Cooke (2007a, p82-83) argued that when social capital involves capabilities to link to state agencies, which run government programs and implement policy, there is almost always rent-seeking practice. From the beginning, the CEOs who came up with the original idea and the ISA knew that their indigenous firm members would not be able to fund a training programme of this scale from their own resources. Hence, a key part of the ISA motivation in bringing a formal proposal to Enterprise Ireland was to seek financial support for any such programme. Of course, there was also the substantial social capital benefit of the advisory time and human resource capability that both Enterprise Ireland and the ISA put into the designing the programme. But these indirect benefits, on their own, would not have been enough to get the programme off the ground. It was clear, that without the 70% grant towards cost, the Irish software SMEs would not have been in a position to send their CEOs on the programme. The following section will address the question: What reciprocal social capital benefits did Enterprise Ireland receive from their involvement in the cluster initiative?

### **Scope of member participants**

One of the challenges facing state development agencies is industry penetration. Cooke (2007a, p103) warned that state agencies need to ensure that policy efforts are not applied to an exclusive 'in group', creating social capital strength for only a few favoured firms. In this case study, Enterprise Ireland collaborated with the ISA and

extended their industry reach, in terms of both identifying and recruiting participants for the programme. Joint ISA and Enterprise Ireland workshops, targeted at CEOs who might potentially be interested in the leadership programme, were organised. CEOs had to commit to travelling to Stanford three times during a twelve month period for intensive week long sessions. Participants also had to commit to complete detailed project work, which involved their management teams, between sessions in the Stanford business school. So it was not just a question of SMEs putting substantial funds into sending their CEO on the programme. There was also significant time and firm resources that had to be committed over a twelve month period.

In-depth interviews for the case study revealed that after the approval of the programme state agency officials were concerned that adequate numbers would not apply. Interviewee 5F from the state agency side commented that, when approached, one CEO replied “CEOs send people on training courses, they don’t do them”. Some senior officials in the state agency began to waiver in their faith in the cluster initiative; they wanted to reduce the places booked in Stanford Business School and consequently the budget for the programme. Interviewee 5G, from the industry side, took a different view, acknowledging that it “required a certain leap of faith on the part of participants, since it was the first programme of that kind”, but was confident the initiative would be over, not under, subscribed:

“I said what are we going to do if we have more than 30 people who want to do the programme? How are we going to select them? Are we going to go back to Stanford who has made clear that they can only take 30 on the programme? They [EI] said the programme will never be over subscribed and I said, I will bet you anything it will.”

The ISA led by the Chairperson of the OFC turned their focus on encouraging software CEOs to consider applying for the programme. Supported by this intervention applications vastly exceeded the state agency’s expectations, with 75 applications received for the 30 places originally booked in Stanford. The strength of social capital bonds and industry reach built up within the ISA contributed to not only filling the available places on the first programme but also generated sufficient



interest to encourage the running of a second programme in the following year. Therefore, the reciprocal bridging social capital benefit to the state agency was not only “the industry expertise they brought to the design”, as Interviewee 5F stated regarding the ISA contribution, but also increasing SME participation in the programme. This supported the contention that one of the strengths of the social capital idea is that it emphasises resources that communities already have and encourages agencies to work with, and build on, this potential (Field 2008, p141, Woolcock 2001, p15). It also supports the assertion that state intervention should work with, rather than replace, existing networks and relationships freely entered into by individuals, which is the essence of social capital (Field 2008, p135, Coleman 1994, p312-313).

### **Resources and facilitators**

The Educate element of the programme took place in Stanford business school on three separate full week modules, approximately three months apart. Professor George Foster was the Stanford faculty director for Leadership 4 Growth. The residential modules in Stanford offered significant bridging social capital opportunities to participants, combining both insights from academic research and practise. Within the Stanford teaching methods, there was also evidence of earlier benefits of bridging social capital with the use of strategy frameworks developed by Professor Robert Burgelman during years of collaborative work with the Intel Corporation. The key themes of the three residential sessions in Stanford, which supported the building of social capital, were dynamic business strategy, high performance leadership and sustainable growth. Interviewee 5G commented on how the sessions in Stanford gave Irish SME participants rare access to software entrepreneurs who had successfully increased the scale of their business:

“All types of people they [Stanford] were able to bring in, because they are right down in the heart of Silicon Valley. They were able to get some amazing people...and not just a matter of picking big names, if there wasn't a particular reason [that is a relevant contribution that the speaker could make] then don't get the guy in...

Generally the CEO came to lunch or dinner and you could sit and chat to them”.

For example, one contributor on the programme was Mark Leslie, founder and former CEO of Veritas software, who took the company from a struggling firm with 12 employees to a billion dollar corporation with 5,500 employees. The strength of weak ties can be beneficial (Granovetter 1973, 1983) and the Irish SME group had the opportunity to leverage social capital benefits from contact with CEO presenters over a meal, as well as in formal classroom situations.

Coleman (1988, pS107) argued that closure of a social structure created trust that allowed the proliferation of obligations and expectations within a network. The L4G initiative also strengthened social capital bonds between the participants, with CEOs working in small groups of around 6, facilitated by a mentor. Significant thought was put into how these groups were assembled, with companies allowed to indicate in advance who they did not wish to be grouped with for competitiveness reasons. The main role of the mentors at Stanford sessions was to support their cohort group and to facilitate case work sessions in the evenings. Interviewee 5H commented that:

“The mentor’s role in the formal educate element in Stanford was essentially to listen and support his cohort group. ....In the cohort group sessions it was important that criticism (by one participant of another) was accepted as being constructive. That it wasn’t point scoring, that it wasn’t to make someone feel badly but was to provide a different perspective to what the original person was coming up with.”

CEOs also had substantial assignments to undertake from Stanford between the educate sessions, often involving the firm’s management team. Mentors also worked with the CEOs on this major project work as part of the execute pillar, offering further opportunities to strengthen ties within the group. Interviewee 5H added that:

“Each of the cohort group would host one of the sessions in their own premises. So the rest of us got to visit those premises, go on a short tour see

what was behind the business concerned, better understand the individual and his company, and the challenges of his company. Then get down to the work that we had to address under the time table dictated by Stanford.”

Cooke (2007a, p83) argued that the use of social capital could contribute significantly to the development of the ‘dynamic capabilities of the firm’ (Teece 2007), with trust being a key element in this regard. The central focus of Leadership 4 Growth was bridging the knowledge gap between how firms in Silicon valley managed to achieve scale while Irish SMEs struggled to do so. Both the evening group work in Stanford, and project work between sessions, facilitated the building of understanding and trust among the cohort of CEOs. Interviewee 5H commented:

“Trust was important here with confidences being shared on the strict understanding that what was said in the group stayed in the group.”

The potential of this group work to build significant social capital bonds among the CEOs involved was confirmed by Interviewee 5H:

“I would say that the bonding between them was immensely helpful to each and every one of them ... I was a mentor for the very first programme but due to time pressure decided not to continue with the subsequent programmes. But, I still get together with my group a couple of times a year and that group still meets now twenty four months after their programme finished. ....as recently as last month (July 2009) there was a meeting of the guys and they were still able to bring one another up to speed as to what their businesses were doing and some of the challenges. Kind of “help me out here guys I’m grappling with this issue, I don’t know whether I need to fill this hole in my organisation or not” and indeed fellows would be able to say “don’t be an idiot of course you have to do this” or “Don’t waste time on that” and you know it was taken in the spirit in which it was intended. I would say for those six guys there will always be a group which will never feel the need to hesitate in picking up the phone to one another.”

The building of close bonds may not have been a feature of every cohort group involved in the programme. However, there was evidence of clustering and close social capital ties among successful software firms through their involvement in networks such as the ISA, as Interviewee 5H added that:

“Maybe other groups didn’t work as well as that particular one. Having said that, some members of my group would have close ties with the odd individual member of another group. Partly because, maybe, they were physically near each other in West Dublin or that they knew one another from some other existence, things like the Deloitte top fifty, the ISA top notch companies, they’re often in for the same awards or they’re meeting in the same networks.”

### **The Coaching element of the L4G – positive or negative social capital?**

In addition to the distinction between structural and cognitive social capital, Ferlander (2007, p116) added a third behavioural dimension to capture the importance of participation on the part of the individual (Field 2008, pp160-161). Another resource provided to participants on the L4G was through the coach pillar, with Stanford University teamed up with a US coaching organisation specialised in leadership behavioural change. Each CEO participant was assigned a coach from this group, who worked on a one-to-one basis with the CEO on developing applied behavioural skills. Usually the same coach was assigned to the each member of the CEO’s cohort group. Sometimes coaches attended the evening sessions in Stanford. In between the sessions in Stanford, one-on-one sessions were organised between the CEO and his/her coach, involving psychometric testing. The sessions also involved 360 feedback with a number of interviews undertaken with members of the CEO’s board of directors, including the Chairperson, peers and subordinates, and customers.

Interviewee 5F from the state agency side of the initiative argued that the coach often challenged the participant to think differently:

“You know your relationship with ‘X’ what do you need to get from him, how do you do that? How are you spending your time at the moment? Are you spending too time on operational detail? How do we get that to be different? You know it is kind of a lonely job being a CEO and coaching should help to address that.”

However, other interviewees indicated that many participants had problems with the coaching element of the initiative. While the US coaching organisation used international standard methodologies, chemistry between the individual CEO and the coach appeared to be important. Interviewee 5G, an industry participant, commented:

“A lot of people would say that they got a lot more value out of the execute piece than they did out of the behavioural (coach) piece. If ever there is chemistry needed, it is far greater in the coaching side.... Whereas on the mentor side you were focusing on business, which is more based on fact ...The coaching element was to an extent opinion based, even though it might be substantiated by psychometric testing etc. ... I do feel that we should stop spending the money with [the US coaching organisation] because of ...how much the programme costs”

Interviewee 5H, an industry mentor, commented that

“Of my group of six, three of them got a lot out of the coach and the other three didn’t get too much. So it was mixed, it depended on their [the participants] own experience and development. You know how much of life they had seen....I’d say the coach helped, probably the three younger guys to ...change behaviour, to do things that they didn’t quite realise that they needed to do or take things more seriously.”

Interviewee 5I, a second industry mentor, when asked (without reference to what other interviewees had said) what did he think of the coaching element of the programme commented:

“I have a lot of mixed feeling about that. It depended a lot on the chemistry between the individual coach and the CEO. It worked very well for some and was appalling for others. It was very hit and miss in my view. ...It got to the stage where some CEOs said thank you very much but no thanks. ”

Consequently, the coaching element of the programme seemed to yield positive benefits for some but was a negative social capital experience for others, with the interaction between the coach and industry participant simply not working in many cases. Therefore, it is important not to assume that providing a social capital bridge will necessarily result in positive outcomes. Perhaps the strongly bonded nature of the software network closed off some members of the network to new ideas. Alternatively, it may have been in that, in this case, the cultural context mattered more than was realised, with some Irish software CEOs not being able to connect with the style of some American coaches.

Despite the difficulty of the coaching element for some, a number of participating CEOs and their firms completed follow-on projects with the assistance of the US coaching group. This was also achieved with the financial support of Enterprise Ireland emphasising again Cooke’s (2007a) assertion that rent-seeking may be an inevitable feature of social capital initiatives involving firms and state agencies. Again, the value for money of this follow-on work was questioned by one interviewee in particular.

In summary, interview evidence indicates that the coaching element was not as successful as other elements of the programme. Interviewee 5F from the agency side commented that ‘there is an argument as to whether you need both coaches and mentors, but ...you need the two, when you have someone coaching it is all about you, but execution (mentors) is about the CEO and the management team, which is much different’. The coaching element was particularly challenging for CEOs because of the openness required. If there was a strong difference of opinion between a coach and a participant, then this was difficult. Interviewee 5G, an industry participant, argued that the coaching element of the programme could be delivered by Irish-based coaches, who might be in a better position to connect from a cultural perspective. Using Irish coaches would also have substantially reduced the cost of

the programme. Interviewee 5F from the state agency argued that the feedback on the coaching was taken on board and that in subsequent versions of the programme two Irish coaches, with strong capabilities and wide experience, were introduced as part of the US led coaching team. However, the lack of a formal oversight structure for the L4G initiative, similar to the CSET structure outlined in section 5.4, meant that changes to the coaching element were incremental rather than radical. The coaching element was very expensive and questionable in terms of value-added for many participants. Other elements of the programme, for example the sessions in Stanford and the execute element led by mentors, were generally perceived by interviewees as adding more value and being far more cost effective. A more formal structure, with an oversight committee with independent advisors, could quite possibly have led to more radical changes to the programme and substantial cost savings, without negatively impacting on the substantial social capital benefits of the initiative.

### **Performance of the cluster initiative: A successful collaboration between industry, state agency and a university?**

Looking at Leadership 4 Growth through the lenses of Sölvell et al's (2003) Cluster Initiative Performance Model (Figure 2.3 in Section 2.5, Chapter 2) indicated a well established cluster initiative. The objectives, to educate, build confidence and improve the capabilities of CEOs of high tech SMEs, fell comfortably within the CIPM. However, the CIPM model alone was not sufficient to understand how, and where, the initiative worked and didn't work. By using the social capital concept to analyse the cluster initiative, greater depth of understanding of the process of collaboration was achieved.

The initiation and planning stage involved deep levels of collaboration between an OFC, the Irish Software Association, and a state agency, Enterprise Ireland. It leveraged off the social capital bonds within the ISA, and built on earlier established bridging social capital between the ISA and Enterprise Ireland. The framework agreed for the programme was greatly enhanced by this collaboration. Participation rates by CEOs in the initial Leadership 4 Growth programme was also helped by social capital bonds existing within the ISA. Finance was shared on a 70:30

percentage basis between the agency and the firms involved, rent-seeking was certainly part of the motivation for the bridging social capital between the industry association and state agency (Cooke 2007a, p83). But the achievement of this objective should not be viewed as negative social capital, given that the cluster initiative had reciprocal benefits for the state agency as well as the firms involved. In addition helping Irish high-tech SMEs to achieve scale can also be seen as a contribution to building a national system of innovation in Ireland, which Mjøset (1992) recommended. The initiative was well resourced with the involvement of the world class business school at Stanford and the mentors who worked with participants on the programme. The coaching element was clearly the most controversial of the cluster initiative. A number of interviewees commented that it worked for some, but not for other, participants and it was viewed as poor value for money by one interviewee in particular.

The design and approval of the first Leadership 4 Growth was well structured with the ISA and Enterprise Ireland team working closely together and the involvement of the Enterprise Ireland Board. The commitment of both the ISA and Enterprise Ireland created substantial momentum to drive the cluster initiative forward. This supported the contention that state agencies should work with existing resources within a community, rather than trying to replace existing networks and trying to do everything on their own (Woolcock 2001, p15).

However, once the programme was approved, the structural social capital appeared to break down somewhat. In Stanford, an informal group of the ISA, participant CEOs and mentors, provided feedback to Enterprise Ireland, particularly on the coaching element and this feedback was acted upon. But unlike the other cluster initiatives reviewed, no formal oversight committee or board, involving the industry, state and university partners, and supported by independent advisors, was established. This was a structural social capital weakness of the initiative; the establishment of an oversight committee might well have helped to address the problems with the coaching element more effectively. It could be argued that the opportunity to build on the social capital benefits evident in the team work during the design stage was lost.



At the time of writing, the Leadership 4 Growth initiative had operated for four years. Subsequent rounds of the L4G programme involved additional industry actors. OFCs and firms from other high technology sectors of the Irish economy included the Irish Medical Devices Association (IMDA) and medical devices companies, and the Irish Biotechnology Association and biotechnology companies. Sölvell et al (2003) listed three performance outcomes in the cluster initiative performance model: competitiveness, growth and goal fulfilment. Significant cohorts of Irish SME firms have been assisted in developing a mindset of thinking about how to create companies of scale. Since the programme was first introduced in 2006, over 140 CEOs and their management teams participated on Leadership 4 Growth. It was a central part of Enterprise Ireland's support to Irish companies to grow their international business in the face of very difficult market challenges' (Enterprise Ireland 2010).

Professor George Foster, Stanford Faculty Director, stated that:

'The Leadership 4 Growth programme is redefining the way CEOs and senior management build their human capital and that of the organisations they lead. It is successfully building a platform that has sizeably raised the expectation levels of participating Irish CEOs and has greatly increased their knowledge base and confidence.'

The Irish owned firm, South Western, is one example of the success of the programme, increasing competitiveness and growth. South Western CEO, Jim Costello, clearly believes that completing the Leadership for Growth programme was beneficial:

"Our vision of growth is now more ambitious (€50m in three years) counting organic growth only. We now have in place a new management team and incentives that are aligned to our goals and are clear to the team" (Enterprise Ireland 2010a)

South Western announced in 2010 it was creating 100 new business support jobs, in addition to the 450 people already employed at its base in Clonakilty, Co. Cork. The firm also employed 200 people in Lodz, Poland, following a move in 2007. At this

stage, it introduced a new combined model, which provided high-value close to customer activities from Ireland and back-office transaction type procedures from Poland.

A second example provided evidence of the benefit of extending the programme to high technology sectors other than software. The Irish medical devices firm, Creganna's CEO Helen Ryan<sup>66</sup>, stated that:

“LAG has changed our view of what was possible for us to achieve – it has been a big mindset shift resulting in a higher level of confidence. We are repositioning ourselves with our customers to make a significant step change in growth”

In 2010, Creganna announced the acquisition of the US firm Tactx Medical Inc. The move represented a key step in Creganna's vision to build a leading global medical technology company. The new firm Creganna – Tactx Medical, with a combined revenue of US\$110 million and 800 staff worldwide, was within the top ten global providers of technologies and services to minimally invasive medical devices companies.

Undoubtedly there were CEOs who found the programme less transforming than others. This indicated that one cannot simply assume positive outcomes from interactions of a social capital nature. This was particularly evident when examining the coaching element of the initiative.

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<sup>66</sup> Creganna create innovative technologies in the medical devices sector.

In-depth interviews also indicated that two years after the end of the first leadership programme, a number of CEO participants maintained contact and continued to meet in their cohort groups to support each other's business development. This is evidence that cluster initiatives can have a lasting benefit in terms of strengthening ties and social capital bonds between industry participants.

The Leadership 4 Growth programme developed by the ISA and Enterprise Ireland also attracted some international attention. The former ISA chairperson and CEO industry actor involved in the design of the programme participated in a business schools' summit in Australia that brought together 46 bodies, including the federal government who were interested in leadership and innovation. The Australian organisers of the summit had previously visited Ireland to see how industry and the state sector came to work so effectively together in the L4G cluster initiative.

In the late 2000s, the Leadership 4 Growth programme was replicated for the construction sector in Ireland, with Duke University and the London Business School providing the education element of the programme. The coaching element on the construction programme was provided by the same US coaching organisation, while the mentors chosen had knowledge of the construction sector. An interviewee from the state side indicated that collaboration on the construction programme got going almost from day one, with companies working together on some projects to develop their businesses internationally. The collapse of the Irish construction market undoubtedly contributed to the pace of collaboration between firms.

Cooke (2007a) advised that state agencies should develop exit strategies from cluster initiatives and in this sense the Leadership 4 Growth may fall down. The overall cost of the programme involved substantial state funding e.g. 70% of the total cost involved. With Enterprise Ireland funding budget declining, the future viability of the initiative will be challenged. The initial design and establishment of the programme clearly involved deep levels of collaboration between the state agency and the organisation for collaboration. Stanford GSB also amended the programme to take on board feedback following the completion of the first initiative. The Leadership 4 Growth programme is now endorsed by a range of organisations for collaboration (OFCs) in the software, medical devices and biotechnology sectors.

But the state agency now describes the initiative as an ‘Enterprise Ireland programme’. This is despite the fact that the idea for the initiative originated within the organisation for collaboration, the ISA, and the first programme would most likely not have taken place without the commitment of the leaders of the OFC.

## **Concluding comments**

As part of the Irish Government’s 2008 framework for sustainable economic renewal, five action areas were identified. The second of these was ‘Building the Ideas Economy – Creating ‘The Innovation Island’ (DOT 2008, p9). State agencies e.g. Enterprise Ireland, were also responsible for providing strong supports for start-up companies and entrepreneurs to create an R&D-intensive indigenous enterprise sector. SFI was responsible for continuing to build Ireland’s world class research capacity in strategic areas allied to the needs of industry. These, and many other of the long list of key actions (DOT 2008, p13-16), were laudable. But the importance of the social capital benefits of building collaboration among firms, and between firms and research institutes, universities and institutes of technology, does not come through in the document. It is important to recognise that ‘to innovate’ is usually a collective action, and organisations and organisational capabilities play a role (Bender 2008, p26). The government framework clearly outlined a number of roles for state agencies in this regard. But the framework failed to give due weight to the important collaborative role played by firms and embedded networks of firms in the innovation process.

This chapter provided evidence of firms and universities collaborating together, with the support of state agencies, in cluster initiatives that can be viewed as the building blocks towards systems of innovation in Ireland. The CTVR cluster initiative (Case Study 3), which involved seven research partners, seven industry partners and three state agencies, can viewed as a building block towards a national system of innovation. It focused on the development of wireless and optical networks, with a strong emphasis on the technology that underpins such networks. The APC cluster initiative (Case Study 4), which was a much smaller collaboration, can be viewed a building block towards a regional innovation. It focused on the interface between food and health and well-being, leveraging off the human capital capabilities of food

and biotechnology researchers. In addition to the two examined in this thesis, there are eight other CSETS that might also be viewed as building blocks toward systems of innovation in Ireland. Case studies 1, 2 and 5 can be viewed as building up and strengthening the ICT and software community in Ireland, which of course can also contribute to a national system of innovation, but in a more indirect way than the CSET initiatives. SFI, the IDA and Enterprise Ireland all play supporting roles in the establishment and funding of many of these cluster initiatives. There is the danger that if these state agencies do not develop effective exit strategies, as suggested by Cooke (2007a), then when public funding dries up so does the potential for innovation in these cluster initiatives. This suggests that encouraging and developing a role for financial institutes and venture capital in these initiatives may be important for future sustainability.

## Chapter 6 Clusters, social capital and the building blocks of an national innovation system in a traditional sector of the Irish economy

Chapter 5 looked at the development of clusters and collaboration within cluster initiatives in the ICT and software sector of the modern economy. This chapter will examine the development of clusters with reference to the traditional economy, focusing on the food and dairy sector. It will also examine the role of collaboration between industry, an Irish state agency and a number of universities in a cluster initiative focused on food innovation and health. This issue will once again be discussed in the context of the building blocks of a national innovation system in Ireland.

### Section 6.1: The traditional economy: The food and dairy sector

The Agri-Food sector makes a significant contribution to gross value added (GVA) in the Irish economy, accounting for €11 billion or 6.6 percent of total Gross Domestic Product (GDP) at factor cost.<sup>67</sup> The dairy industry is one of Ireland's largest indigenous industries and, as table 6.1 illustrates, an important part of the Agri-Food sector.

