The internationalisation process of SMEs in the Irish Life Sciences sector

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Abstract

Extant literature has focussed on describing and explaining the internationalisation of firms, including SMEs, in terms of universal theories of internationalisation. In contrast, in the context of SMEs, there is an argument that internationalisation processes are unique and therefore no 'one theory fits all' SMEs. Informed by prior research on the factors that influence internationalisation in SMEs, and responding to calls for more in-depth explanations of the internationalisation process and for explanations that adopt a multilevel perspective (environment, firm and entrepreneur) this study explores the internationalisation process of SMEs.

The context for the study is the internationalisation of SMEs in the Irish Life Sciences sector. To understand the context that shapes the internationalisation processes of specific SMEs, the empirical research starts with a case study of the Irish Life Sciences Sector. This involves the identification of the population of firms in the Irish Life Sciences Sector (the creation of a database of Irish owned firms and a separate database of MNEs), and interviews with twelve industry experts. To understand the internationalisation processes of SMEs, the research focussed on five SMEs. These case studies are based on twenty-three interviews in total, involving the owners/entrepreneurs, senior managers, and development consultants from Enterprise Ireland. The thirty-five interviews occurred during the period January 2010 to March 2011.

Analysis of the case studies and the industry level data suggests a conceptual framework that explains the internationalisation of SMEs in the Life Sciences industry in Ireland. Central to the framework is the application of a multilevel view, incorporating the firms' environment, the firm, and the entrepreneur. The research presents an analysis of how three themes: on-going networking, trust building and learning, help to explain the internationalisation process of firms in the sector. Factors such as the entrepreneur, the firm's team interactions and characteristics, and the firm's environment help to drive the internationalisation process.

This research makes a number of contributions. First, the research suggests a multilevel conceptual framework that describes the internationalisation process in the context of SMEs in the Irish Life Sciences sector. Second, the research suggests that a multilevel

perspective of the internationalisation process offers a more complete explanation of the internationalisation process. Third, the research extends existing studies of the internationalisation of SMEs to a new context, the Irish Life Sciences sector.

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Chapter I Introduction

SMEs in various industries world-wide are faced with intensified competition from domestic and foreign players. This competition is even stronger in industries such as the life sciences that are very international by nature. Companies operating in this industry compete in very narrow "niches", and therefore growth for such companies necessitates expansion to international markets. However, the smaller size of many entrepreneurial companies and their lack of internationalisation "know-how" and infrastructure may create challenges in becoming successful internationally. This combined with the importance of SMEs to a nation's economic growth, has led to the issue of internationalisation receiving increased attention from researchers and managers alike.

Companies are increasingly internationalising. The understanding of the internationalisation process of SMEs is more complete if a multilevel view on the process is applied. This research looked at levels such as the firm's environment, the entrepreneur and the company to understand the process. The observed internationalisation processes were based on sub-processes of networking, learning, and trust building. The factors that influence the internationalisation process and the sub-processes within it are: the entrepreneur's characteristics, the firm's environment and the teams' interactions and characteristics. Companies in the Irish Life Sciences industry represent specific characteristics and are embedded in particular business environments, which do not appear in other contexts. The existing theoretical and empirical base explanations of internationalisation lack an entrepreneurial focus and typically emphasise either networking activities or look at the role of entrepreneur or teams, without looking at the process from a multilevel perspective. The multilevel perspective presented in this research looks not only at a company, but also at the industry context and individuals, who shape the process, in order to better understand the internationalisation process.

Given the role of such companies in today's economies, for both researchers and entrepreneurs/managers, a clear understanding of how these firms internationalise their operations is necessary.

This chapter provides an introduction to the research, including the research background, research objectives and questions, an overview of the methodology, and outlines the structure of the thesis.

1.1 Research background

Increasing change in world trade results in changes taking place in national economies as well as in both large companies and small and medium enterprises (SMEs), creating new opportunities and threats as well as challenges for academia to capture the changes (Acs & Yeung; 1999; Calvin, 1995; Economist, 1993; Johanson & Vahlne; 2003; Johnson, 2004; Katz, Safranski, & Khan, 2003; Kirby & Kaiser, 2005; McDougall, Oviatt, & Shrader, 2003; OECD, 1997; Spence, 2003; Wright & Dana, 2003). The OECD (1997) reported that perhaps 1-2% of emerging businesses are now international at inception and that the speed with which businesses internationalize is accelerating. Researchers argue that this change follows a rapid phase of globalisation (e.g. Acs et al., 1999; Calvin, 1995; Economist, 1993; Johanson & Vahlne, 2003; Johnson, 2004; Katz et al., 2003; McDougall et al., 2003; Reynolds, 1997; Spence, 2003; Wright & Dana, 2003).

1.1.1 Economic globalisation.

Globalisation has been the major trend of the 1990s, and firms that felt secure within national boundaries are now facing both increasing international competition and market opportunities. This global trend can be seen as developing slowly in economic history. For example, in the early 19th century only one per cent of all manufactured goods were traded internationally. By the mid-1990s world trade was growing in excess of 8 per cent per annum, compared with 3.7 per cent annual growth in economic output (Acs and Yeung, 1999).

Despite the slow changes in the global economy overall, the main global change that happened in the last 20-30 years transformed the global economy into a more complex set of relationships. Globalisation, according to Acs and Yeung (1999), refers to the web of linkages and interconnection between states, societies, and organisations. It creates new structures and new relationships, with the result that business decisions and actions in one part of the world have significant consequences in other places. Reynolds (1997) argues that economic globalisation (i.e. the changes that are expanding economic

markets) may be considered as two types: (1) technical advances in communication and transportation and (2) harmonisation of the regulatory and institutional context in which economic activity takes place. The first reduces cost and the second reduces the risk associated with market transactions.

The harmonisation of regulatory and institutional context can be seen for example in the rise of regional economic markets such as the EU, NAFTA, APEC (Asian Pacific Economic Community), MERCOSUR (Argentina, Brazil, Paraguay, and Uruguay). These structures facilitate economic activity that can achieve advantages by covering a larger geographic and cultural domain. A bigger area creates benefits of disaggregation, or downsizing as the technical costs and institutional harmonisation reduce the risk of engaging in contractual and non-contractual arrangements. The new regional and global markets promote internationalization as a way of survival and growth at a national, as well as a company level. It should be noted that economists suggest that economic globalisation has left out two huge regions of the globe, namely, Africa and Latin America, which are very slowly catching up the rest of the world (Belli, 1991). The emergence of the globalisation "New Economic World Order" has three visible centres: North America, the EU and East Asia.