**Table 6.1: Key Dairy statistics**

Milk intake at creameries	5 billion litres	Average per herd: 225,000 litres
Farmers	19,000	16% of total employed in agriculture
Milk output (value)	€1.6 billion	28% of gross output in agriculture
Dairy and ingredients Exports	€2.2 billion	27% of total exports of food and drink
Dairy processing employment	5,300	

Sources: DAFF 2009, Bord Bia, CSO, IFA (see endnote 1)

<sup>67</sup> Sources for figures referred to in this paragraph and Table 6.1 include the Department of Agriculture, Fisheries and Food (DAFF 2009), The Irish Food Board (Bord Bia 2009) and the Central Statistics Office publications on Milk statistics and Industrial Production (2008 / 2009). Total Gross Domestic Product (gross value added) in the Irish Economy at factor cost in 2007 was €167,547 million. In 2007, there were 117,100 employed (farmers) in agriculture and a further 50,000 employed in the food and drink sector in Ireland. Bord Bia and the CSO value total exports of food and drink in 2008 at around €8.2 billion. Figures on the number of dairy farmers and average production per dairy herd are drawn from an Irish Farmers Association submission to government (IFA 2009).

In addition to direct employment in farming and dairy processing, the industry supports employment in related industries such as infant formula manufacture, transport, engineering, retailing etc.

The development of the Irish dairy industry up the mid-1990s can be divided into four phases (O'Connell et al, 1997, p3):

- (i) An early development phase up to the 1930s,
- (ii) a period of stagnation from the 1930s to the 1950s, affected by protectionist Irish economic policies and industry conservatism,
- (iii) a period of renewed growth and reorganisation during the 1960s and early 1970s, when Irish economic policy became more outward looking as Ireland prepared for, and joined, the EEC (the forerunner of the EU), and
- (iv) a period from the mid 1980s, when dairy industry development was affected by a largely protectionist EU Common Agricultural Policy (CAP).

In this latter period, under the CAP, the dairy industry operated in a highly institutionally managed and protected market environment (Dillon et al, 2008).<sup>68</sup> Between 1973 and 1983 EU milk production increased from 91.3 to 110 million tonnes, creating a market surplus cost equivalent to 30% of the total CAP budget. The adoption of milk quotas by EU member states from 1984 halted the growth in milk production, while ensuring price protection for EU dairy producers. But the CAP system required the use of export subsidies (refunds) to enable EU dairy products to trade on world markets. Additional subsidies were needed to encourage the use of dairy products on the internal markets in schemes for the manufacture of ice cream and confectionery, and animal feeds.

Through this combination of high and stable guaranteed prices, the CAP successfully boosted agricultural production in many regions of Europe. In Ireland, the CAP

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<sup>68</sup> The remainder of this paragraph draws on the evolution of EU agricultural policy presented in Dillon et al (2008, p20).

eased the transformation of a largely rural society to a much more broadly-based economy with substantial high-tech manufacturing and services sectors. However, the CAP became a victim of its own success, resulting in large EU surpluses and budget crises in the 1980s (Bureau and Matthews, 2005, p2), which resulted in the introduction of milk quotas to restrict the potential for the production of surpluses in the dairy sector.

A fifth phase, which can be described as a period of EU agricultural policy reform, can now be added to the four phases of development outlined above. In the 1990s, the EU Commission faced increased criticism from some of its member states, including the UK, due to the continued growth in the internal budget to fund the CAP. Countries outside the EU also objected to the impact of the CAP on world trade. The EU responded by agreeing with its member states the first major CAP reform in 1992 under the direction of the then Agriculture Commissioner Ray McSharry<sup>69</sup>. The McSharry package of reforms was implemented in 1993/94 and began the process of shifting farm support from price to direct payments (Bureau and Matthews, 2005, p9). The reforms instigated a reduction in market support prices and provided compensation for farmers by means of direct income aids, with several rural development measures being introduced to encourage more environmentally friendly and less production intensive systems of farming (Dillon et al. 2008, p20). The main targets of this first reform package were the beef and cereals sectors, with relatively minor changes introduced for the dairy sector.

In addition to easing the pressure on the internal EU budget, the McSharry reform package helped the EU to complete the negotiations on agriculture in the WTO Uruguay round. It was the first time that the agriculture sector was included in a multilateral trade agreement. In the period 1995 to 2000, further CAP changes took place to accommodate the newly-agreed disciplines of the WTO (Bureau and Matthews, 2005, p9). The EU cut domestic support schemes by 20 percent, import tariffs by 36 percent, and export subsidies by 21 percent in volume terms and 36

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<sup>69</sup> Ray McSharry was EC Commissioner for Agriculture from 1989 to 1992, having previously served as Minister for Finance in Ireland.



percent in value terms. These changes had a more significant impact on the dairy industry than the initial 1992 CAP reform measures.

Despite the McSharry reforms and the EU commitment to reduce support under the WTO at the end of the 1990s, agriculture spending still accounted for approximately half of total EU expenditure. This caused political tension between net contributors to the budget, such as Germany and the UK, and member states who were net beneficiaries of the agricultural policy, including Ireland. These tensions were heightened by the prospect of the EU taking in ten new member states in 2004 (and two more in 2005) all with less developed economies than the existing members. The ‘new’ countries were likely to draw heavily on the CAP to support their agricultural sectors. All of this suggested that there would be substantial support among existing EU member states, particularly the net contributors<sup>70</sup> to the budget, for further reform of the CAP.

Consequently, the second major EU CAP reform ‘Agenda 2000’ was implemented in preparation for this EU enlargement. The Agenda 2000 reform package also helped the EU to prepare for entering into negotiations for further liberalisation of agricultural trade under the WTO Doha round. This time around the dairy policy regime was a key focus of the EU reform process. Agenda 2000 also introduced a major change in the overall philosophy of the CAP, by promoting the idea of a ‘second pillar’ that would shift public policy focus from supporting agricultural production (the ‘first pillar’) towards more support for environmental and social services, and the promotion of quality products (Bureau and Matthews 2005, p10).

These cumulative changes in agricultural policy had an impact on the utilisation of milk by Irish dairy processors. A comparison of production levels at the end of the 2000s with those at the end of the 1990s, using three year averages (Table 6.2), provides evidence of a quite significant shift in Irish dairy production patterns. Average Irish cheese production in the period 2007-2009 was 74 percent higher than it was at the end of the 1990s. In 2009, Ireland produced far more (35 percent more)

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<sup>70</sup> Germany held the EU Presidency in 1999 and with the support of the other net financial contributors was in a good position to influence both the size of the future budget and the shape of CAP reform in the wake of the greatly enlarged EU.

cheese than butter, whereas ten years earlier Irish cheese production had been only two thirds that of butter (CSO 2010b).

**Table 6.2 Irish Dairy Production – selected products**

'000 tonnes	1997-1999	2007-2009	Percentage
			Change
<b>Butter</b>	134.9	128.5	-4.7%
<b>Cheese</b>	91.5	159.2	74.0%
<b>Whole Milk Powder</b>	33.7	30.7	-8.9%
<b>SMP</b>	101.0	70.8	-30.0%
<b>Casein &amp; Caseinates</b>	43.4	37.3	-13.9%

Source: CSO, IDB and author’s calculations

In a further policy reform, the EU has agreed to eliminate milk quotas from 2015 and Ireland may be one of the few member states where milk production will increase. Consequently, Ireland’s share of EU milk deliveries may actually increase in the future and Irish dairy processors will have more, rather than less, raw material. Trends towards the production of more cheese and dairy ingredients based on whey protein are likely to continue in the future, as the Irish industry strives to survive in an increasingly competitive and free market environment. The production of certain dairy ingredients such as casein and SMP may decline, as less butter is produced in the absence of EU support. The importance of the cheese and ingredients segment of the Irish dairy industry will be discussed in further detail in Section 6.3 below.

## **Section 6.2: Dairy industry clustering – cheese and ingredients**

### **Aspects of clustering - Irish dairy sector in the mid-1990s**

A detailed study of the dairy industry in the mid-1990s, carried out for the National Economic and Social Council (NESC) of Ireland, ‘identified aspects of a “cluster”

and a “clustering process” as described by Porter’ (O’Connell et al. 1997, p79).<sup>71</sup> The core of the Irish dairy industry was made up of a number of large competing indigenous milk processors. By the mid-1990s, some of these processors were developing into competitive multinational companies, with an innovative cooperative and plc structure, headquartered in Ireland. Smaller cooperatives, from an exporting point of view, were essentially a network of processors supplying the Irish Dairy Board (IDB), which was a marketing cooperative that owned no production facilities in Ireland. There was a strong geographical dimension, with dairy farmers, major dairy processors and supplier industries (including some packaging, equipment, engineering and software) spatially clustered in the South Munster and Leinster regions. Evidence was also found of an agglomeration effect, where the ‘cluster’ of dairy processors attracted suppliers, customers and supporting organisations to the same region. Retailers and foreign multinational customers located in Ireland had a positive influence on the competitiveness of the Irish dairy industry. Retail multiples were sophisticated and demanding buyers, partly responsible for the upgrading of standards of Irish dairy processors. But more important, according to O’Connell et al (1997), was that retailers, both Irish and non-Irish, brought constant pressure on dairy processors to reduce prices and consequently improve cost efficiency.

Mottiar (1997) also applied the diamond model to Irish dairying and found that the development of the sector could be partly explained by the factors outlined by Porter. She suggested the Porter model might be expanded to include an ‘external circuit’ to include transnational business activity and other countries’ diamonds (Mottiar 1997, p257). She correctly identified that international factors also affected the structure of the Irish industry, encouraging firms to merge, make acquisitions or transform into public limited companies (Mottiar 1997, p289).

However, the cluster analysis of dairying undertaken in 1997 faced certain problems and limitations. One problem in applying the diamond model to the sector was that Porter envisaged a much less regulated and freer trading environment than that

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<sup>71</sup> The section draws extensively on the assessment and conclusions of the cluster analysis study of the Irish dairy processing industry carried out by O’Connell et al (1997), pp 68 – 81.

which characterised the dairy industry in the mid-1990s. This led O'Connell et al (1997, p71) to conclude that the Irish diamond worked in conjunction with the EU's Common Agricultural Policy (CAP) to create an industry that could only be seen as competitive 'within the context of the existing regulatory regime'. The downside was that the CAP support programmes for commodity products, such as butter and skimmed milk powder, reinforced seasonality of milk production. This worked against the long term development of export markets for unsupported products and encouraged fragmented production structures. Since the mid-1990s, internal EU budgetary pressures and external pressure for less subsidisation of agriculture at the WTO has resulted in significant CAP reform. Consequently, the business environment for the Irish dairy industry is now less regulated, suggesting that the Porter model, at least in this regard, may have greater relevance in the Irish context today.

In contrast, Wickham (2005) proposed that the role of government can be altered from an exogenous variable (Porter 1990) to one that is central to regional economic development. He found positive key government roles at the introductory, growth and maturity stages of a Tasmanian shipping cluster, including support for building industry networks and the social capital of the region (Wickham 2005, pp43-47). Chapter 5 provided evidence of a positive role for government in the development of ICT and software clusters in the Irish economy, including various forms of building social capital involving industry, state agencies and the research community. The role of government in the emergence of the cheese and ingredients cluster outlined in Table 6.3 below was not as positive as it was in the case of the ICT and software sector. However, section 6.3 provides evidence of a recent positive role for the state agency Enterprise Ireland in building a cluster initiative involving four dairy cooperative/ companies and four research institutes.

One challenge that researchers, particularly those analysing clusters in small open economies, face in using the Porter model is the relatively minor role envisaged for multinationals.<sup>72</sup> Foreign ownership appeared in the 'demand conditions' and

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<sup>72</sup> For a detailed discussion on this point, see the subsection on the criticisms of the diamond cluster model in Section 2.1 of Chapter 2.

‘supporting / related industries’ elements of the Irish dairy diamond, as outlined by O’Connell et al (1997), rather than at the core of the diamond. For example when identifying the horizontal and vertical linkages characteristic of a Porter cluster, O’Connell et al (1997, Figure 7, p73) placed emphasis on foreign owned beverage / brewing companies and chemical/ pharmaceutical companies as customers and related industries. But, both O’Connell et al (1997) and Mottiar (1997) underestimated the importance of the baby food / infant formula multinational companies to the development of the Irish dairy sector. This was probably as a result of inadequate knowledge of the dynamics of Irish dairy sector on the part of O’Connell (1997) and Mottiar (1997). But it raises an interesting issue in relation to the lack of emphasis on the role of MNCs in the Porter (1990) cluster model.

In the case of Ireland, the strength in infant formula / baby food production is related to a strong position in dairying. The growth in the dairy ingredient sector is also related to linkages to the infant formula industry in Ireland. Hence the infant formula industry can be categorised as a related industry, as well as a customer, in the context of dairy clustering in Ireland. Of course, the fact that the firms that produce infant formula / baby food in Ireland are foreign multinationals once again challenges the limited role for FDI suggested by Porter in his diamond model. In defence of Porter, Ketels (2006, p125) argued that there is nothing in the Porter concept of competitiveness and clusters that denies the important role of multinational firms.<sup>73</sup> However, a review of criticisms of the diamond model in Section 2.1 of Chapter 2 still leads one to conclude that Porter essentially saw only an occasional seed role for FDI, whereas Dunning (1998, 2001) saw a deeper role for FDI and MNCs in competitiveness. The role played by the foreign owned infant formula industry in the development of the dairy sector is explored in greater detail during the examination of clustering in the cheese and ingredients segment below. This chapter suggests that this relationship has played a far deeper role than that envisaged by Porter in the cluster concept.

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<sup>73</sup> For a more detailed discussion on this point, see the subsection on the criticisms of the diamond cluster model in Section 2.1 of Chapter 2.

## Clustering in cheese and ingredients segment of the Irish dairy sector

Porter argued that, in explaining competitiveness at national level, one should focus not on the economy as a whole but on specific industries and industry segments (Porter 1990, p9). Furthermore, industries are not homogeneous; segments of an industry have a structure just as industries do and the strength of competitive forces often differ from one part of an industry to another (Porter 1998a). The dairy industry can also be divided into a number of industry segments that face different competitive environments and different supply and demand conditions. These differences have an impact on the context for firm strategies and the way related and supporting industries interact with firms. The key strategic questions for the firm that arise out of industry segmentation are where in the industry the firm should compete and how the firm strategy should reflect this segmentation (Porter 1998a). Essentially, a firm can adopt a broadly-targeted strategy that addresses many segments, or address a small number of segments in a focused strategy. This thesis takes a new approach to previous cluster studies, bringing together insights from Porter's work on industry segmentation and industry clusters with reference to the Irish dairy sector.

O'Connell et al (1997) and Mottiar (1997), in applying Porter's diamond to the Irish dairy industry, focused on the industry as a whole. Both were correct in identifying the CAP as a constraining factor on development of the industry, but only partly correct in the degree to which this restricted the applicability of the model to Irish dairying. Different dairy industry segments face different trading environments. Butter and SMP manufacturers have greater access to EU support schemes than other industry segments, with the Commission buying product during periods of market weakness. This underpins the price paid to farmers whose milk is processed into these products. As already outlined, CAP reform has reduced the level of agriculture support. But the intervention purchasing system for butter and SMP continues to exist, albeit at lower levels. In contrast, cheese manufacturers have never enjoyed such price support and, in this sense, have faced a more challenging trading environment than their butter/SMP industry counterparts. In addition, a strategic report commissioned by the Government with the support of Enterprise Ireland,

ICOS and the Irish Dairy Industries Association (IDIA), recommended that the industry ‘reduce dependence on commodity products and increase value-added content of manufactured dairy products’. The report identified future market opportunities in areas such as dairy ingredients and functional and health foods, which could help to sustain industry competitiveness (Prospectus 2003, p10).

The remainder of this section will examine clustering in the cheese and ingredients segment of the Irish dairy sector. There are at least two reasons for choosing this segment over others: (i) It is historically the least EU-supported segment of the Irish dairy industry and (ii) consumer demand for cheese and ingredients is growing faster than for other dairy products. In this context, it may be a good barometer for what lies ahead for the broader Irish dairy sector operating in a less protected trading environment. The analysis will apply the Porter diamond model to this segment of the dairy industry, with a new focus on collaboration and social capital, drawing on the concepts outlined in the framework developed in Chapter 2.

This segmented approach will also provide some indications of the different strategies adopted by the Irish dairy companies and cooperatives. Section 6.5 of this chapter will examine the emergence of a cluster initiative, involving high levels of collaboration between a number of dairy cooperatives / companies, a state agency and Irish universities, which contributes to the building blocks of a national innovation system in Ireland.

### **The evolution of cheese manufacture 1960s - 2010**

The evolution of the cheese segment in Ireland is interesting from a cluster development perspective. In Ireland, cheese production is predominately cheddar cheese, with smaller amounts of alternative varieties including emmental, gouda and low-fat cheeses.

In the UK, the other major producer of cheddar cheese in Europe, the cheese segment evolved from a farmhouse production structure. The substantial farmhouse sector in the UK has diminished in recent years, partly as a result of changes in farm structure and partly because of increased competition from generic cheeses produced

by large scale manufacturers.<sup>74</sup> In Ireland, over the last 20 years, there has been a greater focus on and interest in farmhouse cheese production, but farmhouse cheese is not the foundation of the cheese industry in Ireland. In 2009 the Irish Food Board (Bord Bia) valued the Irish total cheese market at €180 million, with the farmhouse cheese share valued at less than €3 million (CÁIS, 2009). Teagasc (2009) estimate annual production of farmhouse cheese in Ireland at over 500 tonnes, including exports to the UK, other European countries and the USA. Consequently, the vast majority of the 159,000 tonnes of Irish cheese exported in 2009 was produced by dairy processors in large scale factories (CSO 2010c). The UK is a key export market for Irish cheddar in particular, with Irish cooperatives / companies exporting over 77,400 tonnes of cheddar valued at over €215 million to the UK in 2009<sup>75</sup>. Therefore, in order to understand the development of the cheese segment in Ireland, one must focus on the evolution of large scale manufacturing of cheese.

In marked contrast to UK industry, in Ireland a driving force in the development of the cheese segment was foreign investment. Following the establishment of the IDA<sup>76</sup>, a number of UK multinational companies invested in cheese manufacture in Ireland in the 1960s and 1970s<sup>77</sup>. Unigate invested in four cheese plants located in the south Leinster and Munster regions (see Table 6.3).

Express Dairies invested in two plants in the Munster region. Unigate subsequently sold cheese plants to Avonmore, Waterford and Ballyclough cooperatives, retaining only one in Wexford. During the 1990s a number of mergers took place in the dairy sector. Ballyclough merged with the Munster based cooperative Mitchelstown, another cheese producer, to form Dairygold Cooperative in 1990.

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<sup>74</sup> There are still a small number of farmhouse producers in the UK producing up to 7,000 tonnes of cheese per annum

<sup>75</sup> Unpublished figures obtained directly from the CSO External Trade Section.

<sup>76</sup> See Chapter 5 for a detailed discussion on the establishment of the IDA and the government focus on FDI.

<sup>77</sup> Following the first period of commercial production between 1910 and 1921 the Irish cheese industry declined greatly after the World War I, as creameries reverted to butter production, with limited developments in cheese making from the 1930s to the 1960s pioneered by Mitchelstown Co-op and the Golden Vale Federation (Keane 1998, p12).



**Table 6.3: Evolution of cheese manufacture in Ireland 1960 – 2010**

1960s-1970s	1980s	1990s	2000s
Foreign direct investment (FDI) drives cheese manufacture, limited Irish co-op involvement	Irish Co-ops emerge in cheese sector, Unigate reduces investment in Ireland	Mergers and Rationalisation of Co-ops / Plcs, Express disinvests from Ireland	Further Rationalisation and acquisitions
Unigate <ul style="list-style-type: none"> <li>• Wexford</li> <li>• Ballyragget (Kilkenny)</li> <li>• Kilmeaden (Waterford)</li> <li>• Rathduff (Cork)</li> </ul>	Unigate <ul style="list-style-type: none"> <li>• Wexford</li> </ul> Avonmore Co-op <ul style="list-style-type: none"> <li>• Ballyragget</li> </ul> Waterford Co-op <ul style="list-style-type: none"> <li>• Kilmeaden</li> </ul> Ballyclough Co-op <ul style="list-style-type: none"> <li>• Rathduff</li> </ul>	UK Dairy Crest <ul style="list-style-type: none"> <li>• Wexford</li> </ul> Glanbia Co-op / plc <ul style="list-style-type: none"> <li>• Merger of Avonmore &amp; Waterford</li> </ul> Dairygold Co-op <ul style="list-style-type: none"> <li>• Ballyclough</li> <li>• Mitchelstown</li> </ul>	Wexford (70% by Co-op, 30% by UK Dairy Crest)  Glanbia Co-op /plc  Dairygold Co-op
Express Dairies <ul style="list-style-type: none"> <li>• Carbery (Cork)</li> <li>• Deel Vale (Limerick)</li> </ul>	Express Dairies <ul style="list-style-type: none"> <li>• Carbery (Cork)</li> <li>• Deel Vale (Limerick)</li> </ul>	Carbery Ltd ( West Cork Co-ops)  Newmarket Co-op (Limerick)	Carbery Ltd ( West Cork Co-ops)  Kerry Group Plc <ul style="list-style-type: none"> <li>• Newmarket acquired by Kerry</li> </ul>
Mitchelstown Co-op  Golden Vale Co-op <ul style="list-style-type: none"> <li>• Charleville</li> </ul>	Mitchelstown Co-op  Golden Vale <ul style="list-style-type: none"> <li>• Charleville</li> </ul>	(Merger to form Dairygold see above)  Golden Vale <ul style="list-style-type: none"> <li>• Charleville</li> </ul>	Kerry Group Plc <ul style="list-style-type: none"> <li>• Charleville acquired by Kerry</li> </ul>
Tipperary Co-op	Tipperary Co-op	Tipperary Co-op	Tipperary Co-op

Source: Author's table constructed from interviews for thesis and secondary data.

Later in the decade, Avonmore and Waterford merged to form Glanbia cooperative/plc in 1997. Unigate sold its interest in Wexford to the UK Dairy Crest

group. Express Dairies also divested from Ireland, with Carbery and Newmarket becoming independent cheese producers owned by Irish farming cooperatives.

Consequently, despite the foreign origins of the industry, by the early 1990s all cheese production was controlled by Irish cooperatives/ companies, with the single exception of the Dairy Crest cheese plant in Wexford. The Kerry Group entered the Irish cheese sector by acquiring Golden Vale in 2001 and Newmarket in 2010. In 2010, UK Dairy Crest reduced its stake in Wexford to 30 percent, with Wexford cooperative being the major shareholder.

While the dominant cheese variety produced by the Irish dairy industry is Cheddar cheese, relatively small amounts of other types of cheese are produced by the major manufacturers and a number of independent cooperatives. Tipperary is an independent medium sized cooperative that produces emmental and gouda cheeses, and ingredient products for the infant formula industry. A small quantity of Tipperary cheese is sold on the Irish market, with the majority of its production being marketed through its cheese-packing and distribution centre in Dijon, France, and through the IDB in the USA and elsewhere.

Therefore at this stage of evolution, there are six producers in the cheese segment of the Irish dairy industry, Dairygold Cooperative, Glanbia plc, the Kerry Group, the Carbery Group, Wexford Creamery Ltd and Tipperary Cooperative<sup>78</sup>.

### **Geographic concentration of the cheese and ingredients industry segment**

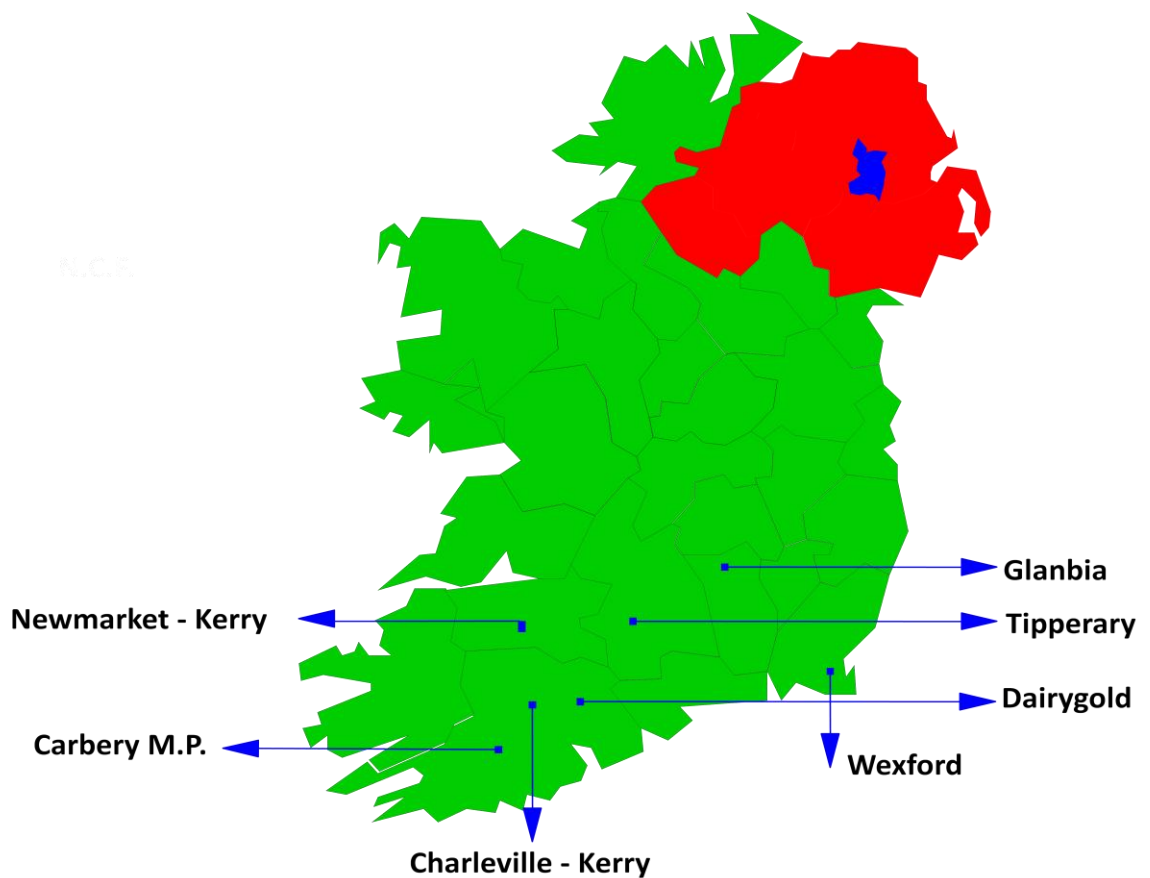
Cheese plants are geographically concentrated in the traditional heartland of Irish dairying, where land and climatic conditions are best suited for milk production (Figure 6.1). Over three-quarters of national milk output is produced in the southern and eastern regions of Munster and Leinster (CSO, 2009a), where farm sizes and

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<sup>78</sup> One cheese manufacturer not included in the analysis here, due to its very small scale, is Mullinahone Cooperative. It was established in 1893, did not amalgamate into the larger dairy groups but has strong collaborative links to Glanbia, who collect 60 percent of Mullinahone's small milk quota of 1.7 million gallons (Briscoe and Ward, 2006, p123). Its small cheese manufacturing division is Compsey Creamery Society Ltd, which produces a range of soft cheeses, soured cream, mascarpone, yogurts, fromage frais and crème fraîche.

milk quotas are bigger than in north and west (Briscoe and Ward, 2006, p114). Cheese and dairy ingredient production is much more markedly concentrated in these good areas for milk production than is the case for the other segments of the industry. For example, in the province of Connaught, where land quality is poor for milk production, cooperatives have concentrated on butter and SMP production, and supplying liquid milk to local markets. Cheese production has not developed in the Connaught region. One plant in Connaught produces the dairy ingredient casein, but this is a by-product of butter production.

**Figure 6.1: Location of major Irish Cheese manufacturers 2010**



Source: Author's diagram

In addition to natural cheese types such as cheddar and emmental, processed cheese is also produced by a number of cheese manufacturers. Processed cheese is made by combining natural cheese, butter and dried milk proteins. Processed cheese is produced by Kerry plc (previously Golden Vale) and Dairygold cooperative in the

Munster region. Processed cheese production, and more recently mozzarella production, used as an ingredient for the pizza industry, has evolved in Ulster in Northern Ireland<sup>79</sup>.

In the Republic of Ireland, the vast majority of manufacturing milk is produced in the spring and summer months, with very limited production in the autumn and winter. This seasonality feature of milk production has had an impact on the type of cheese produced. Cheddar is a cheese well suited to the challenges of the seasonality curve, being a hard cheese maturing over a period of months or even up to two years in the case of ‘fully mature’ cheddar. In contrast continental type soft and semi-soft cheeses, such as brie, camembert and gouda, require a shorter maturation period of weeks rather months and year-round good quality milk production to secure supply.

### **Section 6.3: The diamond model and the cheese and ingredients segment**

The following sub-sections will examine of the changing strength of Porter’s four diamond elements in relation to the cheese and ingredients segment in preparation for a discussion of the extent to which it is a cluster (Figure 6.2). The four elements are demand conditions, factor conditions, related and supporting industries and firm strategy, structure and rivalry. Insights from Porter’s work on industry segmentation and its impact on firm strategy will be particularly relevant in the discussion of the fourth element of the model. The analysis will also incorporate learning from interviews with senior industry figures carried out in order to gain a better understanding of the role of collaboration in the cheese and ingredients segment.

#### **Demand conditions for the cheese and ingredients segment**

Domestic demand influences the goods that an industry produces. The Irish domestic market of circa 4.5 million people is small by international standards. This can place

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<sup>79</sup> By the late 1990s Kerry was a major supplier of process cheese slices to the fast food industry in Europe from their factory in Northern Ireland and Glanbia was a major supplier of mozzarella pizza cheese in Europe (Mottiar 1997, p276).

certain constraints on product development. On the other hand Porter (1990, p96) argued that early saturation of domestic demand ‘forces firms to continue innovating and upgrading’. In the case of the Irish dairy sector, the EU support regime, through providing Irish farmers with a guaranteed milk price, worked against innovation in general. It discouraged the development of new products and entry into new markets (Mottiar 1997, p277).

Cheese is historically the least supported segment of the Irish dairy industry, facing more intense competition than other segments. Prior to recent CAP reform, butter producers not only had access to high levels of EU support via intervention purchasing, but also had access to schemes that supported the use of butter in confectionary and provided aid for private storage (APS) of butter. The Irish cheese industry had no such support; for example there has never been an APS scheme for Ireland’s main cheese type, cheddar<sup>80</sup>. In addition there was never any EU support for whey, the by-product of cheese production. There was substantial support for SMP and casein, the two protein based products produced after separating out cream for butter production.

Furthermore, competition in the cheese segment has intensified from the early 1990s onwards, with the growth of multinational retailers and the introduction of the EU ‘single market’. This resulted in a greater variety of cheese types and brands appearing in retail outlets, affecting the competitive environment for cheese to a far greater extent than for butter.

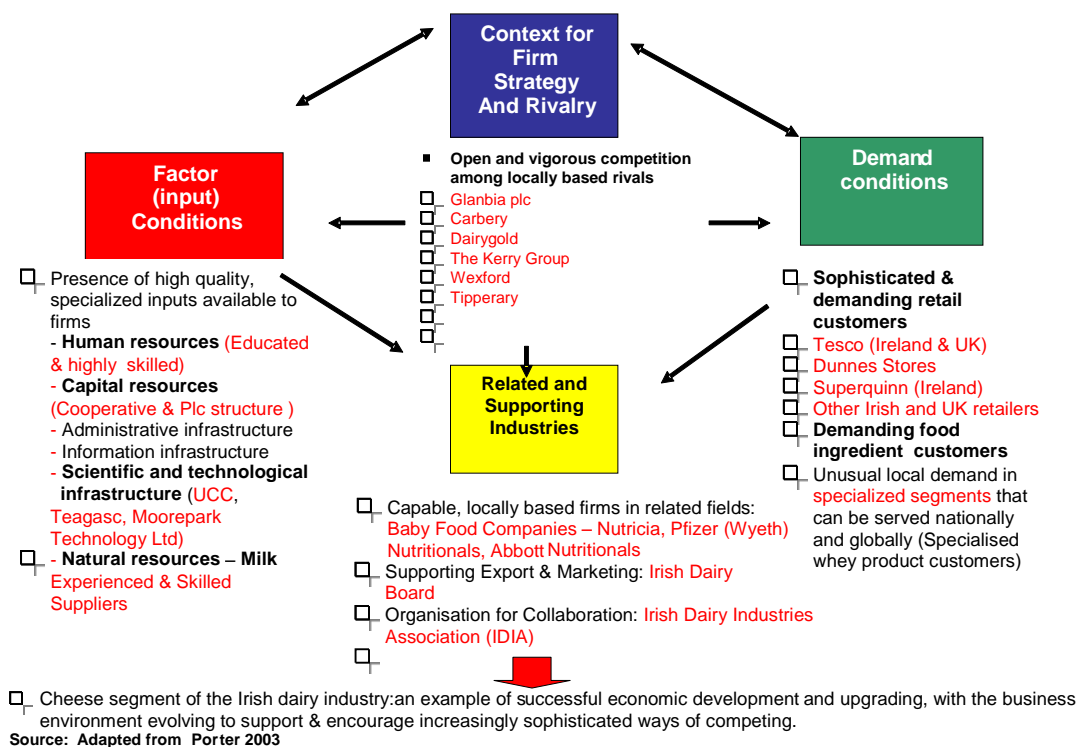
Therefore, demand conditions for the cheese segment are very different to other segments of the dairy industry. There is intense competition among Irish cheese producers on the domestic market with a number of established cheddar and cheddar type brands. Brands such as Kilmeaden and Avonmore (owned by Glanbia plc), Charleville (owned by Kerry plc), Wexford (now majority owned by Wexford

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<sup>80</sup>For a period of years, Ireland had a small allocation under an ‘aid for private storage’ scheme for emmental. This was important to Tipperary cooperative the only Irish producer of emmental. But it was a minor element in the development of the cheese sector in Ireland, in contrast to the importance of the EU support in the development of the butter/SMP and butter/casein segments. During the CAP reforms of the 2000s the emmental storage scheme was abolished.

Cooperative) and Dubliner (developed by Carbery and the Irish Dairy Board<sup>81</sup>) actively compete for sales in retail outlets. There is significant spend on advertising of these brands, including on national television. Some producers also developed strong relationships with major retailers in supplying own brand products e.g. Tesco's Wexford cheddar produced by Wexford Creameries Ltd.

**Figure 6.2: Cheese and Ingredients Segment Cluster of the Irish Dairy Industry**



Source: Author's diagram, using Porter (1990, 2003) diamond model framework.

The introduction of the more open EU single market resulted in increased quantities of different brands and types of EU natural and processed cheese appearing in retail stores in Ireland. Since the early 1990s, there have also been significant innovations in terms of product offering of cheddar, with a wider range of maturation levels (mild, mature, extra mature)<sup>82</sup> and convenience types (sliced, grated etc.). This

<sup>81</sup> The Carbery group manufacture Dubliner, while the Irish Dairy Board (IDB) market the cheese internationally for the group. Carbery and IDB worked in partnership with Teagasc in developing the cheese.

<sup>82</sup> The national cheese grading scheme for cheddar cheese introduced by the Department of Agriculture in 1966 ( Enright 1997) is a positive government intervention that supports such grading of cheese.

facilitates a greater range of price differentiation in the market place, with the consumer willing to pay for both enhanced taste and convenience.

Porter (1990, pp86-87) argued that home demand can confer competitive advantage by driving firms to improve and through that to become successful in export markets. There was substantial competition on the domestic Irish market but a credible cheese and ingredients cluster could not develop, to service the scale needs of the Irish dairy sector, relying solely on this small market. Consequently, exporting off the island was a focus from an early stage in the evolution of the cheese segment. The UK is Ireland's geographically closest neighbour and a traditional export market for Irish food. With a population of around 60 million consumers, the UK provides an obvious first choice export destination for Irish cheese. Ireland is the largest European supplier to the UK cheddar market, which was valued at Stg£1.3 billion and accounted for 55% of the total cheese market in volume terms in 2009 (DairyCo –AHDB, 2009).

Exporting beyond the UK has been more challenging for the Irish industry. Ireland's entry to the EEC in 1973 was not a major boost to the cheese sector and was much more important to other segments of the dairy industry. Mainland European consumers are not traditional consumers of cheddar. For example, in the northern European countries including the Netherlands and Germany, consumers preferred semi-soft cheeses such as edam and gouda. Relatively small quantities of edam and gouda are produced by dairy cooperatives in Ireland, but large scale volume production for export was not pursued by the Irish industry. Attempts to sell Irish produced edam and gouda in Europe would have meant Irish cooperatives competing against much larger Dutch and German cooperatives in their home markets.

As a result, major Irish dairy cooperatives and companies choose to concentrate on developing a presence in the newer emerging dairy and food ingredients segments of the industry. Elsewhere in Europe in countries such as France and Greece, consumers preferred a range of soft cheese made from either cow or goat's milk, the production of which was not supported by the seasonality of Irish milk supply.

The cheese segment was more severely affected by the implementation of the WTO Uruguay agreement, than other segments of the dairy sector. This implementation meant that EU support for the export of cheese had to decline sharply. Supports for cheese exports to the USA were eliminated in the late 1990s and then to other destinations in the early 2000s.

The WTO Uruguay agreement also opened up the EU cheese market through a general 36 percent decrease in import tariffs and through specific cheese import quotas at further reduced import tariff levels, for cheddar in particular. Global dairy competitors such as New Zealand, Australia and Canada were already established exporters of cheddar. Consequently, the impact of the import side of the WTO agreement was greater on Irish and UK cheese manufacturers than on cheese producers elsewhere in Europe who did not produce cheddar cheese.

The combined effect of these different demand conditions is that the cheese segment operates in a far less supported, more openly competitive, environment than other segments of the Irish dairy industry. As outlined above, with a number of established brands owned by different cooperative/companies, there is substantial competition in the home market. After the home market, the main market for Irish cheddar has traditionally been the UK. The completion of the EU single market in goods, and reductions in import tariff protection as a result of the WTO Uruguay agreement, intensified the competitive environment for cheese manufacturers in both the home and UK markets. Modest exports of other types of cheese were achieved to a small number of other EU countries, for example regato cheese to Greece and a range of cheeses to Spain. Quantities of Irish cheese exported outside the EU have been relatively modest, but important to certain manufacturers. Some significant success was achieved in exports of emmental and low-fat cheeses to the USA.

### **Factor input and supply conditions for the cheese and ingredients segment**

Porter distinguished between (a) basic/generalised and (b) advanced/specialised factors conditions. In the context of the Irish cheese and ingredient cluster, such factors had both positive and negative impacts. Appropriate climatic conditions for



the production of milk and good grass growth can all be considered basic factor advantages for the dairy industry. An available supply of experienced and skilled dairy farmers can be considered an advanced / specialised factor advantage for Irish cooperatives/companies. The milk price offered to these farmers is a continual source of competition among all Irish cooperatives, with league tables published in farming newspapers on a regular basis. This is because, despite being members of a cooperative, dairy farmers can choose which manufacturer to supply from year to year (Mottiar 1997, p285). The three largest Irish dairy manufacturers (Glanbia, Kerry and Dairygold) process 82 percent of milk and account for 44 percent of dairy farmers (Briscoe and Ward 2006, p115)<sup>83</sup>. There is continuing consolidation in the industry; over 70 percent of milk was processed by the five largest dairy companies / cooperatives in 1995 (Forbairt 1995, p65) and 80 percent of milk was processed by the twelve largest cooperatives at the end of the 1980s (ICOS 1987, p3). This would suggest that an oligopoly structure is developing within Ireland. However, the market for dairy products is European and increasingly global, with very large international industry players such the Dutch group, Friesland Coberco, and the Danish and Swedish group, Arla Foods. Therefore, in order to survive internationally Irish dairy cooperative / companies must achieve greater scale.

One of the major challenges for the cheese segment of the Irish dairy industry over the years has been access to milk for production of cheese at a competitive price. As already outlined, the EU support primarily focused on butter and SMP, particularly from an Irish perspective. The CAP restricted, rather than supported, strategic development of the Irish cheese segment. Cheese producers found themselves competing for milk supply with butter/ SMP producers whose prices were artificially underpinned by EU support schemes. In years when world demand for butter and SMP was high, cheese producers had to pay high prices for milk. But in years when demand for the commodity products butter and SMP were low, milk prices did not fall as much as they would have (without intervention purchasing ) and cheese producers could end up paying uncompetitive prices for milk<sup>84</sup>. This was a

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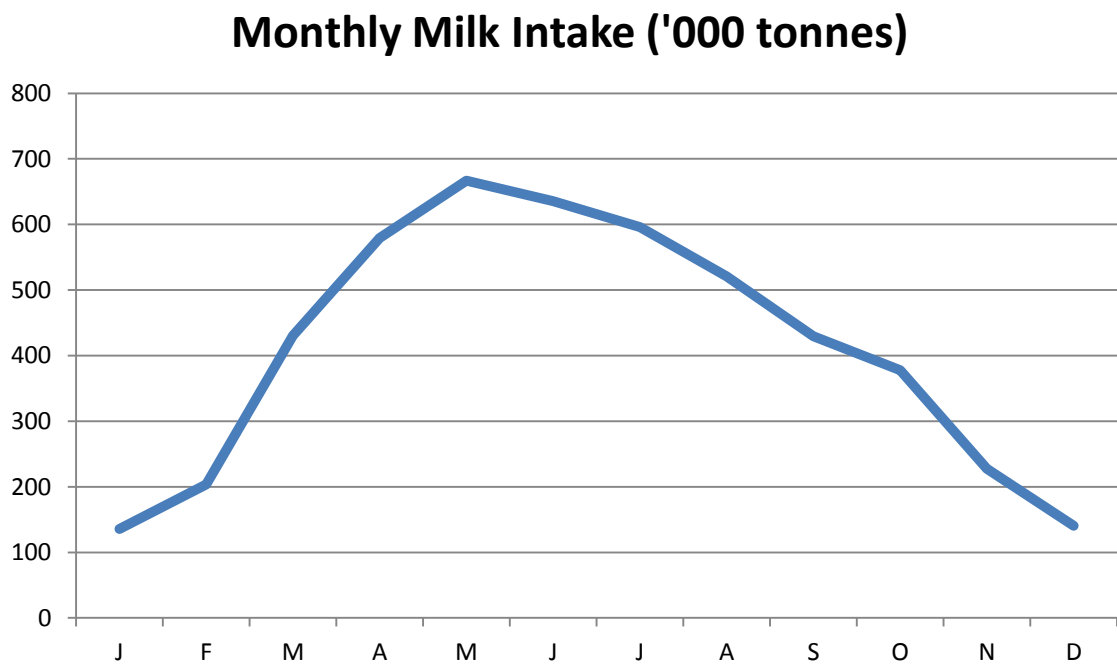
<sup>83</sup> Discussion of the three largest dairy organisations in this section draws on material on mergers, rationalisation, restructuring and acquisitions outlined in Briscoe and Ward (2006, pp115-118).

<sup>84</sup> In the early 1990s, an Irish Minister for Agriculture came back from Brussels heralding a 'success' in securing a 2 percent higher intervention price for Irish butter than in any other member state. This

particularly difficult situation for Irish cheddar producers since their major competitors on the world market, New Zealand and Australia, were not hampered by the EU milk pricing system.

A unique factor condition, and in many ways a negative factor, that Irish dairy manufacturers face is the seasonality of Irish milk supply, which affects the product mix in the dairy industry and makes it difficult to develop product brands (Mottiar 1997, pp 267-273). This seasonality of Irish milk production (Figure 6.3) was intensified by the EU support systems for butter and SMP. Seasonality of milk supply also restricted the development of the cheese segment.

**Figure 6.3: Seasonality of Irish Milk Supply**



Source: IDB, 2009

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had the paradoxical result that the Irish Dairy Board (IDB) and other exporters of butter had to achieve 2 percent more than competitors from the market place before by-passing intervention. It also meant that Irish cheese producers had to pay 2 percent more for the milk they used to produce cheese, in order to compete with the alternative butter / SMP usage.

In particular, seasonality impacted on the potential to develop the production of cheeses other than cheddar. For example Waterford (now part of Glanbia plc), for a period during the 1990s, produced ‘Leerdamer’, a gouda type cheese, in Kilmeaden. But the cooperative could not secure adequate milk at competitive prices during the off-peak months to make production of Leerdamer cost effective. Essentially, the production of varieties of cheese that have lower maturation periods than cheddar, and that require year round milk supply, was costly and difficult under the constraints imposed by the seasonality of Irish milk supply. The cooperative considered paying a premium to encourage farmers to supply year round milk of quality required for this type of cheese production. But this proved too costly, particularly when international competitors in the market did not have to pay such a premium to secure year round milk supply.

Mottiar (1997, pp271-274) concluded that these natural resources e.g. a ready supply of milk, are so important to the Irish dairy sector that it is possible to have a competitive advantage, but that factor disadvantages had to be overcome by recourse to specialised factors. She referred to the seasonality of milk supply and a high proportion of land with impeded drainage as factor disadvantages, which could be addressed by specialised factors involving collaboration between highly skilled individuals and research institutes. Section 6.4 below will consider the role of collaboration as a specialised factor in the generation of social capital in the cheese and ingredients cluster.

## **Related and supporting industries: Infant Formula / Baby Food Industry**

Supporting industries can ‘confer potential advantages on a nation’s firms in many other industries because they produce inputs that are widely used and important to innovation and internationalization’ (Porter 1990, p100). The strength of a nation in one industry, according to Porter, can also be related to a strong position in another industry area (Porter 1990, p101). In her application of the diamond to the Irish dairy sector Mottiar (1997, p286) outlined that related industries had developed as firms tried to diversify their products into areas such as meat, fruit juices and food,

but that this largely resulted as a consequence of acquisitions abroad. An engineering firm called Brewery, Dairy and Chemical Ltd had also developed to serve a variety of industries (O'Connell et al 1997), but did not develop internationally as Porter might have envisaged (Mottiar 1997, p287).