Apart from the clear formation of regional markets, there has also been the emergence of new markets such as China, India, Brazil, Indonesia, México and the ex-Soviet Bloc countries. These regions have suddenly added 2.5 billion people into the global marketplace. This "economic worldwide revolution" (Chandra Jain, 2006; Schwab & Smadja, 1994) has brought about a worldwide delocalization of industrial production. Countries that previously were confined to low-tech, labour-intensive economic activity are now able to produce, at low cost, goods and services that were previously monopolies of the advanced industrialized nations. One especially notable example is Malaysia, which has shed its dependence on commodities to become the world's leading producer of semiconductors, and which now discourages labour-intensive industry (Schwab & Smadja, 1994).

As a result of economic globalisation (seen in the emergence of new markets as well as the strengthening of huge regional markets), companies and countries must now compete not only against rivals in their own league, but also against a continual stream of newcomers, while at the same time playing catch-up with competitors claiming to

have made the latest breakthroughs. The multilateral trade system maintains, expands, and integrates new actors while also preserving the standard of living of the industrialized countries (Schwab & Smadja, 1994). Considering that world trade is not equally accessible to all parts of the world, this research will discuss the internationalization process of SMEs, occurring in a region of the globe where companies can fully benefit from international opportunities as well as face the challenges.

When considering the "world economic revolution", academics and practitioners equally embrace the change of the markets and relationships between them. They stress that firms not only have to face the above mentioned increased international competition, but also have to become more international in outlook and committed to global markets (Kirby & Kaiser, 2005). The traditional view of firms' economic activity - the classical economy since Adam Smith (1776)- argued that collaboration among firms is a symptom of failure. This view becomes partly redundant in the new, globalized market place where competition and cooperation can coexist. Academics believe that the world moved to embrace a new trajectory of market capitalism, called "alliance capitalism" (Dunning, 1995; Gerlach, 1992), relational or the new capitalism (Lazonick, 1991; Ruigrok & Van Tulder, 1995). A critical feature of this new capitalism, which is essentially an outcome of globalisation of many kinds of value-added activity, is that it portrays the organisation of production and transportations as involving both cooperation and competition between market players. Similarly Wright and Dana (2003) argue that globalisation transformed the world economy into a multi-polar network, which includes both large and small companies that both cooperate and compete in the international market place.

Globalisation of economies has also rewritten the role of the nation-state, which on the one hand loses its power to constrain the free flow of international economic activity, but also forces governments to become more active in the international market place (Wright & Dana, 2003). Individual economies have been challenged to participate in the international flow of goods and services, both inward and outward. This change stimulates competition and forces governments to adopt market-oriented policies, domestically and internationally (Acs & Yeung, 1999). As such, the internationalization of economic activities has become a key component of national economies.

Economic globalisation can be viewed as an international transformation, which has rewritten traditional roles of large and small companies, as well as the role of national economies. The domain of international economic activities is no more exclusively reserved for large companies, because SMEs also progressively undertake international steps. The new international role of SMEs, as well as the increased importance of their growth to economies, has also triggered a need in academia to create a research area of International Entrepreneurship to understand and define these changes. The challenge of capturing the manner, in which small and large companies relate to each other, as well as the role internationalization plays for them, is addressed both in the International Entrepreneurship (IE) and International Business (IB) literature, which will be discussed below.

The concept of economic globalisation discussed in this section sets the scene for understanding the internationalisation of SMEs. It is important to understand the macro processes, which are affecting not only the behaviour of MNE (Multinational Enterprises), but also SMEs. Global competition has become relevant not only on an international arena, but also in a local setting where companies have to compete against freely accessible globally available products.

The subsequent sections of this chapter will discuss the importance of international activities to national economies, and to large and small companies, as well as issues emerging from the changes brought about by the new area of IE (International Entrepreneurship).

1.1.2 The importance of internationalization to economies

National economies are naturally interested in internationalizing their economic activities. However, the role that internationalization plays in economies, as well as the role nation states play in the process of internationalization of companies, is constantly evolving. It is possible to differentiate stages in the process of this evolution as (a) the classical view of the importance of internationalization to economies and (b) the modern view of the importance of internationalization to economies.

The classical view can be seen through the lens of international trade theories. In the field of early international trade theories, Smith (1776) and Ricardo (1817) discussed how different nations had factor-based advantages that determined international trade.

Subsequent economic studies suggested that most trade took place between countries with a similar degree of industrialisation (Leontief, 1953) and not between nations with different factor advantages. Some theories explained international trade using the availability of production factors, which might be scarce (Hecksher & Ohlin, 1933), and some considered access to superior technology (e.g. the product life cycle theory) (Vernon, 1966; Wells, 1968).

The main criticism of the international trade theories arising from the literature is that a focus on international trade does not provide sufficient information to understand firm development (Porter, 1990). This critique of international trade theories has resulted in the creation of theories focusing on the firm, such as FDI, stage, innovation-diffusion, or network theories.[1] These theories focus on particular internationalization decisions and activities. This literature synthesis indicates that international trade theories have focussed on the environment in which companies operate and therefore the criticism that the firm role and importance has been overlooked is justified.

The aforementioned criticisms of international trade theories were followed by an increased research focus on internationalizing firms. The increased interest in the firm as the primary agent of internationalization results partly from the increased emancipation of companies from their respective nation-states.

The traditional models of business involvement, in which business activity is organised largely around the segmentation of factor and product markets into distinct nation-states, is giving way to a new paradigm in which the firm – regardless of where the parent company happens to be based – will obtain various elements of value added (which means either increase the product's price or value) from wherever in the world they may be most efficiently obtained, combine or assemble them in whatever location may be the most cost-effective, and then distribute them to wherever appropriate demand conditions exist, almost without regard to national boundaries (Dunning, 2006; Wright & Dana, 2003).