The infant formula / baby food industry is a major customer for Irish dairy cooperatives/ companies but it is also the most important related industry in the Irish cheese and ingredients segment<sup>85</sup>. Three world class producers of infant formula have established major manufacturing bases in Ireland. All are foreign owned multinationals and their impact on the Irish dairy sector challenges the limited role that Porter suggests for MNCs in a cluster. The Danone owned company Nutricia Ireland Ltd<sup>86</sup> produces the well known brands 'Cow and Gate' and 'Milupa' in Ireland. Two American owned companies Pfizer<sup>87</sup> and Abbott also produce a range of baby food brands in Ireland for the EU and world markets– the best known of these brands are 'SMA' and 'Similac' / Gain.

The infant formula/ baby food industry is a major purchaser of skimmed milk, in liquid or powder form, which contains the casein protein. A number of cooperatives/companies in the Munster and Leinster regions supply dried skimmed milk powder (SMP) to infant formula producers. One dairy cooperative in the North East region<sup>88</sup> supplies liquid skimmed milk directly to an infant formula producer.

The infant formula/ baby food industry in Ireland is also a purchaser of dairy ingredient products, whey and lactose. To understand the link between cheese and dairy ingredients and in turn the dairy industry's links to the infant formula /baby

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<sup>85</sup> The Irish Dairy Board in this analysis is considered a supporting industry rather than a related industry, since IDB would not exist without the dairy cooperatives, who make up the industry.

<sup>86</sup> The French multinational food group Danone acquired the Dutch company Numico who previously owned Nutricia Ireland Ltd, in 2007.

<sup>87</sup> In a merger agreement in 2009, Pfizer acquired Wyeth to create one of the most diversified companies in the global health care business. Wyeth produced infant formula in Askeaton since 1974.

<sup>88</sup> Town of Monaghan Cooperative which has a close trading relationship with Abbot Ireland, supplying the majority of its skimmed milk directly to their infant formula factory in Cootehill, County Cavan. Today Town of Monaghan collects a substantial percentage of milk intake from Northern Ireland farmers as well as from farmers in the Republic of Ireland.

food industry, one has to be aware of the contribution that whey makes to competitiveness. Interviewee 6A, a director with a leading Irish dairy cooperative, commented that:

“[T]here are three fundamental items of profitability in cheese production, - scale, efficiency and whey, - the whey piece is absolutely critical”.

Whey<sup>89</sup> is the liquid protein remaining after the production of cheese or the removal of fat and casein (80% of the proteins) in milk. Annual world production of whey is estimated at over 100 billion kilograms with 50% of this amount produced in the EU. Most of the whey (92%) produced in the EU results from cheese production, with a small amount (8%) produced as a by-product of casein production. Whey and whey products are used by the food industry in a wide variety of applications on the basis of their nutritional and functional properties (de Wit 2001, p6). At end of 2008, the world market value for whey proteins and whey protein fractions was estimated to be US\$4 billion and for lactose, lactose permeates, pharma-grade lactose and lactose derivatives to be US\$1.5 billion (3A Business Consulting, 2008).

In the past, whey was viewed as a waste by-product of cheese production with little commercial value, which farmers fed to pigs. In the early days of the dairy industry in Ireland, skimmed milk was also essentially viewed as a waste by-product of butter production. Infant formula, follow-on formulas and toddler milks, provide an increasingly important commercial outlet for both whey and casein proteins, in the form of skimmed milk or SMP. But the relationship between the infant formula / baby food companies and the dairy cooperatives/ companies has also led to an increased focus on innovation in the dairy sector. It has contributed substantially to the development by a number of Irish dairy cooperatives /companies of whey-based food ingredient products.

The development of the infant formula/baby food industry in Ireland provided evidence of a significant impact in terms of innovation and clustering from the

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<sup>89</sup> The content of this paragraph draws on de Wit, 2001, which provides a detailed technical presentation on the manufacture, processing, properties and applications of whey and whey ingredients.

beginning. For example, the Nutricia Ireland baby food factory in Wexford is located on the same industrial site as the Wexford Creameries cheese factory. The factory was called Irish Whey Products when originally set up, but later became Cow and Gate and then Nutricia<sup>90</sup>. In the early 1970s the usefulness of whey as an ingredient became apparent; by incorporating more whey in infant formula, one could alter the ratio of whey to casein proteins from 20/80, the ratio in cow's milk, to a 60/40 ratio to simulate the protein in human breast milk (de Wit 2001, p61). In 1972 Wexford Creameries invested in a 'demineralisation' plant to process the whey coming from their cheese factory in a strategic move to participate in the new era of the baby food ingredients business. Demineralisation involves the removal of minerals and some organic acids through nano-filtration, ion exchange or electro dialysis (de Wit 2001, p25). As a strategy to improve competitiveness by building closer links with the baby food industry, establishing the whey demineralisation facility was successful. The U.K. company, Cow and Gate, who had already purchased whey from Wexford, subsequently closed its factory in Runcorn on the River Mersey in the UK and established a baby food factory in Wexford.

This brought the number of producers of infant formula in Ireland to three, all of whom had received IDA support in setting up manufacturing facilities. Two US multinational companies had also established baby food factories in Ireland in the early 1970s. The Wyeth baby food factory, now owned by Pfizer, was established in the Limerick area of Munster in 1974. The Abbott baby food factory was established in County Cavan in 1975, situated close to Town of Monaghan cooperative who supply liquid skim milk to the facility. Both the US multinationals were major global players in pharmaceuticals, exposing Irish cooperatives / companies who supplied them to a new level of manufacturing standards.

Increased use of skimmed milk and its dried form SMP by the baby food industry also resulted from advances in food science and technological innovation. Increased medical understanding led to animal or milk fat being replaced by vegetable fat in the production of infant formula. Similar to the later focus on whey as an ingredient, mentioned above, the elimination of milk fat moved infant formula closer to the

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<sup>90</sup> Nutricia Ireland is now owned by the French dairy and food group Danone.

constituents of human breast milk. This was also better for the development of the child. Prior to these developments, infant formula was made with whole milk or its dried form, WMP. There was significant collaboration between the dairy and baby food industries in Ireland to minimise and eventually eliminate milk fat from infant formula. Similar advances in scientific understanding subsequently led to increased use of whey in the production of first stage infant formula. Today skimmed milk / SMP is being increasingly incorporated into follow-on and toddler milk<sup>91</sup> as baby food companies extend the range of products on offer to their customers.

The use of these dairy ingredients by the baby food industry has grown with the volume of infant formula, follow-on and toddler milks produced in Ireland. Ingredients such as SMP, demineralised whey powder and other whey products e.g. whey protein isolates, and lactose in various different ratios or recipes are the basis of these mainstream baby food products that are offered to consumers. This has resulted in the link between the baby food industry and the dairy cooperatives/companies becoming an increasingly important part of the competitiveness of the dairy industry in Ireland, particularly as EU support schemes decline with the reform of the CAP.

### **The strength of ties between the baby food and dairy ingredient suppliers**

As chapter 2 outlined, Granovetter (1985) argued that most behaviour, including economic behaviour, is embedded in networks of interpersonal relations. Dairy companies and cooperatives in the cluster benefited in different ways from the relationship with the multinational baby food companies. For example, when discussing the role of major suppliers of whey products in the cluster, Interviewee 6B, a board member and former managing director of a baby food company, stated:

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<sup>91</sup> The advertising of infant formula is not permitted under the World Health Organisation (WHO) marketing code of practise introduced in the early 1980s. However, the advertising and marketing of follow-on formula for children aged six months and over is permitted. There is also no restriction on the marketing of toddler milks, produced for older children.

“[Y]ou cannot say co-ops in a general sense, because size and mass was a factor, in this context. The cooperatives who had sufficient mass to justify the investment in whey processing were the ones in a position to respond to the [baby food] industry’s need. They were also the ones able to develop with changing needs and newer technologies as they emerged.”

In other words, not all Irish dairy cooperatives were of sufficient size to justify the capital investment required to process whey. Consequently, four dairy cooperatives / companies, Glanbia, Carbery, Kerry and Dairygold, emerged as key players in the additional processing of whey and lactose. Smaller cheese manufacturers delivered their whey, in liquid or concentrated form, to these larger dairy cooperatives for further processing. By processing whey, the four larger cooperatives / companies further embedded their position in the cluster as dairy ingredient suppliers to the baby food industry. They also benefitted in terms of supplying ingredients to the wider food sector. For example, an additional volume of whey generated from casein production by three of the four<sup>92</sup>, and a number of smaller cooperatives, is used to produce a range of whey products for use other than baby food.

The relationship has also contributed to improvements in efficiency and innovation at cooperative / company level. For example, over the years, the baby food industry has looked for variation in the whey demineralisation process and the four Irish cooperatives/companies processing whey have responded to these needs. This has resulted in the production of some infant formula today is produced with 90% demineralisation whey for quality and safety reasons, with lower levels of demineralisation (60 – 80%) also possible.

Porter presented his diamond as a mutually reinforcing system, with advantages in one determinant having the potential to create or upgrade advantages in other determinants (Porter 1990, p72). Related and supporting industries can enhance the prospects of international growth in demand via reputation and the ‘pull-through’ effect (Mottiar 1997, p232). The relationship between the infant formula / baby food industry and the dairy ingredients manufacturers in Ireland provides an example of

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<sup>92</sup> Glanbia, Kerry and Dairygold are casein producers, with Carbery being the exception.



the mutually reinforcing nature of the Irish cheese and ingredients cluster. Interviewee 6B pointed out that becoming a key ingredient supplier of whey and lactose to the Irish facility of a multinational baby food company also yielded competitive advantage for dairy cooperatives / companies at an international level.

“Both [‘X’] and [‘Y’]<sup>93</sup> used their relationship with Irish [based baby food] customers as a stepping stone to actually getting at the group on an international basis. So, for example, both of these companies also supply us around the world in significant quantities.”

Smaller cooperatives in the cluster benefited in a different way from the link with the baby food industry, but also contributed to embedding the infant formula industry in Ireland. Developments in the use of different skimmed milk protein types in the manufacture of baby foods required greater refinement in quality, involving a wider range of testing application to ensure higher health and safety standards. Interviewee 6B, when asked ‘Had the relationship with suppliers helped the business to develop?’ replied:

“Our smallest supplier in terms of turnover...without doubt has been our best supplier over the last 25 years, placing their relationship with us at the centre of their strategy from the beginning... How does this manifest itself? ...they did a lot of work to get the standard of their raw material right both at farm and factory level. ...were proactive in adopting the required test methods to actually ensure that the product they supplied to us would not be the cause of problems in the marketplace, exposing us to market recalls. ...actively sought to develop an organic milk cluster among their suppliers to facilitate our demand needs...They put us at the centre of their strategy, see themselves as a being a long term supplier with a long term plan for the relationship...but not just with us, also with other baby food manufacturers. They see themselves as a key supplier to the baby food business and have differentiated themselves from the bigger boys, giving them a stronger position in the marketplace.”

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<sup>93</sup> Names of companies have been removed from this quote for confidentiality reasons.

This quote outlined a high level of commitment on the part of the cooperative involved and suggests that small, as well as large, dairy cooperatives gained competitive advantage from their relationship with the baby food industry. When one considers the substantial gains for all actors involved, it suggests strong ties between the baby food industry and the dairy cooperative / companies, with relationships built on reciprocity, and an embedded cluster in Ireland.

Further refinements are likely in the future as baby food manufacturers continue to work with their Irish dairy ingredient suppliers to fine tune and enhance the quality and range of products offered to consumers. Major innovations have taken place in the baby food business, such as long chain polyunsaturated fatty acid (LCPs) fortified formula, which are linked to brain and eye development in the child. Specialised infant formulas developed for sick children and pre-term babies are also innovative, being very close to pharmaceutical type products. In volume terms, production of these specialist products is small and they are not available in general retail outlets, but rather used on the advice of doctors, mainly in controlled environments such as hospitals. It would be difficult to argue that these products have a major commercial impact, but their development has a positive impact, not only for both baby food companies but also for their dairy cooperative / company suppliers, driving forward innovation and competitiveness.

### **The role of IDB in the cheese and ingredients cluster**

The two supporting actors in the cluster are the export and marketing cooperative, the Irish Dairy Board (IDB) and the organisation for collaboration (OFC) the Irish Dairy Industries Association (IDIA). This sub-section will examine the role of IDB in the cheese and ingredients segment. Section 6.4 below will examine the collaborative role of both IDB and the IDIA in the generation of social capital in the dairy industry.

The Irish Dairy Board (IDB) fits into the related and supporting section of the Irish cheese and ingredient cluster. IDB is an exporting and marketing cooperative owned by dairy processing cooperatives that form the core of the cluster. The forerunner to IDB, 'An Bord Bainne', was established by the Irish government to assist the

development of industry before becoming a cooperative, following Ireland's entry to the European community in 1973 (Mottiar, 1997, p287). The IDB's central commercial purpose is exporting dairy products on behalf of the cooperatives who own the board. IDB own the Kerrygold brand and the cooperative has been most successful in developing butter sales in Germany and in a range of global markets. IDB also played a significant role in the development of the cheese segment in Ireland. IDB's contribution on the ingredients side is far less significant, with the manufacturing cooperatives / companies choosing to develop their own routes to market in the ingredients area.

Porter (1990) saw rivalry as almost exclusively positive, rejecting the idea that global leadership grew out of one or two firms reaping economies of scale in the home market. He argued that 'In global competition, successful firms compete vigorously at home and pressure each other to improve and innovate' (Porter 1990, p117). Rivalry within the Irish dairy sector may well have contributed to driving cooperatives / companies on, such as Glanbia and the Kerry Group to achieve the status of global multinationals, but rivalry was not invariably positive within the cluster. The relationships between the Kerry Group and the Irish Dairy Board effectively broke down in the early 1990s. As the Kerry group grew in size, it sold very little of its product through IDB, with the result that the IDB management introduced rule changes that excluded Kerry from the board of IDB. Following this, the Kerry group tried to liquidate its share holding, claiming that it was worth substantially more than the face value (one Irish punt per share) of the shares. This would not only have weakened the IDB balance sheet but it would also have set a dangerous precedent for IDB, with the danger that in time other cooperatives might follow the Kerry move if it proved successful. A high court case ensued that ruled in favour of IDB. This indicates that organisation rivalry is not an exclusively positive aspect within a cluster. Had the Kerry group succeeded, it would have weakened the competitive position of IDB to compete, threatening to fragment Irish industry activity on global markets.

In the 1990s, competition among Irish dairy cooperatives in the UK market also proved to be counterproductive, weakening the overall Irish industry strategic position. In the 2000s, in a change in strategy, Glanbia reduced capital investments

in the UK. At the same time the IDB, which was jointly owned by Glanbia and the other dairy cooperatives, made major investments in the UK. IDB strengthened their supply chain to the retail and food service sectors, investing further in slicing, grating and pre-packing facilities in the UK. This provides an interesting example of how collaboration, rather than rivalry, can yield benefits in a cluster, running counter to Porter's (1990) focus on competitive rivalry. It provides evidence of how cooperatives and companies working together had a better chance of achieving a favourable outcome for themselves and their suppliers in the UK market. The Irish Dairy Board (IDB) working with cheese manufacturers played a central role here, as interviewee 6A put it:

“Our customer base is consolidating and our competitor base is consolidating and irrespective of what structure or how fragmented that structure is ... if we are to compete we have to have unity of purpose in our interface with customers and the marketplace.”

The Irish cheese cluster also provides evidence that in the case of cheese, while scale and efficiency in production is important, it is not enough on its own, as Interviewee 6A commented:

“[If] you look across Europe, across the major varieties of cheese, scale is becoming hugely important. But scale on its own is not adequate. ... strength in the supply chain, in elements of it, for example in the pre-packing area, that are relevant to the retailer or to the food ingredient customer is at least as important, if not more so.”

The IDB strategy for the cheese business focused on developing scale and efficiency in routes to market, which it did across a range of markets including the UK, the USA and Greece. This complemented the scale and efficiency of cheese manufacturing cooperatives and companies. IDB also acquired and developed a number of brands to support sales.

In 1997, IDB acquired a leading UK specialist cheddar ripening and distribution company with an established brand, 'Pilgrim Choice', at the premium end of market.

In 2003, IDB acquired Meadow Cheese and strengthened its position as a supplier of cheese ingredients to the UK food industry. The majority of Irish dairy manufacturing cooperatives / companies now use these facilities as a route to market for the substantial part of their UK cheese business. Essentially, the Irish cheese industry came to the view that if the IDB could perform the interface with the UK market efficiently then, by using IDB, the industry could exploit value added opportunities and scale in the market place better. This combination would give milk suppliers a better return than could be achieved through a fragmented approach, where Irish producers were competing with each other in the UK, rather than dealing more effectively with the reality of a consolidated customer and competitor base.

### **Firm strategy and rivalry**

Nevertheless, rivalry and a desire to compete internationally has contributed positively to driving dairy cooperatives and companies to growing their organisations globally. Cluster studies rarely link Porter's work on firm strategy (Porter 1980, 1998a), particularly his distinction between broadly-based strategies and focused strategies, with his diamond model (1990). This section will briefly review four of the key dairy producers with particular reference to how their business strategies have evolved, in a number of cases, towards a more focused strategy centred on cheese and ingredients. All four of these cooperative/companies are involved in the cluster initiative examined in section 6.5. Ketels (2006, p125) argued that the emergence of domestically owned MNCs is a sign of the success of a mature cluster. Glanbia and the Kerry group, who are both at the core of the cheese and ingredients cluster, have emerged as major Irish multinationals.

Within the cheese and ingredients cluster, there was substantial rivalry between cooperative / companies with intense competition, particularly in relation to brand share of the domestic cheese market. This satisfied one of the requirements of Porter's cluster concept, firm improvement built on intense rivalry on the home market. When considering firm strategy Porter (1990, pp107-109) observed that (i) the goals and ways of organising firms, (ii) the attitudes of firms towards competing globally and (iii) government policy toward internationalisation all vary widely among nations. In the case of the two most successful actors at the centre of the Irish

cluster, the Kerry Group and Glanbia, the desire for growth led to a new combined cooperative and public limited company structure emerging in order to gain access to funding for acquisitions. The small size of the home market and EU milk production constraints resulted in the dairy industry having an open attitude toward internationalisation. There was early focus on exporting cheese in the first instance, and most successfully, to the UK, and then to other European and global markets. Organic growth in the dairy sector was also constrained by the EU milk quota regime, which capped the amount of raw material available to manufacturers. Consequently, Irish dairy cooperatives and companies sought investment opportunities abroad. Chapter 4 showed that Irish governments since the 1950s have adopted an open policy stance towards internationalisation. Irish government policy on foreign direct investment (FDI) supported the establishment of baby food manufacture in Ireland, with the IDA providing grants to both US and other multinationals. The expertise that the dairy industry developed in the production of dairy ingredients for multinational baby food manufacturers affected on their strategy for investment abroad. Both the Kerry group and Glanbia, who both adopted the new cooperative / plc structure, initially focused on the USA for the acquisitions to grow their business internationally.

The Kerry Group<sup>94</sup> began its existence as a dairy cooperative and still remains a key player in the sector, but it has evolved into a multinational food corporation with an annual turnover of approximately €4.5 billion, operations in 23 countries and 20,000 employees worldwide. Kerry has a long established strategic focus on food ingredients, which encompasses dairy ingredients but now also includes fruit and cereals ingredients. Kerry Group's evolution through 3 separate corporate entities is a significant contrast to that of Glanbia and is important in understanding the business culture of the group. Ownership of the original company established in 1972 was shared by the State owned Dairy Disposal Company (DDC 42.5%), a federation of eight cooperatives (42.5%) and the US company Erie Casein Inc. (15%). The company link to the US was important from the start, leading to an early strategic focus on the manufacture of a dairy ingredient product, casein, for the US

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<sup>94</sup> This paragraph draws on the corporate history of the Kerry Group presented on [kerrygroup.com](http://kerrygroup.com) and on the book *The Kerry Way* (Kennelly 2001).

food market (Kennelly 2001, p65). Following Ireland's entry to the European community in 1973 Kerry acquired the state owned DDC and six of the eight independent cooperatives to become the smallest of Ireland's six major cooperatives in 1974, with modest sales of €29 million. However, in a reflection on Kerry strategy, structure and culture Kennelly (2001, pp 411-432) described an independent organisation that from the start was willing to adopt a position counter to other Irish dairy cooperatives.

During the 1980s, the group embarked on a strategy of acquiring diversified businesses based on an equation for growth defined as 'strategy x capability x capital = sustainable profitable growth' (Kennelly 2001, p423). Kerry has proven itself to be an organisation that places substantial emphasis on what Teece (2002, p157) has defined as the dynamic capabilities of the group's executives to sense the need for change and then reconfigure competencies, significantly through acquisitions, to seize the opportunities created by rapidly changing environments. Reflecting a desire to gain access to additional financial capital in 1986, Kerry introduced a novel and innovative organisational structure that had not been embarked upon before within the cooperative sector in Ireland or elsewhere<sup>95</sup>. Essentially this involved the formation of a Public Limited Company (Kerry Group Plc) by acquiring the assets of the cooperative and, as a consideration; 90 million ordinary shares in Kerry group were issued to the Kerry Cooperative. In 1987, the Kerry Group opened its first overseas food ingredients plant in Wisconsin and in 1988 the group made a landmark acquisition of a US company Beatreme, which provided access to global markets and a platform for development into a leading global food ingredient corporation.

Kerry continued its strategy of growth by acquisition throughout the 1990s and 2000s, extending its reach into Europe and the new emerging markets of Asia and South America<sup>96</sup>. It also became more embedded in the Irish cheese and ingredients cluster. In 2001, Kerry substantially developed its cheese and cheese snack portfolio

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<sup>95</sup> A number of other cooperatives also followed this model, including Avonmore and Waterford who later merged to form Glanbia, at the core of the cheese and ingredients cluster..

<sup>96</sup> Between 2000 and 2008 the Kerry group also acquired 11 ingredient and flavours technology based businesses in Europe, 33 businesses in the Americas (USA, Central and South America, Canada) and 7 businesses in the Asia-Pacific region.

following the acquisition of Golden Vale, one of the major Irish dairy companies at that time. The range included cheddar cheese blocks, sliced packs, savoury cheese spreads and cheese snacks marketed under the Charleville, Coleraine, EasiSingles, Golden Vale, Cheestrings and Attack-a-Snack brands. In 2010, the Kerry Group acquired Newmarket Co-operative, a medium sized cooperative with a turnover of €56.6 million focused on cheese manufacture. In 2009 Newmarket had completed investment in a revamped and efficient cheese plant, with the capacity to produce over 35,000 tonnes of cheese.

Glanbia is the largest purely dairy cooperative/ company in the cluster, and its strategic development is a significant contrast to the Kerry group. Glanbia<sup>97</sup> plc, formed in 1997 through the merger of Avonmore and Waterford, is currently 54.6 percent owned by Glanbia cooperative and 45.4 percent owned by equity investors through trading of shares on the stock exchange. Glanbia plc has evolved into one of the few successful Irish owned multinational corporations (MNC) and is evidence of Ketels's (2006) suggestion that one of the indications of strong clusters is the emergence of such MNCs from the cluster. In order to achieve higher levels of growth, in the early 2000s Glanbia changed overall global strategy following what Porter (1998a) might describe as a defined focused strategy. The company remains a major liquid milk and general dairy processor for the small domestic market in Ireland. But, internationally, the Glanbia group focused on developing their cheese and ingredients business. As part of this strategy, Glanbia engaged in a restructuring plan that involved the disposal of a significant number of liquid milk, food service and meat businesses in the UK, and elsewhere. In 2008, reflecting the outcome of this new strategy, Group MD John Moloney described Glanbia as an international cheese and nutritional ingredients group with operations in Ireland, Europe, the USA, Canada and China, and international joint ventures in the UK, USA and Nigeria (Glanbia 2008). Glanbia's turnover in 2009 was €2.13 billion, joint ventures and associates represented 14 % of total revenue, and it employed 4,349 people in fifteen countries. The Glanbia group, including joint ventures, now processes 5.3 billion litres of milk, producing 440,000 tonnes of cheese, nearly three times national

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<sup>97</sup> The organisation was originally known as the Avonmore—Waterford Group before the change of name to 'Glanbia', meaning 'pure food' in Irish, in 1999.



Irish cheese production, and 223,000 tonnes of dairy-based food ingredients (Glanbia 2009). The group's largest joint venture, Southwest cheese, located in New Mexico in the USA, is one of the largest cheese and high protein whey processing plants in the world.

In contrast to Glanbia and the Kerry group, Dairygold, following its formation in 1990, adopted what Porter (1998a) would describe as a broadly-targeted strategy. This strategy involved addressing multiple segments of the dairy industry including liquid milk, butter and SMP/Casein, cheese and whey and fresh dairy products, for example yogurts. The strategy was not successful, as the cooperative struggled to fully integrate the merged Ballyclough and Mitchelstown cooperatives into a coherent entity. In 2003 the then Dairygold Chief Executive, Jerry Henchy, stated that 'for many years the Society had operated in a tightly regulated market which created a comfort zone allowing it to survive whilst operating inefficiently' (Dairygold 2003, p6). Consequently, the cooperative embarked on a plan involving rationalisation, cost reduction and the sale of loss making businesses. The strategy in relation to any underperforming aspect of the business was to 'fix it, outsource it, sell it, or shut it' and, by 2006, the process was largely completed (Irish Examiner 2006). The new Dairygold strategy involved concentrating production in two sites. Building on the bonds within the sector, it also involved significant collaboration with other Irish manufacturers. Dairygold collaborated with Glanbia plc in the cheese area, in order to utilise processing capacity to the fullest extent, and outsourced the production of the 'Sno' brand of yogurt products to the smaller Town of Monaghan Cooperative in the north east of the country. However, the rationalisation process was controversial, dramatically reducing employment and selling various businesses, and the cooperative and Henchy parted company in 2009 (Boyle 2009). But the rationalisation programme did change the cooperative's strategic focus significantly.

Dairygold's new CEO, Jim Woulfe, described Dairygold's processing business as now 'firmly focused on providing cheese and dairy ingredients solutions to the international food processing, baby food and ready meals sectors (Dairygold 2009, p10). Dairygold turnover in 2009 was €555.2 million and the group has around 900 employees. On the cheese side, Dairygold focused on efficient production of cheddar

in Mitchelstown and production of speciality cheeses for export, including leading brands Jarlsberg and Regato, in their factory in Mogeely, Co. Cork. Recent investment in their Mitchelstown site created one of the largest demineralised whey manufacturing plants in Europe, as a foundation for the cooperative's focus on the baby food market, and further embedding the cooperative in the cheese and ingredients cluster.

The Carbery group, the final actor at the core of the cluster, is also involved in the cluster initiative examined in section 6.5. Carbery is a cheese and ingredients manufacturer owned by four small to medium sized cooperatives. It is admired in the farming community for the consistent ability to pay among the top level milk prices in Ireland (Briscoe and Ward 2006, p122). Successfully adopting what Porter (1985) would describe as a focused strategy, Carbery has reached a turnover of close to €200 million. The group developed a successful brand of cheese called 'Dubliner' in collaboration with Irish Dairy Board. Carbery also developed significant expertise in the whey and lactose dairy ingredient areas, investing in its own R&D facility, which employs 15 percent of its 300 strong workforce. Carbery is focusing on sports nutrition, among other areas, to further develop its ingredient's business.

### **Concluding comments**

The above analysis of the cheese and ingredient segment provides evidence of clustering in a dairy sector embedded in the traditional sector of the Irish economy<sup>98</sup>. When all aspects of the cluster are considered, it has contributed very significantly to the strategic development of the companies within one of Ireland's most important indigenous industries. The role of FDI and multinationals in the cluster was complex and varied. Foreign investment (FDI) by UK multinationals played a significant role in establishing factory scale cheese production in Ireland during the 1960s and 1970s, which aligns with Porter's (1990) view of a seed capital role for foreign investment. Within a nation, the microeconomic 'engines' (clusters) vary in terms of their strength and dynamism; the stronger ones tend to lead to internationally

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<sup>98</sup> For a detailed discussion of the 'embeddedness' concept see chapter 2.

competitive firms, whereas the weaker ones tend to produce only locally competitive firms (Sölvell et al 2003). The cheese and ingredient segment of the Irish dairy industry on this basis could certainly be described as a strong dynamic cluster contributing substantially to the internationalisation and competitiveness of the dairy cooperatives / companies involved, particularly Glanbia and the Kerry group.

But foreign investment also played a deeper role in the cluster, with relationships between multinationals infant formula manufacturers and the Irish dairy cooperative / companies yielding benefits for both industries and for the economy. Firms inside a cluster must also have access to international markets to be able to sustain their efficiency and competitiveness. A dynamic cluster is characterised by three distinct dynamics (i) local dynamism, (ii) global attractiveness, and (iii) global market reach (Sölvell et al 2003). Irish dairy companies have helped the multinational baby food companies to develop and expand their businesses here in Ireland to serve markets in Europe and worldwide. In turn, the relationship with multinational baby food / infant formula companies has led to greater focus and higher level of innovation among the Irish companies and cooperatives in the cheese and ingredients cluster. It has also extended the market reach of some of the major dairy cooperatives / companies, leveraging off linkages formed with baby food multinationals in Ireland to develop business in international markets. It has made a major contribution to the ability of these firms to compete in the ingredients segment of the international food market.

#### **Section 6.4: Social Capital – a cluster initiative in the Irish dairy ingredients sector**

Section 2.3 of Chapter 2 reviewed the development of the social capital concept, which was only beginning to come to prominence in the late 1980s and 1990s when Porter was writing his seminal contributions to management strategy. Chapter 5 examined the relevance of the concept for understanding collaborative relationships within clusters in the modern Irish economy, with particular reference to the ICT and software sector. This section will examine the relevance of the social capital concept, to understanding collaboration within clusters in the traditional Irish

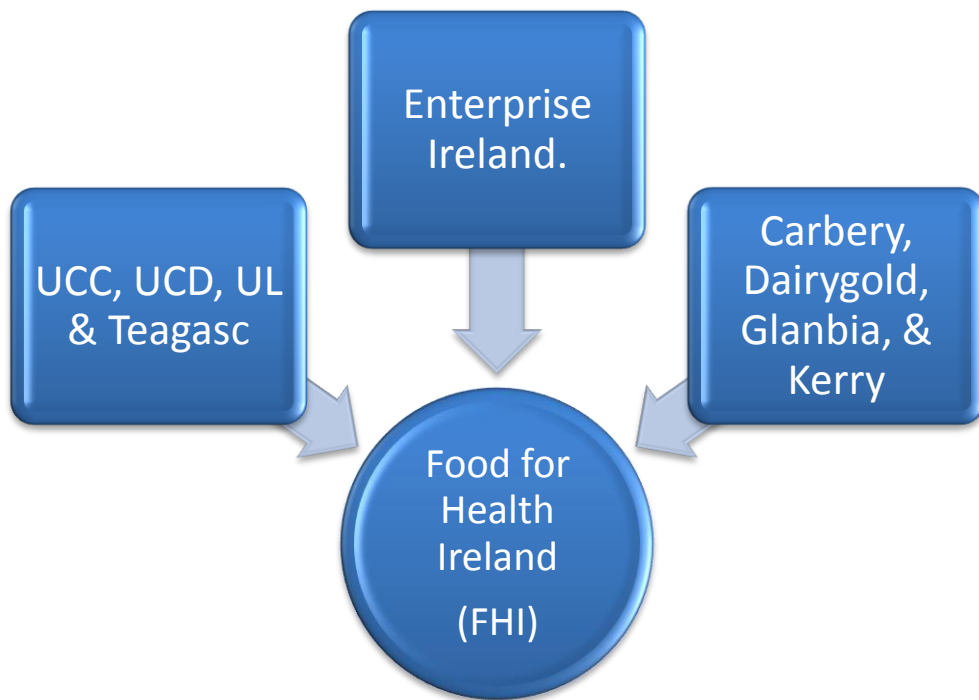
economy, with particular reference to the cheese and ingredients segment of the dairy industry. This section will examine the emergence and development of Food for Health Ireland (FHI), which focuses on improving health, wellness and quality of life through world class innovation in food. FHI is a cluster initiative involving collaboration between industry, universities and a state agency, which fits into the intersection of the framework developed in Chapter 2 and presented in Figure 2.2. Following a number of years of planning, the FHI initiative was finally established in 2008. Although it is not widely recognised as such in Ireland, the FHI can be viewed as part of the building blocks of what Lundvall (1985, 1992, 2005) referred to as a national innovation system. The cluster initiative performance model (CIPM) developed by Sölvell et al (2003) and presented in Figure 2.3 is used in assessing the FHI initiative. The emerging social capital concept, reviewed in Chapter 2, is used to deepen the analysis. The analysis is supported by in-depth case study interviews with actors involved with the various strands of the cluster initiative.

### **Case Study 6: Food for Health Ireland - bonding and bridging social capital**

FHI involves three of the five actors that Sölvell et al (2003) suggest form a cluster (Figure 6.4). The government actor is the state agency, Enterprise Ireland. The industry actors are the four dairy cooperatives / companies: the Carbery Group, Dairygold Cooperative Society Ltd, Glanbia plc, and the Kerry Group. These cooperatives / companies are at the core of the cheese and ingredients cluster outlined in section 6.2. The research community actors are the four public research organisations: University College Cork (UCC), University College Dublin (UCD), University of Limerick (UL) and Teagasc, the food research institute based in County Cork.

The IDIA, an industry organisation for collaboration (OFC) in the dairy cluster, is not an actor in the FHI. However, the four cooperatives/companies who make up the industry actors are active members of the IDIA. The fifth of Sölvell et al (2003) actors – financial institutes – is absent from the initiative.

**Figure 6.4: Food for Health Ireland (FHI) – collaboration in a cluster initiative**



Source: Author's diagram

### **Setting and Objectives of the FHI cluster initiative**

Section 6.3 provided evidence of significant clustering in the cheese and ingredients segment of the Irish dairy industry. Since earlier cluster studies of dairying undertaken in the late 1990s, the cheese and ingredients segment has become more deeply embedded in the Irish economy. This was partly driven by developments in agricultural policy that resulted in lower EU institutional support for the dairy products, butter and SMP. But it was also due to the interaction between the different elements of the cluster diamond, with consumer demand encouraging the production of cheese and related industries supporting the production of dairy ingredients. Therefore, in the case of the cheese and ingredients segment, the individual determinants of the diamond combined into a dynamic system, as suggested by Porter (1990, p131).

O'Connell et al (1997, p74) found there was significant social interaction in the dairy sector with meetings at the Irish Dairy Industries Association (IDIA)<sup>99</sup>, the Irish Dairy Board and the Irish Co-operative Organisation Society, important in the creation of a valuable social network. Of these three, only the industry organisation for collaboration, the IDIA, played a part in the establishment of the FHI initiative, leveraging off the significant social capital it had helped build in the dairy sector over the years. The IDIA was established in 1973 on Ireland's entry to the EU and facilitates interaction and collective action on policy issues affecting the sector. Over the years it has built significant social capital bonds between CEOs and senior executive management of the dairy cooperatives/companies and the baby food companies. It also engages, on behalf of its members, in bridging social capital with relevant government departments and state agencies on a range of issues. For example, the IDIA played a key role in monitoring and advising members on developments in specific EU regulation, on milk policy and international trade agreements, affecting the different industry segments of the industry. The IDIA is the Irish member of the European association of companies who produce food for people, including infants, with special dietary requirements (IDACE) and the European Dairy Association (EDA). IDIA executives, and a number of its member, participated in the various committees and ingredients working groups of these organisations. This extended the network that the IDIA provided to member cooperatives /companies from a national to a European level, avoiding an over-reliance on a narrow range of business contacts (Cooke 2007a). The IDIA also facilitated direct access to senior officials working in relevant areas in the EU Commission. Irish dairy cooperatives / companies were also instrumental in establishing the European Whey Processors Association (EWPA)<sup>100</sup>. The mission of the EWPA is to promote good communication and understanding of whey based dairy ingredients and related issues towards potential customers and consumers. The role that the IDIA played in helping to establish the FHI will be commented on further in the sub-section below on initiation and planning.

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<sup>99</sup> The author was Executive Director and Secretary of the IDIA from mid-1994 to 2004 and was an economist in the Irish Dairy Board (IDB) from 1990 to mid-1994.

<sup>100</sup> The EDA provides the secretariat support for the EWPA in their offices in Brussels.

The business environment facing the Irish dairy sector in the early 2000s was particularly challenging. The Irish industry was losing competitiveness due to high domestic costs, an over-reliance on declining EU support for the commodity products (butter and SMP) and lower levels of investment in R&D than that of international competitors (Prospectus, 2003, p8). This loss of competitiveness resulted in a renewed focus on rationalisation, consolidation and growth through acquisition by major Irish dairy cooperatives and companies, with a shift in strategic focus towards cheese and ingredients. This is covered in some detail in the sub-section on 'firm strategy and rivalry' in Section 6.3 above. Dairy cooperatives and companies were aware that they needed to innovate more and adapt strategies to compete. Staber (2007) argued that situational context is important in understanding how social capital evolves and how the social capital existing in a cluster can make a significant difference to the performance of firms. The situational context for the Irish dairy industry in the 2000s was very challenging and focused the industry on finding new ways to compete in a more open, and less supported, trading environment. In this context, FHI is a cluster initiative that presents a bridging social capital opportunity with four industry actors and four research actors collaborating together to improve competitiveness, by focusing on raising levels of R&D and innovation. An additional attraction to the cooperative and companies involved was that industry itself could lead the initiative.

Traditionally food research in Ireland has mainly been carried out by public funded research institutes. In the period 2000-2006, funding was provided under the National Development Plan's Food Institutional Research Measure (FIRM), which was administered by the Department of Agriculture and Food. FIRM is a public good competitive programme, separate from Science Foundation Ireland (SFI), whereby multi-disciplinary teams from two or more public institutes carry out research projects. The FIRM aimed to develop public good technologies that underpin a competitive, innovative and sustainable food sector.

A value-for-money review, covering the period 2000-2006, outlined that under the FIRM, 193 projects were awarded funding totalling to €97 million, €50.3m of which had been spent by the end of 2006 with the under spend being due to ongoing projects (DAFF 2007, p6). As table 6.4, shows the allocation of funding under the

FIRM was concentrated in three public research institutes, Teagasc, UCC and UCD, who, combined, accounted for 82.5% of the total funding awarded. The FIRM funding helped these three research institutes develop a critical mass in the food research area (DAFF 2007, p39). Under FIRM, notable research was also undertaken in a number of other institutes including TCD, UL, NUI Galway, DCU and Dublin Institute of Technology.

**Table 6.4: FIRM Awards and expenditure by Institute**

Institute	Total Awarded - €m	Share of total awarded percentage	Expenditure by end 2007 €m
Teagasc Ashtown	18.08	18.6	8.87
Teagasc Moorepark	15.49	16.0	7.52
University College Cork (UCC)	26.31	27.1	16.30
University College Dublin (UCD)	20.24	20.8	10.23
Trinity College Dublin (TCD)	3.98	4.1	2.20
NUI Galway	3.90	4.0	1.92
University of Limerick	3.76	3.9	1.40
Dublin City University (DCU)	1.46	1.5	0.67
Dublin Institute of Technology	1.22	1.3	0.24
Other institutes and organisations	2.67	2.7	0.95
Total	97.11	100	50.30

**Source: FIRM Review 2007, p38.**

By late 2007, when the FIRM review was undertaken, a total of 58 projects were completed at a cost of just under €27 million. The main output findings of the review suggested that these projects were quite academic in focus. Key outcomes included 53 MScs, 83 PhDs, the publication of 526 refereed international papers (average of 9 papers per project), and presentations at 447 workshops (average of 8 per project). There were 108 ‘outputs with commercial potential’ associated with completed projects. But less than half of the completed projects (26) had actually resulted in an output that had been taken up by the food industry, or in an output that had led to changes in industry behaviour.



Stakeholders surveyed as part of the review were generally satisfied with the areas being addressed and the relevance of the FIRM funded research. But they requested more input into setting the research agenda and particularly raised the need for more industry involvement. While recognising that not all public good research is amenable to collaboration between industry and research institutes, the review concluded that more collaboration was possible and desirable. In fact, one of the key recommendations of the review was that ‘collaboration between research institutions and the food industry should be encouraged where appropriate’ with the Department of Agriculture, Fisheries and Food (DAFF) tasked with clarifying the types of collaboration permissible under FIRM (DAFF 2007, pp6-9).

This indicated that the FIRM helped individual universities and centres achieve critical mass in the food research area. But FIRM had low social capital impact in terms of achieving collaboration with industry. As section 2.3 of chapter 2 outlined Burt (1997) defined social capital in terms of acting as a broker between those disconnected in the social structure, while Field (2008) emphasised that policy decisions may have an impact on social capital in a negative or positive way. In the case of FIRM, it appears that the Department of Agriculture, Fisheries and Food missed an opportunity to act as broker in bridging the gap between publicly funded food research taking place in universities and the research needs of industry. The FHI cluster initiative outlined here changed the nature of the way research institutes and industry worked together in the emerging area of functional foods.

On the private research side, Interviewee 6C commented that Enterprise Ireland carried out desk research in the early 2000s that highlighted two things:

“There was a very low level of expenditure on research in Irish food companies. Out of 700 food companies surveyed, only 90 were actually involved in research to a significant degree, for example spending more than €100,000 per annum, and just 18 food companies spent more than €1 million on R&D. Secondly, there was a lot of focus internationally and activity happening around functional foods, particularly in Japan, which did not seem

to be on the radar in Ireland.”

This functional foods area provided a focus to raise levels of R&D and innovation in the ingredients segment of the dairy industry. A functional food can be defined as ‘a food which is satisfactorily demonstrated to beneficially affect one or more target functions in the body, beyond adequate nutritional effects, in a way that is relevant to an improved state of health and well-being or reduction of the rate of disease’ (Enterprise Ireland 2006, p4). Functional foods marketed to consumers include foods enhanced with probiotics, prebiotics and synbiotics. The functional foods category is expected to grow significantly in the future as improved scientific understanding and consumer awareness of the links between diet and health further affects on the market for food products (IBEC 2009a, p30).

### **Initiation and Planning – the value of collaboration and social capital**

The initiation and planning stage for the FHI initiative can be traced back over a number of years. As part of raising awareness of the potential for developing functional foods products in 2003, Enterprise Ireland, with their Tokyo office, organised a trade mission to Japan. The initiative leveraged off existing social capital bonds with the IDIA, the organisation for collaboration (OFC) for the sector, supporting the agency in promoting the mission among industry. The high-level mission was led by the Irish Minister of State for Food, who was accompanied by the Secretary General of the Department of Agriculture and Food<sup>101</sup>. In addition to the government and state agency, the IDIA and two public research institutes made up the Irish contingent. The director<sup>102</sup> of the IDIA and seven members of the association participated in the mission. These included Glanbia plc, the Kerry Group, the Carbery Group and the cooperatives - Dairygold, Lakelands, Shannonside and the Irish Dairy Board (IDB)<sup>103</sup>. The director of the Teagasc Dairy Products Research

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<sup>101</sup> The Minister for State for food at that time was Noel Treacy TD and the Secretary General of the Department of Agriculture and Food was Tom Moran.

<sup>102</sup> The author was the Director of the IDIA at this time and participated in the mission to Japan with the IDIA members referred to.

<sup>103</sup> One mineral water company also participated in the mission, but the main focus was the dairy industry.

Centre and the Dean of the Faculty of Food Science at University College Cork were the two participants from the research community. As case study 4 in section 5.4 of chapter 5 outlined, significant social capital bonds had been built up between Teagasc and UCC over a number of years. In organising the mission, Enterprise Ireland leveraged off the strong ties and social capital bonds already existing in the sector, on the industry side through the IDIA and on research side through decades of close contact between UCC and Teagasc.<sup>104</sup> Therefore, at least in the initiation stage, the FHI aligned with the idea that state agencies should work with, and build on, the resources already existing in a community (Field 2008, p141, Woolcock 2001, p15). The positive and negative aspects of these social capital bonds will become apparent in further analysis of this case study.

There were significant bridging social capital benefits for the industry and research actors who participated in the mission to Japan. During the mission, the Irish contingent was given presentations by research institutes on functional foods trends and consumer needs in Japan. They also learned about the regulatory system of food for specified health in Japan. They heard case studies by Japanese companies and visited a number manufacturing facilities including the Yakult Fuji factory, Meiji Dairies Corporation, the Calpis Tatebayashi factory, the Morniga Milk Industry Co., and Kyodo dairies. They visited Japanese research facilities focused on functional foods. Some of these were run by the state while other facilities were an integral part of private companies. It became apparent that there was a far higher commitment to R&D in Japanese food companies than that existing in Ireland. They also visited department stores and supermarkets in Tokyo to see how functional foods were sold to the consumer. There were significant benefits from this bridging social capital initiative, which brought senior Irish dairy executives and researchers together to Japan to see for themselves the potential of functional foods. They were exposed to a completely different way of using milk than experienced in Ireland, with a much greater emphasis on its potential as a food ingredient with certain well-being and health benefits. By organising this trade mission, Enterprise Ireland, with the support

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<sup>104</sup> See Case Study 3 on the APC cluster initiative for interview evidence of the close ties between UCC and Teagasc.

of the IDIA, helped span the structural gap in knowledge in relation to functional foods between the Japanese and Irish food industries.

In addition to the level of knowledge gained in the areas referred to above, the mission also had a number of less tangible social capital benefits. Some social capital theorists have emphasized trust (Putnam 1995) and the need to develop trust (Woolcock 2001), in building up systems of innovation (Lundvall 2005). In relation to the mission to Japan Interviewee

6C, a senior state agency manager, commented on the building up of trust among the participants:

“One of the big benefits of the Japan trip is that we got to know each other better. The social aspect of bringing people together on a mission, sharing experiences and getting together with their guard down was important. This was very helpful in building the network to focus on developing functional foods in Ireland”.