This increased divergence between corporate and national interests poses the biggest challenge to International Business scholars at the turn of the 21st century (Mudambi, Cantwell, & Narula, 2004). The internationalization of economic activities brought not

[1] The FDI-, stage-, innovation-diffusion, and network theory are discussed in Chapter 2

only the demise of the nation-state as the primary macroeconomic player, but also a need to rewrite the role of national governments in relation to economic activities. For example Porter (1990) agrees that internationalization becomes not only important but also necessary for some nations. Therefore it is vital to understand the macroeconomic aspects of internationalization. He suggests that nations, where companies face fierce competition at home will have to support internationalization. Porter (1986, 1990) also stresses that some nations are more successful in internationalization and exporting than others, although firms, not nations, compete in international markets meaning it is more useful to analyse a particular industry. Porter (1990) has suggested a combination of factors - depicted in his "diamond"- which influence how internationally competitive a particular industry in a nation might become. In order to support the competitiveness of a particular industry, governments therefore adopt market-oriented policies, both domestically and internationally.

There are undoubtedly significant discrepancies between nations in terms of their international involvement. Some economies have strong international presence, and the degree to which internationalization is important to nations influences the way they develop an internationalization-friendly environment (Caves, 1982; Makhija & Stwwart, 2002; Sweeney, 1990). It becomes very important for companies, in which economies they operate as research has shown that the firm's environment influences the way they internationalize (Andersson, 2004; Czinkota & Tesar, 1984; Domanski, 2003; Strandskov, 1986). Therefore, according to Wright and Dana (2003), public-policy leaders have to decide on the optimal degree of government policy and regulation, as well as the appropriate level at which to locate those powers, in order to provide the most suitable environment conducive to internationalization without excessive regulation, which may hinder growth. They state:

> "This new environment also calls for increased cooperation among the different levels of government, if they are to create an environment that will foster entrepreneurship – an environment in which entrepreneurs will easily identify networks and participate in them." (Wright and Dana, 2003, p.149)

National environments differ, however, in their fundamental structures, which are difficult to modify via public policy strategies. Robinson (1960) suggests, for instance,

that bigger nations offer a market size[2], which allows a company to operate on a bigger scale in a domestic market. He additionally suggests complementary factors in nations such as legal handling of the problem of monopoly, and income and expenditure per capita; which co-determine how important internationalization might be to particular economies.

A comparable view on the importance of internationalization (Luostarinen, 1977) stresses that companies have to internationalize due to pressure caused by the smallness and openness of domestic markets. Madsen and Servais (1997) suggest that firms in nations with small domestic markets have a higher propensity to become "born global" than firms in nations with large domestic markets. Not dissimilar is the argument presented by Wade (2004), who states that the evidence from the long wave of globalisation confirms neoliberal economic theory, whereby more open economies are more prosperous, and economies that liberalize experience a faster rate of progress.

The internationalization of economic activities, which increasingly develops in the global economy, undoubtedly plays an important role in national economies as well. In economies more dependent on participation in the international market, governments may create policies supporting internationalization of business. Therefore firms are subsequently dependent on the economic policy of a country, but at the same time their international activities may pose a dilemma for competition policy insofar as national policy seeks to maximize national welfare, not that of the trading world as a whole (Caves, 1982). As a result of this underlying dilemma the role of internationalization to economies as whole and single companies might differ.

The evaluation of this trade-off between benefits and losses, flowing from the internationalization of business in particular countries, belongs to the policy makers, and remains beyond the scope of this research. The policies of governments are of interest to this research from the point of view that they contribute to a creation of a business environment that also affects the internationalization of businesses.

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[2] The size of an economic market is measured by utilising various factors such as, geographic, demographic or economic size of a nation, as well as the size of gross national product and income per capita. Robinson differentiates nations into small (10-15 mil. population), medium-sized (15-50 mil.) and big nations (over 50 mil.). Robinson, E. A. G. 1960. ***Economic Consequences of the Size of Nations.*** London.

1.1.3 The importance of issues related to internationalization in large companies

The literature suggests that internationalization plays an increasingly important role to national economies in the face of economic globalisation. The increasingly important issues of internationalization, however, can be viewed from a slightly different angle in the context of a single company. The importance of internationalization to large companies has been traditionally recognised in research on international business (Athanassiou & D.Nigh, 1999; Bailey & De Propris, 2002; Bellandi, 2001; Carlson, 1966; Dunning, 1980, 1988; Forsgren & Johanson, 1992a; Garofoli, 2002; Gelsing, 1992; Geringer, P.W., & daCosta, 1989; Ghemawat, 2003; Hallen, 1992; Hecksher & Ohlin, 1933; Mariotti & Piscitello, 2001; Porter, 1980, 1981, 1985; Riddle & Gillespie, 2003; Robinson, 1960; Rugman, 1987, 1990; Stapford & Dunning, 1983; Williamson, 1975b). This literature discusses various issues related to internationalization in large companies. In fact, the majority of existing theories of internationalization has been tested on large companies, which have created a considerable "pool" of theories dealing with the issue, but even this profuse research has been challenged to adapt and change according to recent trends in world trade (Dunning, 2006; Dunning, Fujita, & Yakova, 2007; UNCTAD, 2006).

Amongst the wide group of issues related to internationalization are large companies. It seems to be relevant from the point of view of this research to mention how the presence of these companies in the international arena influences the business environment, particularly the SMEs and the national economies, as well as how the global changes in the markets have affected large business.

For example Dunning et al. (2007) argues that globalisation is impacting strongly on location of MNEs, meaning more FDI by companies in their home regions, or increased FDI towards India and China affecting the conditions under which firms can choose to better exploit their ownership advantages and location strategies.

The international business literature argues that in the era of globalisation the role of multinational enterprises (MNEs) increased, particularly large multinationals (Geringer et al., 1989). There are, however, academics (Harrison, 1994) who are convinced that the strategic influence of large firms is diminishing. The majority of academia (Anand, 2000; D'Cruz & Rugman, 1991, 1992, 1993; Das, 1998; Dunning, 1995; Economist,

1993; Gulati, 1998; Keeble & Wilkinson, 2000; Koka, 2002; Stuart, 2000), nevertheless, argues that large companies merely restructure their operations replacing hierarchical with alliance relationships, and that an increasing number of small firms are, in fact, part of keiretsu-like networks typically dominated by large lead or flagship firms, or as Lorenzoni and Baden-Fuller (1995) put it, "strategic centres" (D'Cruz & Rugman, 1992, 1993; Dunning, 1995).

The restructuring helps large companies to adapt to new opportunities and threats (Acs & Yeung, 1999; Athanassiou & D.Nigh, 1999; Birkinshaw, 1997; Boddewyn, 1988; Geringer et al., 1989; Reynolds, 1997). The rapid pace of globalisation has transformed the traditional role of a large company, with a single-activity, autonomous company now rather an exception. Most contemporary firms are multi-activity and are often part of a web of inter-firm cooperative alliances and joint ventures that increasingly replace vertically integrated structures of companies (Anand, 2000; Das, 1998; Economist, 1993; Gulati, 1998; Keeble & Wilkinson, 2000; Koka, 2002; Stuart, 2000). This has shifted the emphasis from the traditional neo-classical view of the firm, focusing on its role as a production unit to a transacting and coordinating unit (Reynolds, 1997). An international large company has to diversify its operations progressively more, but at the same time runs a risk of exceeding a critical "Internationalization threshold", thus eroding profit margins (Geringer et al., 1989).

These changes in organizational structures has resulted in the creation of "federations" of autonomous businesses units within large companies, which fosters the inter-firm cooperation (Keeble & Wilkinson, 2000; Stuart, 2000). MNEs are beginning in many ways to look more like the free-standing companies of the 19th century, companies that leveraged knowledge, financial resources and personal networks across vast geographical distances, (Casson, 1994).

The new role played by large companies has also rewritten the role of an SME in relation to large counterpart, increasingly strengthening the cooperation and partnership between them (Markusen 1996; Dana 2001; Porter 1996; Buckley 1997; Rugman and D'Cruz 1997; Keeble and Wilkinson 2000), but also increasing the competition between them (Heum & Ylaanttila, 1994; Narula, 2004).

An SME becomes not only a strategic partner for a large company, but also a model to follow (Pearson, 1989). Calvin (1995) states that large companies increasingly recognise

the need to think small, creating smaller units with higher flexibility and independence, in order to take advantage of these attributes. It seems to be a particularly effective strategy in R&D teams (Narula, 2004). Another example of large companies "thinking small" also involves the tendency to increasingly encourage corporate entrepreneurship (Birkinshaw, 1997). This new, increased flexibility of large companies is therefore diminishing one of the main advantages that SMEs have traditionally held when competing against larger firms (Narula, 2004).

On the other hand large companies cannot emulate SME strategies and vice versa. There are differences regarding how large and small companies develop their strategies (Acs & Yeung, 1999; Berra, Piatti, & Vitali, 1995; Etemad, 2004a). Acs (1999), for example, argues that small companies tend to develop their international operations through cooperative strategies, whereas in large companies the non-cooperative strategies slightly prevail. Despite differences large and small companies evidently need each other in the era of global economic changes (Buckley, 1997; Dana, 2001; Heum & Ylaanttila, 1994; Keeble & Wilkinson, 2000; Markusen, 1996; Porter, 1996; Rugman & D'Cruz, 1997).

In the era of the globalisation of economies, large companies still stimulate the dynamism of a business environment (Heum & Ylaanttila, 1994; Keeble & Wilkinson, 2000; Markusen, 1996; Porter, 1996), and have a great impact on economic growth - probably greater than their share in the economy. They put more emphasis on research and development, on innovations and contribute to technological diffusion. Thus, they can have remarkable positive externalities, usually for SMEs. They provide, for example, new niche opportunities for smaller companies (Buckley, 1997; Rugman & D'Cruz, 1997). However, they can also have some negative impacts as well, by having a too dominating position in the market, which prevents SMEs from thriving (Heum & Ylaanttila, 1994). They are also exposed to risks themselves, such as a loss of confidentiality and freedom. For instance a firm which hands its production schedule over to a supplier may see that supplier run off with a rival, not to mention that it is very difficult to manage a partnership between managing firms with different cultures and strategies.

It can be seen from the arguments presented above that not only does internationalization play an important role for large companies, but also those firms

greatly influence the business "ecosystem" to facilitate the internationalization process of business in this environment.

1.1.4 The importance of internationalization to SMEs

The previous section has shown that competition in international markets was traditionally the "territory" reserved for large companies, while SMEs competed in domestic markets. However, changes in the world economy have also affected the competitive position of SMEs in international and domestic markets, impacting dramatically on the opportunities and challenges facing them (Acs & Yeung, 1999; Audretsch, Carree, van Stel, & Thurik, 2002; Baird, Lyles, & Orris, 1994; Beamish, 1999; Beamish & Lee, 2003; Boter & Holmquist, 1997; Calvin, 1995; Dana, Etemad, & Wright, 1999a, b; Dana, 2001; Economist, 1993; Etemad, 2004a, b, Etemad & Lee, 2003; Etemad & Wright, 2003; Gankema, Snuif, & Zwart, 2000; Henley, 2005; Johanson & Vahlne, 2003; Johnson, 2004; Katz et al., 2003; Manolova, 2000; Martinez, 2005; McDougall et al., 2003; Reynolds, 1997; Spence, 2003; Welch & Welch, 2004; Wolff & Pett, 2000; Wright & Dana, 2003).

Historically the importance of SMEs increased. The traditional logic held that a firm had to be big in order to compete globally, and consequently international business and entrepreneurship were largely separate fields, both academically and practically. With the exception of exporting, international business literature focused on the behaviour of large multinational companies, while the entrepreneurship literature dealt mainly with the evolution of new companies and the management of small businesses in the domestic context. However, as Dana et al (1999b) point out this demarcation is no longer sustainable.

The lack of demarcation between entrepreneurship and international business does not mean that it is possible to use international business literature in the context of SMEs. Clearly, small firms differ fundamentally from larger firms in ownership, resources, organizational structures and processes, as well as management systems (Smith, 1988). Given this, it is clear that there needs to be more research in diverse international options which can be represented by an SME (Geringer et al., 1989). For example, Qian and Li (2003) point out that in high-technology industries, SMEs can be even more successful in certain strategic options than larger businesses, and excel in strategically

focused areas such as: manufacturing components; specialization in manufacturing processes; component adaptation; production in emerging markets and acquisition investments. This is because of intrinsic advantages including flexibility, nimbleness, innovativeness and even size. The economic globalization created new links between companies along the value chain as well as among countries, and this evolution of the international business environment has also redefined the role internationalization plays for all the economic agents involved. SMEs became very much an active international player, and the role of its internationalization is currently universally appreciated. SMEs represent about 61% of total turnover and 73% of total employment (OECD, 1997).