Hence, higher levels of trust among the industry and research community participants was one of the outcomes of the visit to Japan that the state agency viewed as useful in building the network. Therefore in this case study trust may be viewed as an outcome of social capital, with the mission to Japan beginning the process of building lasting social capital within a network. Nooteboom (2007, p33) has emphasized that trust is not something that can be brought and installed but needs to develop over time. The mission to Japan was a start in building up trust between the various actors involved but further challenges would need to be overcome as the cluster initiative developed.

On returning to Ireland, efforts were made to keep the momentum going on the potential of developing functional foods. A development workshop in November 2003 covered topics such as managing clinical trials, patenting and commercialisation of intellectual property and functional foods science. Attendees at the workshop included the leading dairy and food companies, SMEs and academics working in the area. Following this in 2004, Glanbia, with funding support from Enterprise Ireland, opened a €15 million group innovation centre (GIC). Staffed with

a team of nutritional microbiologists, immunologists, food scientists and application experts, the Glanbia centre focused on the development of nutritional solutions for a range of industries including functional foods, dietary supplements, infant and sport nutrition (IBEC 2009b, p30). The Carbery group also upgraded their R&D facilities with the support of Enterprise Ireland.

The Japan mission, and the follow up workshop, was successful in raising awareness, but it was only a first step in establishing an effective increase in R&D at firm level. Commenting on the Japan trade mission, Interviewee 6D, a director of the state agency, said:

“It was a look and see type of initiative and certainly prompted people to think a bit more radically about what might be possible. In tandem with that we decided to set up a networking group called the functional foods forum. The idea was to get people to discuss issues relating to the sector and to see what the blockages were”.

Field (2008, pp159-160) argued that social capital may be termed capital insofar as it gives rise to resources that enable actors, both individual and groups, to pursue their goals more effectively than they could without it. The National Functional Foods Forum was set up in 2004, comprising representatives from the food industry, the research community, and government departments. Government departments involved included Agriculture and Food, Health and Children, and Jobs, Enterprise and Innovation<sup>105</sup>. Once again, the initiative was supported by the organisation for collaboration, the IDIA and its dairy industry members. The forum brought together commercial managers from the dairy, beverages and ingredients sub-sectors of the food industry that might be interested in developing functional foods. Enterprise Ireland coordinated the work of the forum, which essentially was a bridging social

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<sup>105</sup> At that time it was the Department of Enterprise, Trade and Employment, from 1994, was known as the Department of Enterprise, Trade and Innovation before becoming the Department of Jobs, Enterprise and Innovation in 2011.

capital initiative bringing together industry, the research community and the government<sup>106</sup>.

The objective of the forum was to work towards developing Ireland as an internationally recognised centre of functional food development and manufacture. The forum highlighted that there was very limited coordination of research taking place in different Irish universities and research centres that could contribute to development of the functional food area. The visit to Japan involving both industry and researchers had opened the participants' minds to different ways of using milk and marketing product to consumers. It had also helped to strengthen ties and build bonds between the participants. Krishna and Uphoff (1999) defined structural social capital as facilitating mutually beneficial collective action (MBCA) through established roles and procedures. Following the mission to Japan, both the state agency and industry actors believed that to bring potential ideas and new ways of working forward, a more formal structure was required.

One of the key roles was the chairman of the forum and, following consultation with food industry members, Enterprise Ireland was anxious to get a high level individual with experience of the pharmaceutical sector. Globally the pharmaceutical industry had a strong reputation for R&D and significant focus had been placed on raising levels of R&D carried out by industry in Ireland. Joe Hartford, former President and CEO of the Japanese pharmaceutical company, Astellas Ireland,<sup>107</sup> was approached and accepted the chairmanship. In addition to his pharmaceutical industry experience, he had an understanding of the agricultural sector, being a farmer as well. Hartford understood the potential social capital benefits from industry networks. He had built up strong ties and social capital bonds as an active participant in the pharmaceutical industry association. He also understood the benefit of weaker ties and was a member of the national council of IBEC and other bridging type social capital networks. Consequently, he was well placed to chair the forum.

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<sup>106</sup> A second Irish state agency Bord Bia, the food marketing board, participated in the forum but played a less active role than Enterprise Ireland.

<sup>107</sup> Astellas Ireland Co Ltd. was formed as a result of the merger of two Japanese companies Fulisawa and Yamanouchi in April 2005.

Enterprise Ireland and the members of the forum attempted to leverage the potential benefits of the more formal social capital structure by establishing a number of working groups. Some of these attempts failed, while others succeeded. Interviewee 6D, a director of a state agency, commented that:

“One was in the area of the market and Bord Bia was to take a lead on that. That group did not take off the ground – there was no energy forthcoming, it didn’t happen and that bit of it petered out. The second piece was the legislation and business environment and the IDIA [the industry OFC] did a super job on that. It did work and added real value. The third area was around the innovation and R&D. In that group we had Teagasc and UCC and some of the companies”.

The failure of one working group, focused on marketing issues, to take off indicates that positive benefits do not automatically result from social capital structures. Cognitive social capital, a more intangible concept referring to norms, values, trust, attitudes and beliefs (Krishna and Uphoff 1999, Uphoff 2000, Grootaert and van Bastelaer 2001), is also a part of positive outcomes in addition to structure. The interviewee evidence indicates that the second state agency, Bord Bia, did not value or believe in the initiative to the same extent as Enterprise Ireland, who coordinated the overall forum. It also raises the question as to whether the level of trust was sufficient between the two agencies to enable coordinated action within the forum. In contrast, the IDIA industry OFC, who had worked closely with Enterprise Ireland on the Japan mission, valued the initiative and approached the task of leading their working group with a more positive attitude.

This working group led, by the IDIA, focused on the legislative requirements for functional foods and gained significant momentum. It collated existing functional foods claims, the scientific justification for such claims and looked at what would be involved in new claims. The IDIA provided information on legislation, regulatory and labelling requirements. It helped the group to understand the development of such claims by focusing on the EU Food for Particular Nutritional Uses (Parnuts) and novel food directives. Dairy cooperatives / companies who produced the functional foods, or the ingredients for functional foods produced by their customers,

would want to use such claims in order to add value to the product. The IDIA had developed expertise in this area over many years through involvement with the European association of food companies involved in producing for people with special dietary requirements (IDACE) and through contact with the EU Commission and the European Food Safety Authority (EFSA). This was an example of how bridging social capital, built up by the IDIA with the European industry association and the European institutes, yielded benefits for dairy cooperative / company members. It also an example of the strength of weak ties in the context of innovation diffusion (Granovetter 1973, pp1365-1369). The IDIA engagement with IDACE and EFSA was on behalf of their multinational infant formula company members, rather than their dairy cooperative/company members. This case study 6, therefore, provides an example of knowledge gained while working for one sub-group of the IDIA network yielding benefits to another sub-group of the network, without loss of benefit to the first sub-group. Consequently bridging social capital should not be viewed as a zero sum game, but rather as something that can build contacts and knowledge with substantial positive outcomes. The comment above, by Interviewee 6C, also indicates that this contribution by the IDIA was appreciated by others involved in the forum, including the state agency coordinating the initiative, providing the IDIA with the broker advantage referred to by Burt (1997, p340). In this instance, the IDIA was spanning the gaps that delineate the knowledge space between the Irish dairy industry and their customers who would purchase the dairy based ingredients to produce functional foods. The interaction between the industry organisation and the state agency in the functional foods forum also suggests a relationship built on norms of reciprocity inhering in a social capital network (Putnam 1995, Woolcock 1998, Cooke 2007a).

The second working group focused on the challenges and potential of the research and development agenda of the forum. An Enterprise Ireland official, Dr. John Mulvihill, chaired the working group and was recognised as contributing significantly to building the necessary bonds among the industry participants that contributed to the success of the initiative. Interviewee 6E, a senior industry manager, commented:



“The first thing we needed was the R&D. That was my background and role and that was where we focused...John [Mulvihill] was the common link that everybody trusted and that was probably critical in the whole thing. There was somebody there from Enterprise Ireland who was neutral and who we [industry] had a lot of respect for and trusted. It would not have happened without that kind of individual in the middle of it”.

In this instance, Dr John Mulvihill of Enterprise Ireland acted as the broker spanning the gap between participants and provided a focal point of trust as a precursor of the social capital engagement. Hence, this trust in Dr Mulvihill appeared to be an essential part of the process that enabled different cooperative and companies to work together in this working group, rather than an outcome of social capital.

The dairy cooperative/companies involved in the forum were concerned that universities, with a traditional focus on food research, were focusing more and more on the pharmaceutical industry and that the food industry was losing out. Consequently, the dairy industry members of the R&D working group concluded that they needed to develop a common research strategy for the medium to the long term. Interviewee 6E, from the industry side, commented:

“There was a long standing criticism coming from researchers that there was no clear direction from the [dairy] industry as to where we wanted them to work and focus on ...the agenda of the main dairy companies and the agenda for the main researchers in Ireland had gone off in completely different directions. Certainly this was not to the good of the [dairy] industry.”

In addition to the need for a more focused agenda from the industry, there was a second reason why university research had shifted toward the pharmaceutical sector. This is the fact that the mandate of Science Foundation Ireland, the state agency established in 2003 with responsibility for funding research, did not cover the food industry.<sup>108</sup> Consequently, if universities and research centres wanted to work with

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<sup>108</sup> As outlined in Chapter 4, Science Foundation Ireland (SFI) was mandated by government to focus on the development of a relatively small number of areas in the Irish economy, with the result that

SFI they had to focus on research in an eligible area for funding, such as biotechnology.<sup>109</sup> Field (2008, p139) emphasized that government policy decisions may have an impact on existing social capital in either a positive or a negative way. From the point of the view of the ICT and biotechnology industries, the targeted focus of Irish government policy, as implemented by SFI, was a positive support for cluster initiatives involving their sectors (see case study 3 and 4 in section 5.4 of chapter 5). However, from the point of view of the dairy industry, it had the negative impact of encouraging research institutes such as UCC and Teagasc, who had traditionally worked with the food industry, to focus on initiatives outside the traditional dairy sector in order to gain access to funding.

### **Process of establishing the food for health Ireland (FHI) cluster initiative**

By 2006, four of the dairy companies involved in the national functional foods forum were anxious to take the possibility of developing functional foods in Ireland to the next stage. The bonds between them had been strengthened and by working with the state agency within the forum structure, these cooperatives/companies formed a consensus view on their future research needs and defined the outlines of this common research strategy. This aligns with the Grootaert and van Bastelaer (2001, p5) view that structural social capital, such as networks, can facilitate information sharing, collective action and decision making. This is discussed in further detail in the section below on framework and consensus.

With agreement reached between the industry partners and the state agency, the next step was to seek out partners from the research community. In mid June 2006, an open call was placed in a number of Irish newspapers<sup>110</sup> inviting Expression of

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certain industrial sectors, including the large indigenous food and drink sector, were effectively excluded from receiving state support via the SFI.

<sup>109</sup> Case Study 3 in chapter on the APC cluster initiative is an example of how UCC and Teagasc sourced funding through SFI by linking biotechnology and food research.

<sup>110</sup> The open call for expressions of interest (EOI) in an industry led functional foods centre was placed in the Irish Independent, the Irish Times and the Examiner on the 16<sup>th</sup> June 2006. Details in relation to the defined industry led research strategy in this section are drawn from a supporting

Interest (EOI) applications for the establishment of an industry-led functional food centre. The key objective was to create an internationally competitive, multidisciplinary, industry-focused research centre developing skills and technologies that would lead to new products, processes and services. The identified industry led research strategy revolved around the development of ‘new bioactive components to feed into the product development system, through the scientific substantiation of the nutritional and other beneficial values of food components’ (Enterprise Ireland 2006, p2). Interviewee 6D, a director of a state agency, indicated that approximately 12 universities and research institutes replied to the EOI invitation; including a number of those listed in Table 6.4 above who had built up their facilities and research capabilities through substantial state (FIRM) funding. EOI submissions were reviewed by a panel of expert technical evaluators, including independent evaluators, the industry actors and Enterprise Ireland. Successful applicants were notified by mid-August and asked to submit more detailed applications in a second call for proposals following this notification. Approximately half the original number submitted more detailed proposals.

During the assessment of the more detailed applications, it was recognised that different research institutes had different areas of expertise. Independent evaluators, appointed by Enterprise Ireland, recommended that, to achieve maximum potential from the initiative, a collaborative approach combining a number of the detailed proposals would be the best option. This was not easy to achieve. The major public research institutes were traditionally independent-minded and used to limited collaboration with perhaps one other organisation in their region, for example the collaboration between UCC and Teagasc referred to in case study 4 in of section 5.4 of chapter 5. They were now being asked not only to work in an ‘industry led’ centre but also to work in close collaboration with other major public research organisations. The industry and state agency actors were determined that a joined-up collaborative approach would win out. Interviewee 6F, from the industry side, commented:

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document for the open call (Enterprise Ireland 2006).

“From where we sat at the time, we were quite clear if they were not working together, it was not happening at all. We needed the best brains in the country working on this. We needed to have the best offering from each of the research institutes and if we were not able to do that, well then you know it really wasn’t giving us the world class capability that we needed to be able to compete.”

The determination of the industry and state agency actors in this regard, evidenced by the comment above from interviewee 6F, illustrates the strong ties and social capital bonds that had been built up between them through the involvement in the cluster initiative. There followed a protracted period of consultation, facilitated by Enterprise Ireland, with the potential public research partners. The process was not helped by the fact that one of the research institutes had already expressed a wish to lead the initiative (see below) and already had strong ties with another institute on a regional basis. Consequently, according to interviewee 6D from the state agency side, there was significant resistance to broader collaboration involving other major research partners. However, the non-research partners in the initiative insisted on a collaborative approach and eventually a proposal was made involving UCC, UCD, UL and Teagasc, which the state agency and the industry partners were happy to sign off on. Consequently, one bridging social capital benefit that the FHI cluster initiative encouraged was collaborative activity between researchers in universities in different regions, who traditionally had not worked together. In this way, the FHI initiative was similar to the CSET initiatives examined in section 5.4 of chapter 5, but it differed in other respects, particularly in relation to the level of collaboration among firms.

### **Framework consensus / Resources and Facilitators**

The vision of FHI is ‘To improve health, wellness and quality of life through world class innovation in food’ supported by a mission statement ‘To build genuine, long-term industry-academic collaborations and networking and to develop appropriate industry-focused world class capabilities and competencies so as to create profitable new business opportunities’ (FHI 2010).

Interviews with participants from all three strands (the state agency, the industry partners and the research community) involved in the process of establishing the FHI cluster initiative emphasized the significance of the ‘industry led’ aspect of the initiative. Interviewee 6D, from the state agency side, explained how in the R&D working group of the national functional foods forum, one research institute had presented an institute led model for establishing a competence centre.

“Immediately friction arose between themselves and the companies because there was a diametrically opposed approach to innovation. Their [the research institute’s] idea was they would lead the research and discuss how the industry could use it. But the companies were saying – look that model has not really worked to maximum effect in the past.”

This view, expressed by the companies, reflected the stakeholder desire for deeper involvement in setting the research agenda of institutes involved in food research referred to above in the 2007 review of the FIRM. Consequently, the four dairy cooperatives / companies and the state agency worked together to define the research agenda framework for the FHI initiative. The industry-led research agenda for FHI is broken into two interlinked strategic platforms<sup>111</sup>, as presented in figure 6.5.

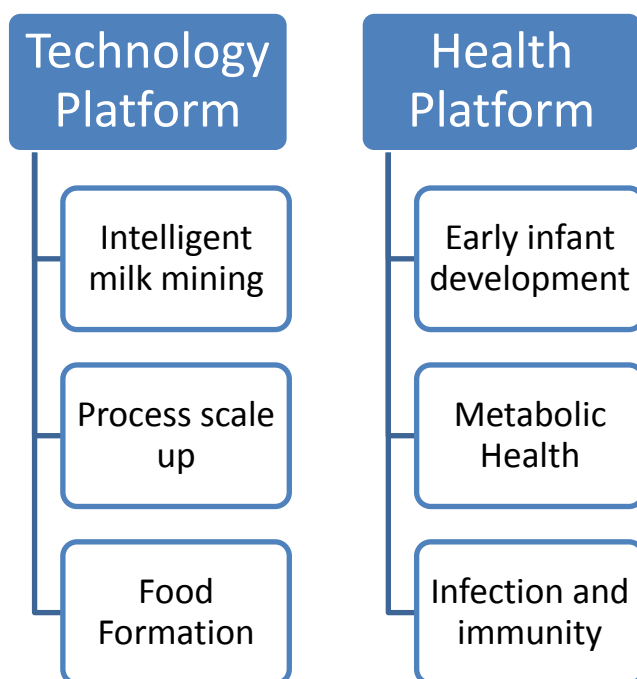
Interviewee 6F, from the industry side, indicated a consensus view on the research agenda was agreed with relative ease. This suggested significant social capital bonds already existed between the industry partners:

“When we started, we had very little difficulty in coming to a common view. We all have marketing departments, capabilities and the knowledge of where the food industry is going and the importance of health. ...It didn’t take very long for us to actually lay down what we considered to be the health pillars and areas in which we considered the research needed to be carried out. That was quite quick from the industry point of view.”

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<sup>111</sup> Information in this section is drawn from a combination of interviews, documents prepared in the process of open call for expressions of interest in establishing the initiative and the Food for Ireland website.

**Figure 6.5: FHI Interlinked strategic platforms – technology & health**



Source: Author's diagram

Interviewee 6G, from the research side, confirmed this view that the industry partners worked well together in defining the industry-led nature of the FHI cluster initiative:

“The dairy companies working with Enterprise Ireland identified early infant development, which essentially is infant nutrition; the metabolic syndrome, which is obesity... type II diabetes; infection immunity – protecting against infection and so on. ...the industry did spend a lot of time working together on it and that was quite remarkable, given the way they compete in the market place. The fact that they could sit around the table and were able to come to a consensus about what they needed to do is commendable.”

As section 6.3 above outlined, the four cooperatives/ companies involved in the FHI initiative were part of an established industry cluster, in which there was substantial

rivalry among industry actors. But there was also a history of working together in organisations for collaboration such as the IDIA, in the cooperative organisation ICOS and also with the IDB structure. Industry ties were also strengthened for the individual industry managers through the functional foods forum. The facilitator role of Dr John Mulvihill, who industry participants could trust, also contributed to the ease of reaching agreement. Therefore, despite strong rivalry within the cluster, the significant social capital bonds between the industry actors could be built on, and contributed to, the success of the FHI initiative.

By mid 2009, the ‘intelligent milk mining’ process had started. This involved the systematic deconstruction of milk to reveal a new range of bioactive substances with the capacity to positively impact on human health. Material was sent to the various research teams to be screened for activities against the different health pillars. Interviewee 6G, a Professor of food microbiology at one of the major research university actors involved in the initiative, briefly explained how a positive result in the intelligent milk mining stage moved forward in the process:

“You see something that might have an application in infant nutrition or you see something that might suppress appetite as part of an obesity agenda, then you have to ask a whole range of questions: Can an ingredient be formulated into a food? Is the food and ingredient safe? Can it be made in the way that the industry could make it?”

Depending on the answers to these questions, the process moves through the subsequent technology stages, as outlined above. At a more advanced stage, the process may involve intervention in humans to provide scientific and clinical validation for a claim attached to an ingredient that came through the screening and other programmes. This description of the research approach indicated a substantial benefit from the bridging social capital of the FHI initiative, linking the substantial knowledge and expertise of the public research community with the needs of industry.

The research undertaken in the technology and health platforms involved a higher level of collaboration among the public research organisations than in the past,

particularly between institutes based in different regions of Ireland. Interviewee 6G, on the research side, commented:

“This (FHI) is increasing the level of interaction quite significantly,... there is a huge amount of goodwill to make this work. We are a single centre even though we are geographically dispersed across four locations.”

One of the underlying strengths of the FHI initiative is that it brings together expert resources located in the different research centres. Interviewee 6H, the independent CEO of the initiative (see section below on governance and finance), outlined that:

“Each of the centres is very good in its own right. All excellent researchers and they all have their own strong fields of academic research. But only if you bring them together in one room.... to work together, then you really get something world class out of that. One example is our hydrolysis milk mining package, where we have excellent capacity in UL –[Professor] Dick Fitzgerald [is] really one of the world known experts in enzymatic hydrolysis. And then you have [Professor] Alan Kelly in UCC, who is a well known expert in thermal processing of dairy products and indigenous enzymes in milk, and then Moorepark research centre can deal with the up scaling of hydrolysis and in UCD you have the bioinformatics experts [Dr. Lorraine Brennan] bringing in a completely new element ....Combining these four elements really allows us to create peptides and hydrolysis that have never been created before.”

By acting as a broker between the different universities located in different regions, Enterprise Ireland working with the industry actors spanned structural gaps with substantial social capital benefits for all the partners involved in FHI. Burt (1997, p340) defined social capital in terms of the information and control advantage of being the broker in relations between people otherwise disconnected in social structure. The reciprocal benefit from the state agency perspective was the establishment of the cluster initiative involving the research community and their food industry clients.



In addition to the potential of new discoveries resulting from the research carried out across the four centres, the FHI also provided both the industry and the research actors involved in the cluster initiative with substantial social capital benefits. Reflecting what Lundvall (2005) would describe as a learning firm approach in the building of a national system of innovation, Interviewee 6F, from the industry side, commented:

“Our R&D team have become familiar with the working of FHI on a day-to-day basis and from that we gather significant learning...There is a huge level of capability which we can plug into. We can get real benefit from that...First of all,...our scientists are liaising with world class scientists...there is knowledge transfer. There is then the whole appreciation of our customers that we are involved in this level of scientific research. Then, from the university point of view, there is the whole market focus which is brought to their research, whereas in the past some might say that some research programmes were just there for the generation of scientific papers.”

Cooke (2002, p135), in his analysis of regional innovation in the UK, suggested that specialist, tacit knowledge exchange arising from the agglomeration can reduce costs for firms<sup>112</sup>. The above comment from Interviewee 6F also suggests the potential for the cooperatives/ companies involved in FHI to lower their research costs through the knowledge exchange potential of the FHI initiative. A number of writers on social capital theory, including Woolcock (1998) and Cooke (2007a), have emphasized norms of reciprocity inherent in social networks. The above comment, from interviewee 6F, indicates norms of reciprocity at several levels: within FHI — with industry gaining from the knowledge expertise in research institutes and universities gaining from the market knowledge of industry, and outside FHI — with industry gaining reputational goodwill from customers and, hopefully, commercial contracts and the customers themselves gaining access to new ingredients.