In the 1990s, statistics showed that compared to large companies in the EU, SMEs have increased their share in employment, adding value and sales up to 1990, which has brought subsequent growth in GNP (Gross National Product) (ENSR, 1993, 1994, 1995). A similar process for small business has occurred in the United States and Canada. The growth of small business and consequent contribution to wealth creation has partly developed as a result of increased internationalization. For example, the OECD report (1995) determines that the role of SMEs in international trade is increasing[3]. A preliminary analysis comparing 33-34 manufacturing sectors in each OECD member country suggested, that in all of them the presence of smaller firms is associated with the economic sector growth; even if the overall sector, such as manufacturing, may be in decline (Schreyer & Chavoix-Mannato, 1995). Similar results come from a Swedish study (Davidsson, Lindmark, & Olafsson, 1995), in which an analysis of the effects of business dynamics on regional economic well-being has indicated that: (1) greater turbulence (firm births, deaths, contractions, and expansions) tends to lead to enhanced economic well-being; (2) there were low correlations among measures of business dynamics, regions tended to be unique in this regard, (3) higher levels of change seemed to have a positive impact even when absolute levels of growth were modest; (4) firms births and deaths tended to have a more positive impact on economic growth than measures of expansions and contractions; and (5) the single most important factor affecting economic growth was simple birth rates. The overall conclusion was, however, that neither a high dependence on small firms nor on large

[3] About 10% of all SMEs mostly in manufacturing were involved in FDI. Within OECD Member countries 26% of direct exports were provided by SMEs; this figure was 35% among Asian countries. The report expected that 80% of all SMEs will be involved in international trade by 2005.

firms solely appears to be optional. The regions which have experienced the most favourable development of economic well-being were those that had a good mix of industries and business sizes, and whose business sector was characterised by a relatively rapid pace of change. Reynolds (1997) also concluded that SMEs have a major role in economic growth, which does not undermine the role of large companies as sources of economic growth, but recognises that they increasingly became an independent source of economic growth.

As a result of this increased awareness of governments, new public policies and programmes to support the successful growth of small and medium enterprises both domestically and internationally have emerged, such as setting up public venture-capital programmes, certifying programs to capture technological spill-overs, creating a banking structure promoting lending to SMEs (Hart, 2003). Certain policies are also industry specific, for example: public research funding, intellectual property law regulation, and ethical controversies influence biotechnology entrepreneurship (Toole, 2003). Examples can also be observed in EU policies, which stress the need to develop entrepreneurship in Europe, suggesting that member countries should expand the tendency to internationalize by taking advantage of the advice offered through local and regional networks, as well as design policies which foster a more entrepreneurial mind-set among young people, reduce the stigma of failure, provide support for women and ethnic minorities, reduce the complexity of complying with tax laws, make it easier to transfer a business to new owners (EU, 2003), and take action in other key areas, internationalization amongst them, to support and encourage SMEs (EU, 2000).

An example provided by von Bargen et al. (2003) demonstrates the importance of public policies to entrepreneurship stimulation in "The rise of the entrepreneurial society". They argue that the success of entrepreneurship in the US is mainly due to effective public policies that support and nurture an entrepreneurship-friendly system. Similar findings are presented by Miller (2004), which suggest that certain features determine the success of entrepreneurial clusters. These include: a favourable regulatory regime; advanced research universities and research institutes that are well connected to industry; a flexible and mobile work force; mechanisms for maintaining global linkages; and formal associations and informal mechanisms that foster collective learning for the whole cluster. Some public policies even create such clusters for SMEs (Tambunan, 2005).

The current statistics still confirm that SMEs continue to form the backbone of the EU economy (EU, 2012). In 2012, SMEs still account for 60 to 70% of the jobs in most OECD countries (OECD, 2012). In other words, the trends observed in 1990s have continued.

The recognition of the increased importance of SMEs brought the attention of academia, public policy makers and business people to the internationalization of SMEs. This study reflects this need to research and understand better SME internationalization.

1.2 Research objectives

The existing literature offers explanations of the ways firms grow internationally, both in the IB (International Business), and the IE (International Entrepreneurship) literature. There is a significant theory development in FDI (Foreign Direct Investment) that explains the "internationalisation" of a firm's activities (e.g. Dunning, 1988; Williamson, Mariotti & Piscitello, 2001). That is, international expansion behaviour is explained by the argument that firms choose their optimal structure for each stage of production by evaluating the costs of economic transactions. From this, they choose the organisational form and location for which overall transactions costs are minimised. Thus transactions which are perceived to be high risk and requiring significant management time or other resource commitments are more likely to be "internalised", with the firm acquiring or establishing wholly-owned subsidiaries in foreign markets.

An alternative view of internationalisation is proposed by stage theories of international expansion (e.g. Johanson and Vahlne, 1977, Moini, 1995; Bilkey, 1978) including innovation-diffusion theories, which also follow a staged approach (e.g. Harvey, 1979; Reid, 1981; Cavusgil, 1980; Czinkota, 1982). Both schools suggest that internationalisation occurs incrementally, with increasing market knowledge and commitment (stage theories) or with changes of attitudinal and behavioural commitment of key decision makers, i.e. their "adaptation of innovation" (innovation-diffusion school). Collectively these authors argue that the perceptions, beliefs or commitment to foreign markets are influenced and shaped by incremental involvement in foreign markets resulting in a pattern of evolution from little or no interest to gradual initiatives in other markets (from "psychically" close to more distant).

Both FDI and Stage models have been increasingly challenged over years in the literature. For example, FDI have been criticised as too deterministic (Johanson & Mattson, 1988). Stage models have been criticised for the following reasons: not considering that firms sometimes leapfrog stages (Hedlung & Kverneland, 1984), for excluding other strategic options during the process of internationalisation (Melin, 1992), for being also too rigid about how the decision to internationalise is taken (Mason & Mitroff, 1981), dismissing nation-specific factors (Sullivan & Bauerschmidt, 1990); for not considering other stages beyond export adoption (Hedlung & Kverneland, 1984); and for not explaining "born-globals" (Riddle & Gillespie, 2003).