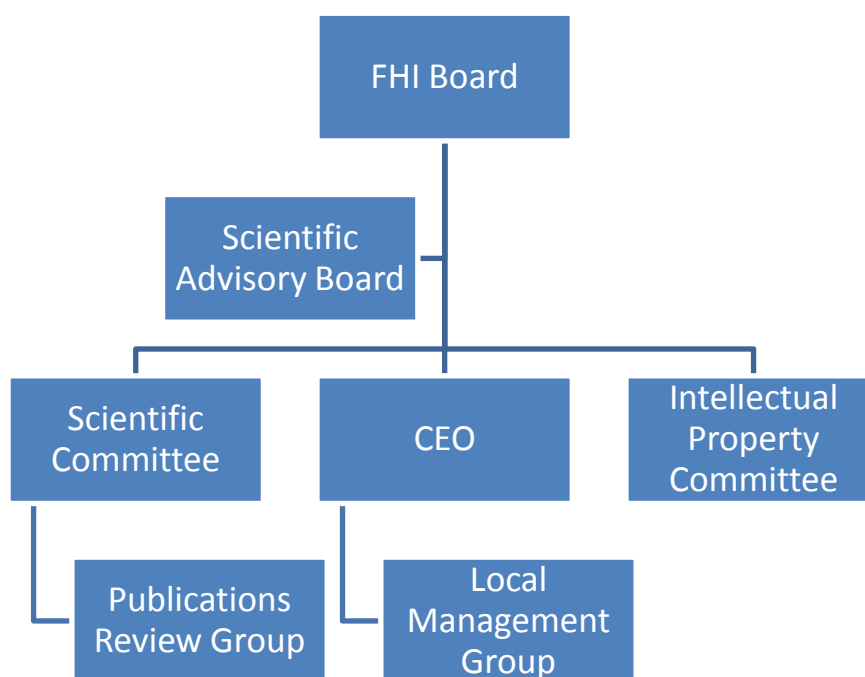
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<sup>112</sup> A detailed discussion of this point is contained Section 2.3 on national and regional innovations systems of Chapter 2.

## Governance and Financing

Krishna and Uphoff (1999) emphasized that structural social capital is important in facilitating mutually beneficial collective action, with established roles, rules and procedures. The structure of FHI is also important in generating social capital in the cluster initiative (Figure 6.6).

**Figure 6.6: Structural social capital in the FHI initiative**



Source: Author's diagram

The four dairy cooperatives / companies and the four public research institutes, together with an independent Chairman and CEO, form the board of the FHI. A scientific advisory board has been established, similar to the SFI funded CSET structure outlined in section 5.4 of chapter 5. A scientific programme committee and publications review group coordinates the researchers in the different locations. An intellectual property committee facilitates the sharing of outcomes from the research undertaken in FHI among the different actors in the initiative. Finally, local management groups coordinate day-to-day activity and deal with personnel issue etc.

Food for health Ireland (FHI) is approximately 80 percent funded by the state agency Enterprise Ireland, with the remaining 20 percent of the budget being provided by the dairy cooperatives/ companies involved. The four cooperatives / companies share the contribution equally regardless of the overall size of their organisation, giving each of them equal weight in the cluster initiative. The overall budget for the FHI cluster initiative, secured for a five year period, is €23 million. Enterprise Ireland is not a board member but has observer status at board meetings. The IDIA is also not on the board, either as full member or an observer. Hence, it relies on weaker ties to maintain contact with FHI, providing support on regulatory and legislation matters where required. The substantial state funding for the initiative supports the view expressed by Cooke (2007a) that social capital initiatives involving industry and state agencies almost always involve an element of rent-seeking.

One of the research organisations involved in the initiative provided an interim CEO in the initial set up stage, of around 6 months, of the FHI cluster initiative. An independent CEO, Jens Bleiel, with substantial international commercial experience and no connection to any research or industry partner was then recruited<sup>113</sup>.

Interviewee 6E from the industry side commented:

“Once we got the CEO in place, it (FHI) was clearly very even handed and he is passionate – that this is one team. That is a key principle for him and he is putting effort into building that sense of team and breaking down barriers.”

The strong industry-led nature and the governance structure of the FHI cluster initiative made it unique as a food research centre from a European perspective. One example of another research institute known for operating in an integrated, collaborative approach with companies and government is Wageningen University

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<sup>113</sup> Jens Bleiel became the Chief Executive Office of Food for Health Ireland in August 2009, a business economist by training; his past assignments brought him from Germany (his home country) to the Netherlands and Argentina. After five years at a management consultancy in Germany, he joined Dutch company Numico where he held several management and executive functions in the baby food branch of the company (Cow&Gate, amongst other brands). After 10 years in this business, he joined the Dutch multinational DSM, world market leader in vitamins and other food ingredients, where he built up the functional food business.

and Research Centre (Wageningen UR) in the Netherlands<sup>114</sup>. But as Interviewee 6H, the CEO of the cluster initiative, commented:

“Of course there are other research institutes, like for example the top institute for food and nutrition in the Netherlands which is located in Wageningen University. That, in a certain way, is a similar institute, but not as strongly linked to industry.”

This view that the collaborative nature of the FHI cluster initiative is unique was also supported by Interviewee 6G, from the research institute side:

“Unique in that they (companies) would work at this level of closeness. There are other models ... Wageningen, the big Dutch university, but their companies buy-in, as individual companies, rights to look at the research — but not together. These Irish companies have agreed to act as one almost, in terms of how they interface with us and what they are getting for their monies.”

In this sense, the FHI cluster initiative (case study 6) is also different to the SFI funded CSETs reviewed in case studies 3 and 4 in section 5.4 of chapter 5, where collaboration between the researcher actors and industry actors was largely at the individual firm level. Lundvall (2005, p10), in his theory on systems of innovation, defined social capital as ‘the willingness and capability of citizens to make commitments to each other, collaborate with others and trust each other in processes of exchange and interactive learning’. The FHI cluster initiative largely fits into this definition; with the four dairy cooperatives / companies and the four university research centres committed to collaborating together in a process of exchange and interactive learning on the potential of milk, to create ingredient products with health

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<sup>114</sup> Wageningen University and Research Centre (Wageningen UR) in the Netherlands provides education, undertakes research and generates knowledge in the field of life sciences and natural resources. Wageningen UR’s mission is “To explore the potential of nature to improve the quality of life”. For Wageningen, quality of life means both an adequate supply of safe and healthy food and drink, on the one hand, and the chance to live, work and play in a balanced ecosystem with a large variety of plants and animals. Wageningen UR is a collaboration between Wageningen University, Van Hall Larenstein, the University of Applied Sciences and the specialised former research institutes (Dienst Landbouwkundig Onderzoek) from the Dutch Ministry of Agriculture.

and wellness benefits. Lundvall (1998, p410) viewed trust as crucial for interactive learning and innovation, but he correctly observed that trust is a multi-dimensional and complex concept, involving consistency in behaviour and deep sharing of information and knowledge. In the case of FHI, in order to cement the relationships, the appointment of an independent CEO was an important part of generating the necessary level of trust among the different actors involved.

### **The potential performance of FHI**

The FHI cluster initiative is firmly established, but in the early stages of implementation. Therefore one cannot assess or comment with certainty on how it will impact on research institutes and the four cooperatives/ companies involved in the initiative.

However, the above analysis under the various headings of the CIPM, provided evidence that the FHI cluster initiative involved careful planning during a prolonged initiation stage. It indicates that cluster initiatives may take significant time to develop and supports Nooteboom's (2007, p33) contention that social capital requires investment, in the sense of effort and sacrifice, and that trust may need to develop in time. The objectives of FHI address some of the challenges identified in the section on the setting for the initiative, for example the need for closer collaboration between industry and research institutes involved in food research. The process of establishing FHI was robust, for example applications from universities were evaluated by expert and independent evaluators, who made recommendations that were taken on board and shaped the final structure of the initiative. This was particularly important in achieving the potential for deeper collaboration between research institutes that had previously not worked closely together.

The industry-led consensus on the framework for the initiative, involving two interlinked strategic platforms i.e. technology and health, indicates social capital bonds and a high level of commitment to the cluster initiative by the four industry actors involved. The coordinated industry-led nature of the cluster initiative is certainly unique in a European dairy research context.

The research resources available to FHI are substantial, with significant potential for tacit knowledge transfer between, and among, the scientists working in the various research and industry organisations. Lundvall (2005) advocated that connecting producers and users, in a process of interactive learning, would bring about innovations in terms of new products and systems. In the FHI initiative, the researchers in the universities are the producers of scientific knowledge and the research managers in the dairy cooperatives are the users. The interactive learning that takes place between the two will hopefully lead to valuable new dairy ingredient products. The weaker link that the dairy cooperative/companies can provide to their customers, and feeding their customers needs back into the FHI, has the potential to enhance the interactive learning within the initiative.

The structure of FHI (Figure 6.6) is important in terms of generating social capital in the cluster initiative. The board structure provided evidence of sound governance involving all the key actors from the industry and research organisations involved in FHI. The appointment of an independent Chairman and CEO also reduced the potential for conflict between the various actors and helped to build the trust necessary for 'a one team approach', as interviewees described it. The commitment to joint funding on an 80:20 percent basis by the state agency and industry actors involved is also significant. Enterprise Ireland, while choosing not to take a voting seat, did retain observer status on the board.

Edquist (2001, p3) criticised the systems of innovation approach for lacking a theoretical component about the role of the state. While the state agency plays an obvious part in providing 80 percent of the funding for the FHI initiative, which can be viewed as part of a systems of innovation approach in Ireland, its role over a number of years in the planning of FHI went well beyond the provision of finance. The positive attitude, value and belief that individual directors and managers in Enterprise Ireland placed in the initiative was a critical component in over coming obstacles in the establishment of the FHI. The cognitive social capital which other actors, particularly the dairy cooperatives and companies involved, brought to the initiative was also instrumental in establishing the FHI. Enterprise Ireland worked well with, and appreciated the contribution of the industry organisation for collaboration, the IDIA, during the mission to Japan and the national functional food

forum. Hence, the IDIA also played a significant role in the initial planning stage of the initiative but is not on the FHI board even as an observer. Therefore, despite a positive role in establishing the initiative, it must rely on weaker ties to the FHI in terms of future involvement.

Vandenburg (2002) provided a link between the literature on moral norms and ethical codes developed by North (1990) and literature on social capital, where trust is viewed as playing a role in economic and social relations<sup>115</sup>. Trust among the cooperatives/companies is clearly important in the FHI initiative. This is evidenced by the ability, with the support of Enterprise Ireland, to agree a framework for the initiative, to agree to jointly contribute to the initiative and to work in a collaborative mode together with the various research institutes. However, Lundvall (1998) in his theory on systems of innovation, emphasized that trust is a multi-dimensional and complex concept and the FHI initiative also has the ability to further build trust among the various actors, including the public research institutes who previously have not worked so closely together. Interview evidence provided here indicates that ‘there is a huge amount of goodwill’ among the public research institutes involved to make the FHI initiative work. If trust between the industry actors, or the research institutes, breaks down then, clearly, the potential of the FHI cluster initiative to deliver meaningful outcomes in terms of innovation and competitiveness would be damaged and constrained. However, the appointment of a CEO, with no previous ties to any of the actors involved, provides broker advantage, in social capital terms, at the centre of the FHI cluster initiative.

Interviews involving a range of actors in FHI also provided some indications of what is expected from FHI in terms of goal fulfilment. The appointment of a commercially focused CEO is also seen as important in terms of the performance of the initiative. For example interviewee 6F from the industry side commented:

“What is FHI going to deliver? It is going to deliver commercial output. So if it is going to deliver commercial output, it has got to be market focused and therefore we have got somebody [the CEO] who has commercial capability

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<sup>115</sup> For a detailed discussion on this point see the subsection entitled ‘North – the rules of the game, the players – moral norms and ethical codes’ in Section 2.2 of Chapter 2.

and a track record. So we spent a little time looking around and, in the end, we considered him the best man for the job, with a good marketing knowledge and commercial capability and that is what we need really.”

Interviewee 6E, a second industry participant, suggested some time-frames in terms of expected outcomes:

“By two years we would need to see some revenue coming through, not complete pay back but a revenue stream, by five years we would be looking for pay back and a return on investment.”

Interviewee 6H suggested that even at this early stage there are significant returns, particularly for the smaller companies involved in the initiative:

“[T]he smaller companies are benefiting in general terms, because they can really use FHI in their sales efforts. ....The next time they go to their customers they can not only talk to the purchasing manager, but also to the marketing manager and the research manager, because they have a new story to tell. Access to new technologies that can potentially deliver new product benefits, which is an interesting story.”

This interaction between the cooperatives / companies and their customers builds on the potential in FHI for what Lundvall (2005, p3) called ‘the kind of interactive learning that interconnects users and producers in a process aiming at new products’. In this sense, the FHI cluster initiative has the potential to strengthen the cluster relationships referred to in Section 6.2 between the dairy cooperatives / companies and infant formula / baby food companies e.g. the supporting industry of the cheese and ingredients cluster. Of course, it also has the potential to build relations with other customers of the dairy cooperatives /companies.

In 2010, the FHI CEO organised workshops to focus on how competencies and resources at the four universities / research institutes might be used to enhanced existing products that the cooperatives / companies have in the market. This has the potential to improve innovation and competitiveness at individual cooperative /



company level in the short term. Furthermore, this building of competences may in turn contribute to commercialising medium outcomes from the FHI initiative.

There are early signs of progress from the research being carried out within FHI. For example, the new ‘metabolomics’ team at University College Dublin is building on FHI’s ‘intelligent milk mining scheme’, which was set up to identify bioactive milk peptides with health-enhancing properties (Heller 2010). According to Dr Lorraine Brennan, project leader for FHI at UCD, metabolomics is used to examine how milk compounds can alter the metabolism and will play a “key role” in the discovery of commercially viable bioactive ingredients from milk:

“Through the precise, multivariate analysis of the metabolite environment, we can achieve a broader understanding of the exact processes taking place, following treatment with milk fractions. Additionally, it enables us to link milk-derived bioactives into metabolic pathways, substantiating future health claims with essential physiological data.”

FHI uses bioinformatics, a computer-based approach, to identify amino acid sequences in human, bovine and other mammalian milk proteins that have remained unchanged throughout evolution. Heller (2010) explains that an unchanged, or ‘conserved, region in a protein is a sign that the sequence is performing an important function, and is therefore more likely to deliver health benefits. The group has, so far, identified around 30 peptides that could be used to develop functional food and beverage ingredients.

FHI researcher, Professor Philip Newsholme of UCD, contributes to research which has discovered a novel pathway for immune-mediated Type 2 diabetes mellitus. A study, result of collaborative FHI research involving scientists in TCD and UCD, as well as other institutes in Japan and USA, and co-authored by Prof. Newsholme was published on 12th September 2010 in the *Nature Immunology* journal. Prof Newsholme's research links nutritional biochemistry to endocrine, muscle and immune function in diabetes and ageing, which links into the metabolic health platform identified by the FHI initiative.

## Concluding comments

In summary, the analysis above suggests that FHI is a well thought-out cluster initiative with the potential to make a significant contribution as a building block, within a traditional sector, towards a national system of innovation in Ireland.

Interviewee 6E, an industry participant, commented on the potential of the collaboration involved in the FHI initiative:

“The key things are the pulling together of the marketing and production capabilities of four companies, and the research capabilities of a number of Irish public institutes. In the functional foods area, no one [Irish] company and no one [research] institute will be able to compete globally. We recognised that from an early stage and we also recognised that there is a national agenda here to pull together, and that there was a lever to access a significant level of funding.”

Interviewee 6F, a second participant from the industry side, confirmed this view:

“We have access to a scale of research that, as a stand-alone company, we couldn't have. It is a big one for us. ....we are actually accessing a whole cluster of world class capability that we certainly wouldn't even dream of doing ourselves. We could not afford to.”

The potential social capital benefits of the cooperatives and companies linking into four different research institutes, in terms of raising levels of innovation, is critical. The comments above suggest learning benefits for the organisations, particularly the cooperatives and companies involved, within the systems of innovation approach encapsulated in the FHI cluster initiative. The initiative will undoubtedly face challenges over the next number of years as the research progresses and decisions have to be made in relation to outcomes. It is obviously not possible to comment in detail on these unknowns. The FHI cluster initiative is also a first attempt at moving collaboration in food research from the regional to the national level. If successful, it may, in time, result in collaboration in other areas of food research at the national level.

## Chapter 7 Conclusion

### The economic context and the thesis case studies

Industrial policy in Ireland in recent decades has focused on high technology clusters as key drivers of growth. This thesis highlighted the need for a better understanding of cluster policy and the contribution that cluster initiatives can make to supporting the development of clusters, increasing competitiveness and innovation. For example the role of collaboration and social capital in cluster development is poorly understood in Ireland. Staber (2007) argued that situational context is important in understanding these factors in cluster analysis. Mjøset (1992) found that a weak system of innovation combined with population decline, due to high levels of emigration, resulted in vicious circles of under-development in Ireland for decades. This was in part the result, as highlighted in this thesis, of the fragmented evolution of state agencies focused on enterprise development, creating a disconnected agency structure, affecting innovation policy for the modern and traditional sectors. Industrial and business representative organisations, here defined as organisations for collaboration (OFCs), evolved to reflect the changing focus and needs of the Irish economy.

This thesis and its case studies provide evidence of the embedding of ICT/Software and dairy clusters and recent efforts to improve the systems of innovation in Ireland. A better understanding of cluster initiatives, and how collaboration works in such initiatives, in both the modern and traditional sectors, can help to strengthen this endeavour. The six case studies (summarised in Table 7.1) provided examples of different types of collaboration within clusters and cluster initiatives and the principal forms of social capital involved in each case. Case study 1 examined the role of the industry OFCs, ICT Ireland and the ISA, in strengthening ties and building social capital bonds in a modern technology cluster. Case study 2 examined the role of OFCs in building social capital bridges between ICT/ software firms and other actors in the economy, including government departments, state agencies and the broader business community. Case studies 3 and 4 examined the process of collaboration involving universities and ICT / software and biotechnology firms within cluster initiatives, supported by the state agencies – SFI, IDA, and Enterprise

Ireland. The collaboration examined in both case study 3 and 4 did not involve an OFC. Case study 5 examined collaboration within a cluster initiative in the high-tech

**Table 7.1: Case studies –Types of collaboration and principal forms of social capital**

<b>Case Study</b>	<b>Title of Case Study</b>	<b>Type of Collaboration</b>	<b>Principal form of social capital</b>	<b>Economic Actors involved</b>
1	ICT Ireland and ISA – collaboration among firms	Within an industry OFC	Bonding and Structural	Firms
2	ICT Ireland and ISA – collaboration with other economic actors	Between an OFC and other economic actors	Bridging and Cognitive	Firms, Government and state agencies
3	Centre for Telecommunication Value Chain Driven Research (CTVR)	Between universities, and firms with support of state agencies	Bridging and Structural	Universities, firms and state agencies
4	Alimentary Pharmabiotic Centre (APC)	Between universities, and firms with support of state agencies	Bridging and Structural	Universities, firms and state agencies
5	Leadership 4 Growth	Between an OFC and a state agency, involving firms and an international university	Bridging and cognitive	An OFC, a state agency, firms and an international university
6	Food for Health Ireland	Between firms/cooperatives and universities supported by a state agency (and an industry OFC)	Bridging Structural, and cognitive	Universities, firms, and a state agency (with support of an industry OFC)

Source: Author's table

economy, involving an industry OFC – the ISA – and indigenous software firms, the state agency – Enterprise Ireland, and a leading international university – Stanford Business School. Finally, case study 6 examined collaboration within a cluster initiative in the traditional economy, involving four Irish dairy cooperatives/ companies, four universities and the state agency – Enterprise Ireland. The industry

OFC, the IDIA, is not a partner in the cluster initiative, but was significantly involved in the process of establishing the initiative.

### **The role of clusters initiatives in embedding clusters and building systems of innovation**

Chapter 5 provides evidence on the ICT and software sector deepening its embeddedness in the Irish economy and builds on work undertaken by a number of Irish researchers (Ó'Riain 1997, O'Malley and O'Gorman 2001, Ó'Riain 2004, van Egeraat and Jacobson 2006, Barry and van Egeraat 2008). This research provided evidence of clustering, particularly in the case of the indigenous software industry. However, the importance of FDI remains apparent with an impressive number of global leaders in the computer industry continuing to locate and expand their range of activities, such as product development, in the country. This is a contrast to the limited seed role for FDI put forward by Porter (1990) in his original cluster model. The nature of the ICT cluster in Ireland and the level of embeddedness of various subsectors have changed over time. The microcomputer assembly subsector declined, with multinationals moving this part of their operations to lower labour cost locations, such as Eastern Europe. However, the research evidence reviewed and built on in this thesis suggests that other parts of the ICT sector are becoming more embedded over time, with collaboration between different economic actors playing a significant role in this process. The production of electronic components such as microchips, requiring more skilled labour, increased. The contribution of the multinational and indigenous software sector is also growing in importance. Firms in the ICT sector moved towards the provision of traded services, reflected in €24.2 billion of exports of computer related services in 2009 (CSO 2010b). These subsectors provide opportunities for higher skilled, and better educated, workers. These changes also suggest a more enduring and embedded ICT cluster based on high-tech manufacture and services, rather than one based on computer assembly.

From a cluster policy perspective, most attention is paid to the development of high-tech manufacturing and services clusters in Ireland (Forfás 2008). However, clusters and cluster initiatives are also features of the traditional economy. Chapter 6 provides new evidence of a deeply embedded cheese and ingredients cluster and builds on research undertaken in the late 1990s (O'Connell et al 1997, Mottiar 1997)

that identified the elements of a dairy industry cluster in Ireland. Ketels (2006, p125) argued that the emergence of domestically owned MNCs is a sign of the success of a mature cluster. Irish dairy cooperatives/companies are much larger than the indigenous software SMEs and this thesis highlights that a number of dairy cooperatives have emerged as multinational corporations in their own right. But the relationship with foreign owned firms was also important in the dairy sector, with multinational infant formula companies playing a significant role in the development of the ingredients segment of the dairy sector. By combining insights from Porter's work (1980, 1998a) on industry segmentation and its effect on firm strategy with his diamond model (1990), this thesis presents evidence of a strong cheese and ingredients segment cluster within the dairy industry. Given the declining EU intervention support for the production of agricultural commodities, such as butter, the focus on the potential of the cheese and ingredient segment is likely to grow in the future. The expected increase in milk supply in Ireland following the abolition of EU milk quotas in 2015, indicates a need for the dairy industry cluster to continue to develop its product offering and to intensify its focus on innovation.

This thesis also contributes to the literature on the cluster concept and builds on cluster research in Ireland through a focus on collaboration and the application of the cluster initiative concept (Sölvell et al 2003) in an Irish context. A new framework (Figure 2.4) for analyzing collaboration within clusters and cluster initiatives was proposed in Chapter 2, bringing together, in a novel way, insights from the literature on clusters, institutional economics and the systems of innovation approach. The thesis illustrated that there is a greater overlap between the development of the cluster approach (Porter 1990, Sölvell et al 2003) and the systems of innovation approach (Edquist 1997, Lundvall 1998) than that suggested in recent Irish research by Giblin (2007).

Sölvell et al (2003, p31) defined cluster initiatives as 'organised effort to increase the growth and competitiveness of a cluster within a region, involving cluster firms, government and/or the research community'. The use of the Sölvell et al (2003) model (supplemented by the use of the OFC concept) in case studies 3,4, 5, and 6 illustrated that cluster initiatives, involving substantial levels of collaboration, are further embedding the ICT /software and dairy clusters in Ireland. Sölvell et al

(2003, p10) found that cluster initiatives were most frequent in economies focused on the development of high-tech sectors such as ICT, medical devices and biotechnology. Case studies 3, 4 and 5 provide examples of such cluster initiatives that help to sustain and embed the ICT/Software and biotechnology clusters in Ireland.