The more recent IE literature considers networks as a tool of internationalisation; suggesting that networks allow the "stretching" of existing modes of entry (Welch, 2004). This, combined with policy and resources, is beneficial to internationalisation of the SMEs environment (Ratten, 2008). In other words internationalisation via networks consists of an on-going process of learning, creating opportunities and trust building in international relationships (Johanson & Vahlne, 1977, 2009). The network approaches, unlike other schools that understand internationalisation as a more rigid process, discuss a flexible way of internationalisation that may be more appropriate to SMEs. However, empirical research in this area, to date, is quite limited.

Related to the general body of research on internationalisation is the area of entrepreneurial/team characteristics. Research suggests that factors such as top management characteristics affect the information-processing capacity and ability to deal with complex international situations, with factors such as education, industry experience and international experience (Finkelstein, Hambrick, & Cannella, 2008) being the key characteristics identified as relevant (Nielsen, 2009). The findings seem to agree with previous research suggesting that individuals with certain dispositions, aptitudes and cognitive styles tend to pursue certain curricula (Hitt & Tylor, 1991).

The existing literature related to both the internationalisation process, to CEOs and team characteristics tends to focus on large firms. In particular, the combination of entrepreneurial/team characteristics and internationalisation process is not examined in the context of entrepreneurial, high-tech, knowledge-intensive companies. Clearly, there is a need for exploratory in the area of SME internationalisation, and this research goes towards filling the gap in this field.

This research therefore attempts to address some of these limitations by studying the internationalisation process in indigenous, Irish Life Science SMEs. These firms are characterised by both technology- and knowledge-intensity, and serve international markets through a variety of international business relationships.

The general purpose of the research is to explore the area of SME internationalisation, and to develop an empirically-based framework of the internationalisation process of high-tech, knowledge intensive SMEs. The overall objective of this study is:

> Research Objective 1: To explain the internationalisation process in SMEs in the Irish Life Sciences sector.

Prior literature suggests that adopting a multilevel approach to explaining the internationalisation process of SMEs provides a more complete explanation of the internationalisation process. Therefore, the second research objective:

> Research Objective 2: To apply a multilevel approach, incorporating the entrepreneur, the firm, and the firm's environment, to the study of SME internationalisation.

This study, building on themes identified in prior literature, explores the specific role of a range of factors in the internationalisation process:

> Research Objective 3: To identify factors influencing the internationalisation process in SMEs and explore how these factors affects the processes.

Much of the literature on SME internationalisation takes a somewhat narrow view, focusing on either a company, or the entrepreneur, or the industry or networks in general. As a result a perspective encompassing micro and macro aspects of internationalisation is lacking. Therefore, as indicated in the above research objectives, this study will examine SME internationalisation from a multilevel point of view.

The use of exploratory methodology allowed the researcher to be receptive to new ideas and thoughts that arose during the research process. The researcher interviewed numerous people who were familiar with the topic of internationalisation of indigenous Irish SMEs. The interviews were open ended and provided the respondents with flexibility to elaborate on important aspects of internationalisation. The researcher sought to negotiate between theory, literature and empirical data to identify factors and

understand how they relate. The exploration of the phenomena in this way deepened the researcher's understanding of the various problems. This helped not only to identify the problems but also relevant operative factors. It facilitated the task of mapping the terrain of the internationalisation process affecting SMEs in the Irish Life Sciences sector. The researcher faced difficulty in obtaining access to information to understand the terrain of the internationalisation process. The process of overcoming the challenges during the exploration process included attendance at industry events and networking to access relevant people. The researcher also faced the difficulty at the analysis stage of reducing large amounts of data.

The levels examined during the data collection and analyses are: the entrepreneur, the firm and the firm's environment (mainly industry). Stage one of the data collection, including both primary and secondary research was undertaken to understand the context in which the internationalisation takes place. It is presented in chapter IV as an industry study. An extensive series of interviews with industry experts in the Irish Life Sciences sector allowed for illustration of challenges underpinning SME internationalisation of indigenous companies. Stage two consists of in-depth case studies of Irish SMEs in the Life Sciences sector.

The research suggests that internationalisation is a process of simultaneous networking, learning and trust building that is driven by the firm's environment, entrepreneur characteristics and team interactions and characteristics. The dynamic process of internationalisation seems to be not only unique in each particular case, but is also modified by the influences coming from three levels: the firm's environment, entrepreneur and the teams. In this study the process is altered by the Irish socio-economic background and history.

Overall, the research is primarily exploratory in nature. This research focuses on explaining internationalisation of SMEs in Irish Life Sciences sector.

1.3 The summary and structure of the thesis

This introductory chapter prepares the socio-economic canvas for the study of SME internationalisation. The intensified competition among SMEs internationally challenges the existing models and raises the question what is the know-how when it comes to internationalisation of such companies. Given that there is very little literature on SME

internationalisation in Ireland, in particular in the Life Sciences sector, this study adopts an exploratory approach. In order to give an holistic answer, a multilevel approach is followed in this study (firm's environment, company and the entrepreneur). The research study is presented in seven chapters, outlined as follows:

Chapter I Introduction: a background of the research, the problem orientation, research objectives.

Chapter II The Conceptual Framework of the Research: a critical review of the relevant literature, highlighting major research issues in the area and research gaps, suggesting potentially literture.

Chapter III Methodology: a presentation and discussion of the research objectives, method and procedures used in this research.

Chapter IV Case Data - a presentation and analysis of Stage 1 (industry study) and 2 research findings (firm cases).

Chapter V Analysis: Thematic analysis - cross-case thematic analysis of Stage 2 findings.

Chapter VI Discussion: a discussion of the research results.

Chapter VII Conclusions: a discussion of the research conclusions, limitations, practical and research implications

Chapter II The Conceptual Framework of the Research

As has been discussed in the previous chapter, the world economy has evolved in the last few decades, and the resultant changes have impacted on the position of companies and governments towards international trade. One of the main developments that took place was an increase in the importance of internationalisation to economies, along with a growth in the significance of SMEs in the internationalisation process.

Considering that economic and regulatory environments have changed dramatically, the behaviour of companies had to change to in order to adjust to the new international milieu. Those changes pose a challenge to academia to capture them and translate into clear frameworks. In order to explore what is the most suitable framework to explain internationalization behaviour of Irish SMEs in Life Sciences sector, this chapter will review both the existing literature in IB as well IE field.

2.1 The existing frameworks in IB literature

There has been a variety of different approaches to explaining the internationalisation process of companies. The investigation of this phenomenon has been traditionally reserved for economics. Economics as a field began in England in the 18th century. The problem generally discussed was an issue of free international commerce. The debate around this issue has continued since and has evolved in many directions. The traditional theories focused their attention on the internationalisation of production and foreign direct investment (FDI), where the multinational enterprise (MNE) has been mainly investigated. This subsection will assess the evolution of the main theories of MNE internationalisation in order to pave the way for a new study of internationalisation that takes into account SMEs, which coexist in the current international economic environment with both MNE and national states. This section is divided into subsections each of which will present a main theory from existing IB literature.

2.1.1 International trade theories

Among the international trade theories, one can look at classical trade theory, the factor proportion theory, product life cycle theory, market imperfections theory, and international production theory.

Classical trade theory argues that the extent to which a country exports and imports relates to its trading pattern with other countries. That is, countries are able to gain advantage if each devotes resources to the generation of goods and services in which they have an economic advantage (Ricardo, 1817; Smith, 1776). Therefore, the classical trade theory argues that countries produce goods and services for consumption and they export the surplus. As a result they import the goods and services in which they have an economic disadvantage. Economic advantages/disadvantages arise from differences in factors such as resources, labour, capital, technology and/or entrepreneurship. It can be seen that the classical trade theory explains the differences in advantage as resulting from differences in production characteristics and resource availability which is based upon domestic differences in natural and acquired economic advantages.

The factor proportion theory differs from the classical trade theory by seeking to explain the differences in advantage exhibited by trading countries. The theory proposes that countries export products because they possess large amount of production factors, which might be scarce in other countries (Hecksher & Ohlin, 1933). The theory develops further the concept of an advantage considering costs of production factors. Both theories fail, however, to explain fully the pattern of international trade.

The further development of the international trade theories has been accelerated by significant change in international business reality triggered by technological development in the 1960s. The product life cycle theory (Vernon, 1966; Wells, 1968) became at that time useful in explaining the technological gaps between countries, and picturing the patterns of international trade and the development of multinational enterprise. Vernon (1966) used a microeconomic concept to explain a macroeconomic phenomenon: the growth of the USA, and FDI in Western European countries in the post-war period. The main argument used by Vernon was that a high level of income and demand fostered innovation, which gave American companies an advantage to increase exports and then through import-substituting investments in Europe. This

theory explains that the cycle emerges, were the product is produced by a parent company, than is sold through subsidiaries and then anywhere in the world, this process is driven by technological innovation and need for market expansion, at the same time the type of internationalization is also determined by the size and structure of the targeted market. The product cycle model is concerned mainly with the changing location of production as products moved through the various phases of their life cycles, but at the same time stresses the importance of technology as a key factor in creating and developing new products while market size and structure partly determine the extent and type of international trade. From the point of view of a firm the life cycle is partly dependent on the technology as a key factor in creating and developing new product while market size and structure partly determine the extent and type of international trade. The technology increasingly strengthens the importance of a firm as factor in determining how international trade becomes.

Vernon's theory was criticised for its inadequacy to explain FDI by several authors including Yamin (1991) and Cantwell (1995). Yamin (1991) argued that with increasing integration and the change of perspective in the internationalisation of firms, more and more firms are likely to encounter each other in the international arena and therefore the degree of unrivalled technology leadership will no longer be enjoyed by American firms. Cantwell (1995) questioned Vernon's hypothesis (innovators are virtually always generated in a firm's home country and technological leaders are predominantly international investors'. He has demonstrated that innovation is geographically dispersed within MNEs, and stressed that internationalisation of technological development is led by firms with the strongest records in innovation. The criticisms show that the emphasis in theory evolved towards stressing individual differences between companies, their resources and capabilities, but also the dynamic nature of competition in internationalisation.

The continuation of the development of economic thought can be observed by researchers, who partially followed Vernon's footsteps. One of the subsequent studies building on Vernon's theory was developed by Horst (1972), who after finding that firm size was a significant factor in the firm decision to invest abroad, concluded that:

> "The principal deficiency in the line of analysis, I believe, is the absence of dynamic considerations. Nowhere is there a description of how a firm came to

> acquire its current attributes (...). But if we are to unravel the complexity of the decision to internationalize, a systematic study of the dynamic behaviour of firms must be undertaken" (p.264)

It can be seen that Horst called for a more longitudinal view and a process perspective. The main weakness of international trade theories can be seen in their rigid assumptions that factors of production are immobile between countries; perfect information for international trade opportunities exists; and traditional exporting or importing are only mechanisms for transferring goods across national boundaries. The synthesis of the theories shows that international trade theories focus on understanding of the environment in which trade takes place and not on individual players, such as firms or entrepreneurs.

In sum it can be seen that the world economy changed considerably from the time of the classical trade theories, and also those theories did not consider SME as a relevant player, they were tested mainly on large companies.

2.1.2 FDI & the Eclectic Paradigm

The foreign direct investment (FDI) school of thought (Buckley, 1988; Buckley & Casson, 1976, 1985; Dunning, 1980, 1981, 1988; Hymer, 1960; Oviatt & McDougall, 1994; Williamson, 1975b) embrace a variety of schools, such as: market imperfections theory (Hymer, 1960), international production theory (the eclectic paradigm) (Dunning, 1973, 1977, 1980, 1981), internalization theory (Buckley et al., 1976, Buckley 1985, 1988), the theory of monopolistic advantages (Kindleberger, 1969), international portfolio theory (Grubel, 1968), transaction cost economics approach (TCE) (Williamson, 1975b) amongst others. The vast volume of literature documenting issues concerned with FDI has been characterised as inconsistent and diverse (Morgan & Hunt, 1994), which contributes to the decision to analyse just the main schools in FDI literature. In general, the theory of Foreign Direct Investment argues that firms internationalise via international expansion (Dunning, 1981; Williamson, 1975a).

Hymer (1960) presented the first theory of foreign direct investment. A considerable amount of literature existed on foreign investment but no difference was made between portfolio investment and foreign direct investment. Hymer (1960) distinguishes the two using the measure of control, if the investor directly controls the foreign enterprise, his

investment is called direct investment; if he does not control it the investment is called portfolio investment. Hymer explains that market imperfections for products and factors of production cause that firms engage in international activities. He was one of the first to explain the issue of international production. The theory suggests that a firm's main motivation to locate production facilities abroad involves the pursuit of market power (the market power approach) and not the desire for technological advance. According to Hymer (1960) the objective of locating production abroad is to extend networks, to decrease the level of competition and increase the entry barriers to outsiders, to take advantage of the restrictive and anti-competitive nature of MNEs' impact on market structure.