Case study 3 was a large national cluster initiative, focused on R&D in the software and telecommunications sector, involving a complex range of partners on both the research and industry side. Case study 4 was a regional cluster initiative based in Munster, focused on R&D in the biotechnology sector, involving a much smaller number of partners. Malerba (1999, pp5-6) placed significant emphasis on the role of non-firm organisations such as universities and government in the process of building sectoral systems of innovation. Both case studies 3 and 4 can also be viewed as contributing to building systems of innovation for the sectors involved, the former at national level and latter at the regional level, and thereby supporting the embedding of these industry clusters in the Irish economy.

In addition to research and innovation, Sölvell et al (2003, p25) listed a number of other areas as appropriate objectives for cluster initiatives, including education and training. The Leadership 4 Growth (L4G) cluster initiative examined in case study 5, focused on the education and skill needs of the CEOs of indigenous software firms. It involved collaboration among software firms, the state agency responsible for the development of indigenous industry – Enterprise Ireland – a world class university, located in the heart of Silicon Valley – Stanford Business School – and an OFC<sup>116</sup>, the ISA. However, a key cluster stakeholder group identified by Sölvell et al (2003), financial institutions and venture capitalists, was not involved. The venture capital market in Ireland is at an early stage of development and one of the benefits of collaboration with Stanford was exposing Irish software firms to a mature venture

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<sup>116</sup> The OFC concept replaces the Institutions for Collaboration (IFC) concept, that Sölvell et al (2003) borrowed from Porter and Emmons (2003), to capture the contribution of the industry association, in this case, the ISA.

capital environment. The success of the first programme led to the initiative being extended to other SME clusters in Ireland, including the medical devices and biotechnology sectors.

Sölvell et al (2003) also found low-tech clusters in areas such as furniture, processed food and textiles. Food for Health Ireland (FHI), examined in case study 6, is a cluster initiative focused on innovation in the dairy sector of the Irish economy. It involves four dairy cooperatives/ companies collaborating together with four universities/ research centres in an R&D initiative focused on generating new dairy based ingredients for increased health and well-being. The FHI case illustrates that cluster initiatives in the traditional sector of the economy, as well as high-tech sectors, can contribute to embedding clusters and building systems of innovation in Ireland.

### **Why do firms and universities engage in cluster initiatives?**

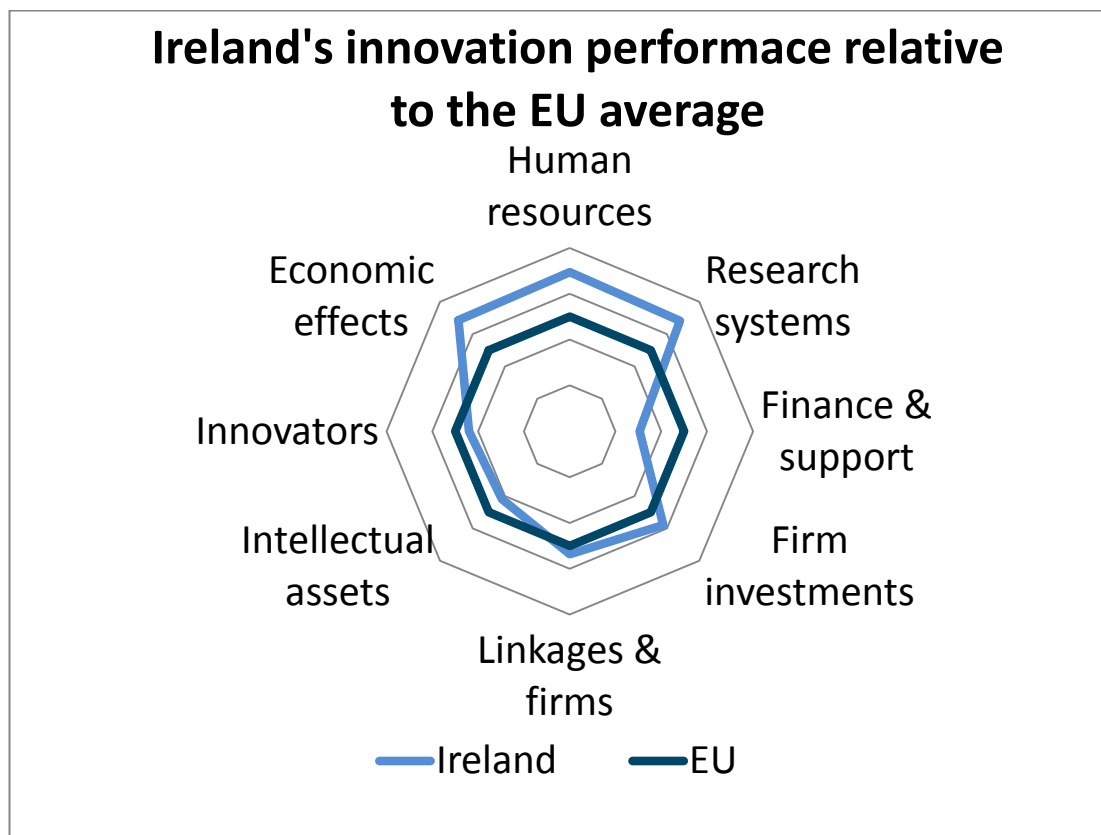
The principal reason why firms and universities collaborated together in the cluster initiatives examined in this thesis was to improve competitiveness and build research capabilities. However, the financial support provided by state agencies was important to the establishment of these cluster initiatives. Cooke (2007a) argued that access to funding or rent-seeking was almost always part of the reason for firms' interaction with state agencies. Case studies 3, 4, 5, and 6 and to an extent case study 2, showed that even if there was rent-seeking motivation, the activities undertaken to obtain the funding still generated social capital. These case studies thus illustrated the importance of the state in supporting cluster initiatives, involving collaboration between firms and universities. The Centres for Engineering and Technology (CSETs) profiled in case studies 3 and 4 were supported by funding provided by SFI, and supplemented by the IDA and Enterprise Ireland. These case studies could be seen as the State encouraging these initiatives to support the further embedding of these industry clusters by building R&D capabilities. This was in contrast to case study 1 where collaboration took place within a privately funded OFC with no element of public funding and to case study 2, where public funding support was in some instances an outcome of the collaboration rather than a driver of collaboration.



For example the ISA gained funding from a state agency for establishing an Irish Software Innovation Network (ISIN), employing a full-time executive to act as a broker between SMEs and research institutes. While the cluster initiatives profiled in case studies 5 and 6 involved significant financial commitment by the firms and cooperatives involved, they also received substantial state funding from Enterprise Ireland.

Many of these cluster initiatives were valuable in the industry sector involved and in building a stronger system of innovation in Ireland. Mjøset (1992) found that Ireland’s economic development was held back for decades by a weak system of innovation. The fact that state funding was part of the process of encouraging collaboration, among research institutes, and between universities and industry, to address this issue should not be viewed negatively. In fact, finance and support for innovation remain low in Ireland, relative to its EU partners (Figure 7.1).

Figure 7.1: Ireland’s improving innovation performance



Source: European Commission Innovation Scoreboard, 2011

If state funding declines over time, as may well be the case given Ireland's economic challenges, it raises questions about the future long-term viability of these initiatives. It also highlights the need to develop alternative sources of funding through financial institutes and/ or a more mature venture capital market.

### **The role of Organisations for Collaboration (OFCs) in clusters and cluster initiatives**

Porter's (1990) seminal work on clusters did not develop the role of collaboration between firms within clusters, preferring to emphasize rivalry. In later work, Porter and Emmons (2003, 2006) proposed the Institutions for Collaboration (IFCs) concept, citing industry associations, chambers of commerce, export promotion agencies among a list of examples of such IFCs. In their cluster research Sölvell et al (2003) placed substantial emphasis on collaboration between various economic actors and attributed IFCs with a central role.

This thesis contributes to cluster and cluster initiative research by developing a new framework that provides a more precisely defined concept for describing the collaborative role of industry associations and other organisations, which represent the views of business. This new concept, organisations for collaboration (OFC), offers a clear way of analyzing how, and why, firms choose to work together, particularly in engaging with decision makers in the area of enterprise and innovation policy. It is suggested as an alternative to the Institutions for Collaboration (IFCs) concept suggested by Porter and Emmons (2003).

The OFC concept is theoretically grounded in institutional economics and is consistent with the systems of innovation (SI) approach, particularly that of Edquist and Johnson (1997, pp46-47) who clearly distinguished between institutions and organisations. They defined institutions as common sets of habits and routines that regulate interaction between individuals and groups, while organisations are structures with an explicit purpose, which are consciously created. This distinction between institutions and organisations is more than an issue of semantics, it is also important for understanding how collaboration works in clusters and cluster initiatives. It aligns with the institutional economist North's (1990, 1994) view that institutions are the rules of the game and organisations are the players who try to

influence the outcome of the game. In extending economic theory, Williamson (2005) in his new institutional economics argued that the firm can be described not only in technological terms as a production function but also in organisational terms as a particular mode of governance among a number of alternative modes. As discussed in Section 2.5, in 2005, the integrated NEWGOV project<sup>117</sup> under the EU's 6<sup>th</sup> Framework Programme produced a glossary of different modes of governance, under which 'coordination' was described as a non-hierarchical mode of governance where actors accommodate behaviour in a process of communicative exchange – without being subject to binding legal obligations. Organisations for collaboration (OFCs) are a particular mode of governance that facilitates not only information flow, exchange and interaction among firms, both large and small, but also interaction between firms and other actors (or players) in the economy, such as government and state agencies. OFCs can also enhance international connectivity by facilitating contact between industry and business associations at a national level and similar organisations, and their members, at a European or global level. Therefore, this thesis argues that this new OFC concept provides greater theoretical clarity (than the IFC concept) for analyzing the role of industry associations, and business representative groups, as players or actors within clusters and cluster initiatives.

This thesis also contributes to Irish cluster research, placing greater emphasis than previous Irish studies on the role of collaboration in clusters and cluster initiatives. The thesis shows how industry OFCs contributed to further embedding the ICT/software and dairy clusters in the Irish economy by facilitating interaction among firms (and cooperatives) and between firms and other actors in the economy.

Polanyi (1944) was the first to refer to the concept of embeddedness and Granovetter (1985), in developing the concept, argued that most behaviour, including economic behaviour, is closely embedded in networks of interpersonal relations. Case study 1 showed that the industry OFCs, ICT Ireland and the ISA, contributed to embedding the ICT and software clusters in the Irish economy by strengthening ties and building bonds among the firms in the sector. Case study 2 illustrated that the industry OFCs also built bridges to other actors in the economy, further supporting the process of

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<sup>117</sup> [http://www.eu-newgov.org//public/NEWGOV\\_pub.asp](http://www.eu-newgov.org//public/NEWGOV_pub.asp), Glossary of shared terminology (M)

embeddedness by developing contacts between individuals who are not part of the same societal group – for example between industry executives and government officials. Through interaction with government, ICT Ireland and the ISA could also influence the rules of the game – national government policy for the sector and how it was implemented – for their sector. Case studies 3 and 4 illustrate the fact that collaborative cluster initiatives, involving firms, do not always involve an industry OFC. However, the absence of an OFC in case studies 3 and 4 possibly contributed to the collaboration largely taking place between universities and individual firms, rather than among a group of firms working together as a unit. In contrast case 5, which examined the establishment of the LAG cluster initiative, involved substantial collaboration between an industry OFC, the Irish Software Association, and a state agency, Enterprise Ireland, in addition to collaboration with individual firms.

The examination of the evolution of the Irish dairy industry cluster in chapter 6, referred to the collaborative role played by the industry OFC, the Irish Dairy Industries Association (IDIA). In the traditional dairy sector there are long established ties among farmers and the farmer members of cooperatives boards, with the ICOS organisation in existence since the late 1800s. The IDIA complemented collaboration in the sector by providing a defined focus on the impact of policy on the development of agri-business as opposed to farming. The IDIA, following Ireland's entry to the EU, contributed to building bonds among the Irish dairy industry executives and bridges to their European dairy industry counterparts. Through their involvement with the European Dairy Association (EDA), a pan-European OFC, the IDIA provided a bridge to EU Commission and Parliament for their members. Together with their members, including the IDIA, the EDA could influence the 'rules of the game' – EU regulations and directives – which were set by these European institutions to govern the dairy industry.

The IDIA was also involved in the initiation and planning stage of the FHI cluster initiative, with Enterprise Ireland leveraging off the strong ties and social capital bonds built up within the industry group. The collaborative process to establish FHI was long and complex, with the IDIA and Enterprise Ireland working together to facilitate a mission to Japan to explore the potential of the functional foods area and to establish the National Functional Food Forum.

Field (2008) argued that social capital can be termed capital insofar that it creates resources that enable their member firms to pursue their goals more effectively. In this context the industry OFCs, ICT Ireland/ ISA and the IDIA can be viewed as social capital assets of modern and traditional clusters in the Irish economy.

### **How the process of collaboration works through social capital in clusters and cluster initiatives**

The emerging social capital concept (Field 2008) was used as an analytical tool to examine collaboration within clusters and cluster initiatives in this thesis.

International studies have examined the role of social capital in an economic context. For example, Beugelsdijk and Van Schaik (2005), in an econometric study, found a positive and significant relationship between social capital and economic performance in a regional analysis covering seven EU countries. Ireland was not included in the study and Northern Ireland was also excluded from the UK element of the study. Few Irish studies have considered the relevance of the social capital concept in a business context (Breathnach 2006, Bradley and Kennelly 2008a, 2008b).

This thesis contributes to research on the investigation of social capital from a business context in an Irish setting. Table 2.1 in Chapter 2 provided a summary of the key definitions and theoretical components of social capital that were used to add depth to the analysis. Naphapiet and Ghosal (1998) suggested three dimensions of social capital – structural, cognitive and relational. The dual distinction between ‘bonding and bridging’ and ‘structural and cognitive’ social capital was used in this thesis, because it provided greater theoretical clarity and a clearer analytical tool for examining collaboration within cluster initiatives. It proved to be a useful mechanism to explore how the process of collaboration worked in the various case studies undertaken as part of the thesis.

### **Bonding and bridging social capital**

In case study 1 the bonding social capital achieved by ICT Ireland and the ISA yielded benefits for both multinational and indigenous firms. Putnam (2001) distinguished between the benefits of dense and larger networks. The ability of ICT

Ireland and ISA to generate bonding social capital in the ICT and software clusters could be viewed as part of the benefit of interaction within dense networks.

Extending connections through the creation of larger networks also has the potential to yield benefits (Bourdieu 1986, Putnam 2001). In case study 2, by creating bridges to other actors in the economy, such as government and state agencies, the OFCs involved in the ICT and software clusters extended the size and extent of network connections for their member firms. This aligned with Burt's (1997) contention that there is an advantage from being the broker between people otherwise disconnected in social structure, with the OFCs playing the role of broker in this case.

Several writers emphasize mutual benefit and reciprocity in their definitions of social capital (Putnam 1995, Woolcock 1998, Cooke 2007). In an example of this, ICT Ireland established a bridge between CEOs and high-level civil servants in the ICT Clearing House, with reciprocal benefits for both sides. A key benefit to the industry OFC and its members was that, with the support of the high-level civil servants involved, various items that they raised were responded to quickly, with appropriate follow-up action taken at lower levels in the administration. The government department benefited from the understanding of the market environment they gained from high-level business executives, which helped in the design and implementation of enterprise policy affecting business.

Nooteboom (2007) also emphasised the relationship between groups, rather than within groups, as the most relevant relationships in social capital terms. In case studies 3 and 4 the state agencies SFI, the IDA and Enterprise Ireland supported the generation of bridging social capital between universities and firms, with the aim of raising levels of innovation and supporting systems of innovation in Ireland. Case studies 5 and 6 provide examples of the process of establishing bridging social capital within cluster initiatives involving universities, firms, state agencies and OFCs. Both cases indicated that the generation of bridging social capital may not be a straight forward task and requires high levels of commitment to stay the course on the part of the different actors/ players involved.

## Structural and cognitive social capital

Several writers (Coleman 1988, Grootaert 1998 and Krishna and Uphoff 1999) emphasize structure in their definitions of social capital, with Coleman (1994, p302) viewing social capital as a process of building up ‘social structural resources’.

Researchers at the OECD (Grootaert 1998 and Krishna and Uphoff 1999) have also emphasized the importance of shared norms, values and beliefs, which they describe as cognitive social capital.

Case study 1 provided evidence that the industry OFCs, ICT Ireland and the ISA, provided structures that facilitated ICT and software firms working together effectively to strengthen ties within their sector. In the various examples of bridging social capital of case study 2, structure appeared to be less of a feature than in case study 1. A shared belief in and valuing of the collaborative initiatives by the different actors involved, indicated that cognitive social capital, which also encompasses norms of reciprocity, was a more important feature of the bridging social capital in that case study. This accords with the emphasis placed on mutual benefit and reciprocity by a number of writers in their definitions of social capital (Putnam 1995, Woolcock 1998, Cooke 2007).

The cluster initiatives reviewed in case studies 3 and 4 can be viewed as examples of structural social capital, which provided universities and firms with the opportunity to work together, sharing knowledge and experience, and make informed collective decisions to advance ideas and innovation. Case studies 3 and 4 also suggested that by collaborating in these cluster initiatives, individuals in the different organisations could learn about each other’s knowledge and research, which in turn could alter the value they placed in each other’s work – building up cognitive social capital over time.

The cluster initiative reviewed in case study 5 showed elements of both structural and cognitive social capital. The social capital bonds built up in the ISA structure, over an extensive period of years, increased participation rates in the L4G initiative and helped secure the belief (cognitive social capital) that enabled the initiative to take place. The structural social capital within the ISA was shown to facilitate

decision making and collective action. Structural social capital was shown to be important in the design stage of the initiative, while the lack of a formal oversight structure during the implementation stage of the initiative was a weakness in addressing the challenges posed by the coaching element of the programme. In case study 6 the importance of structure to the FHI initiative was also apparent, with an organisation board, independent scientific advisory board, an independent CEO and various committees and working groups. The industry-led nature and the governance structure of the FHI cluster initiative make it unique as a food research centre from a European perspective. Again in the design stage of the initiative the structural and cognitive social capital built up in the OFC, the IDIA, over a number of years was supportive in getting the initiative off the ground. The National Functional Foods Forum, established in 2004, can be considered an example of structural social capital driving the initiative forward. This involved both the state agency and the industry OFC, with norms of reciprocity inherent in the social capital engagement. The shared value (cognitive social capital) of the cluster initiative facilitated joint action to drive the initiative forward. A second state agency, which did not share the same belief in the initiative as the IDIA and Enterprise Ireland, effectively opted out of the cluster initiative. Case study 6 also indicated that norms of behaviour (cognitive social capital) on the university side had to be challenged in order to admit new players into the initiative.

### **Trust and social capital within clusters and cluster initiatives**

Trust proved to be a complex but important element of the social capital engagement in the cluster initiatives examined in the thesis. Vandenburg (2002) provided an analytical lens that links the institutional economics literature, on moral norms and ethical codes, developed by North (1990) with the literature on social capital, in which trust is viewed as playing a role in economic and social relations.

Woolcock (2001) argued that trust is better understood not as social capital *per se*, but as a measure of it. In case study 1 the deeper collaboration facilitated by the OFCs, ICT Ireland and ISA, helped to build relationships of trust within the sector. Therefore, in this example of strengthening social capital bonds in a business context, trust was an outcome rather than a precursor of collaboration.



In developing his theory of systems of innovation, Lundvall (1998, p410) observed that ‘trust is a multidimensional and complex concept’. In case study 3, the structure of the cluster initiative enabled people to get to know and understand each other better. This suggested that, through achieving shared norms and attitudes, trust could be built up over time and be an outcome, rather than a precursor, of social capital. In case study 4, a lack of trust between industry actors, in regard to access to the intellectual property (IP) arising from collaboration, was dealt with through a formal agreement. In this sense, the formal structures within the cluster initiative helped to solve this problem and ensure that a lack of trust was not a barrier to the generation of social capital. However, this case study did highlight the challenges faced in sharing IP in such cluster initiatives.

Trust in case study 5, the L4G initiative, was shown to be a complex issue, which cannot be assumed, even in situations where organisations have a history of collaboration. On the one hand, trust was a precursor to the involvement of industry CEOs, leveraging off the social capital bonds within the ISA. On the other hand, trust was an outcome of the collaboration between particular individuals, in the OFC and the state agency, who had not worked together previously. This supports Nooteboom’s (2007, p33) contention that ‘trust as a feature of social capital cannot be bought and installed’.

Case study 6 revealed the tenacity of the various actors to stay the course, solving the problems and overcoming the various obstacles as they arose. Once again, the FHI initiative illustrated that trust is a multidimensional and complex issue (Lundvall 1998) that cannot be bought and installed (Nooteboom 2007). The trust that industry participants placed in a state agency executive provided an example of trust as precursor to social capital engagement. The significant levels of trust between the state agency and the OFC, the IDIA, helped establish the National Functional Food Forum, which in turn helped to get the FHI initiative off the ground. The experience of researchers in different universities working together, and with the industry partners, in FHI may increase levels of trust between the various actors over time, ensuring that trust is also an outcome of the cluster initiative.

## Concluding comments

This thesis provided an analytical framework for examining collaboration within clusters and cluster initiatives. The OFC concept is theoretically consistent with institutional economics and the systems of innovation approach, which underpin this framework. It is suggested as an alternative to Porter and Emmons' (2003, 2006) IFC concept for examining the role of industry associations, and similar organisations, in clusters and cluster initiatives.

This thesis contributed to cluster research in Ireland, by using the cluster initiative model put forward by Sölvell et al (2003) to examine the process of collaboration between firms, state agencies and universities in two sectors of the economy. The two clusters examined, the ICT/ software cluster and the cheese and ingredients cluster of the dairy industry, provide an interesting contrast between a modern and a traditional sector of the Irish economy. The thesis and its case studies indicate that the process of collaboration, among firms and between firms and different economic actors, works in broadly similar ways.

The use of the Sölvell et al (2003) cluster initiative model, supplemented by the use of the OFC and social capital concepts as analytical tools can be recommended for examining collaboration in other areas of the economy. Other sectors of the modern economy, such as medical devices and biotechnology, and the traditional economy, such as the plastics industry, would provide rich areas for further research. The role of industry associations in each of these sectors would be interesting to consider with the OFC concept as a theoretically grounded tool to examine that role. The social capital concept, supported by the dual distinction between 'bonding and bridging' and 'structural and cognitive' forms, provide useful analytical tools to explore how the process of collaboration works. Further research on CSETs within the ICT and software sector would also be interesting. The focus on cluster initiatives, as a way of sustaining and embedding industrial clusters, and the recognition that traditional sectors, as well as modern sectors, have an important role to play in this regard would improve Irish policy implementation.

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