According to Kindleberger (1969), under the theory of monopolistic advantages, a direct investment abroad is costly and risky and therefore the firm decides to engage in it because it gives the investor the control over the investment. Perfect competition must be avoided for direct investment to succeed and this creates conflicts. Market imperfections can be created in different ways: due to marketing skills, via access to capital and other resources such as superior management, using governmental intervention, and through a creation of external/internal economies of scale.

International portfolio investments are discussed under the portfolio theory. The beginning of international portfolio theory can be found in Grubel (1968) and Hymer (1960). Grubel sought (1) to specify the variables in a model which determines how the individual (portfolio) investor distributes his assets internationally, and (2) to show what welfare gains investors could attain through international diversification. Regarding the first Grubel argued that interest rate differences are only one of several reasons for the international flows of equity. Other factors in this model are the growth and stocks of wealth, and the degree of correlation of returns. Regarding the second goal Grubel found that there are possibilities for investors to increase their welfare through international diversification. Hymer took more limited view; arguing that the basis of the portfolio investment is the interest rate. Each investor maximises his profits by investing where returns are the highest, so if there are no barriers to capital movement - capital will move from countries where the interest rate is low to countries where it is high until interest rates are equal. Hymer argues, however, that this perspective is naive, and if one considers additional factors such as risk, uncertainty, and barriers to movement, almost anything can happen, and the extra empirical information needed to

make predictions is very great and almost impossible to acquire.

It can be seen that the market imperfections theory represented by Hymer takes a step forward in understanding internationalisation patterns. It recognised market failures as a source of possible international opportunities. The theory, however, does not conceptualise international activities. Hymer suggests only that the forms of international operations may include mergers, profit sharing agreements or forms of competition, but he does not explain how firms create a particular form of international operations. He also generalises in regard to small companies, that in industries dominated by them "international operations do not occur" (Hymer, 1960), partly as a result of the lack of integration in the world.

A step forward in developing the understanding of FDI was taken by Dunning. He proposed the Eclectic Paradigm (1977), which is basically a synthesis of other theories of international production. Dunning's (1973, 1977, 1980, 1988) contributions provide a framework designed to synthesise internationalization theories within the international business literature to explain the nature and direction of FDI . Dunning (2003) admits that he was "much influenced by the ideas of Peter Buckley and Mark Casson (the internalisation theory). His synthesis embraces also partly the TCE theory.

Dunning suggests that the following factors will influence a firm's choice of entry-mode: Ownership Advantages (O), Location Advantages (L), and Internalization Advantages (I). Location (L) advantages reflect how attractive in terms of market potential and investment risk a specific country is, how similar the culture and market infrastructure is and the availability of lower production costs. A firm can combine the location resource with its own unique assets. O advantages include management know how, patents and trademarks. I advantages means that the MNE uses its own internal markets, its network of headquarters and sister subsidiaries. The eclectic paradigm is part of the internalisation theories, which provide insight into how large companies create internal markets. International SMEs draw on wide range of outside resources and external organisations to facilitate their internationalization (Dana et al, 1999). They also lack in most cases the scale of MNE to create internal markets.

The advantages bear a resemblance to TCA (Williamson, 1975a). It seems that the main theories used by Dunning were the resource based view and the transaction cost theory. It can be seen that Dunning started to recognise the importance of networks, clusters,

"alliance capitalism", which he argues is a necessary change in organising economic activities considering that "economic activity became more complex" (1995, p.463).

SME FDI has been considered by Mariotti and Piscitello (2001). They have emphasised that a particular foreign location can provide an advantage (Mariotti & Piscitello, 2001). Mariotti and Piscitello (2001) argue that FDI by SMEs is more likely, if the companies can build on localized advanced capabilities (qualified capabilities), such as the area 's specific institutional endowment, including all the rules, practices, routines, traditions, as well as the entrepreneurial spirits available in the area; and the natural resources accessible in the area. They stress that the so called generalised capabilities (the area's infrastructure and build environment, as well as the natural resources accessible in the area) is not as relevant for the FDI by SMEs as the presence of qualified capabilities. They subsequently advise that policy measures aimed at maintaining the competitive positions of SMEs in the international arena should be directed towards the strengthening of localised qualified capabilities by encouraging the activities of advanced services such as logistics, consulting, marketing, engineering, quality control, etc).

As it can be seen in the review the international production theory contains concepts that are potentially useful for a theory of internationalization of SMEs, such as the ownership advantages, which especially in the field of entrepreneurship draws attention to the role of owner-manager. An entrepreneurial firm taking international steps can potentially be affected through the regional/national context, i.e. how attractive in terms of market potential and investment risk the specific country is, how similar the culture and market infrastructure are and the availability of lower production costs (Dunning, 1980, 1981, 1988). Particularly SMEs can build on localized advanced capabilities (qualified capabilities), such as the area's specific institutional endowment, including all the rules, practices, routines, traditions, as well as the entrepreneurial spirits available in the area; and the natural resources accessible in the area (Mariotti & Piscitello, 2001).

FDI scholars have also widened the portfolio of entry modes included under this term, such as equity joint investment, wholly owned enterprises, or acquisitions (Wei, Liu, & Liu, 2005), contractual joint ventures (CJVs) and joint stock companies JSCs (Vachani, 2005). The view on FDI has widened as well, with a firm's foreign market entry s to be explained as a process of increasing accumulation of experiential knowledge about business partners, and of committing human, technical, and administrative resources.

Experiential knowledge is important in the detection of opportunities and risks (Brand & Slater, 2003; Chang & Singh, 1999; Kogut, 1988), because market research is often not a feasible option since firms find it difficult to conduct such research effectively in international markets (Denis & Depelteau, 1985).

2.1.3 TCE

The TCE (Transaction Cost Economics) approach is mainly represented by Williamson (Williamson, 1975b, 1979; 1988). TCE focuses on appropriate structure for transactions between two parties (Williamson, 1988). The core dimensions of the transaction consist of the frequency of economic exchange, and the uncertainty surrounding the exchange of resources. The composition of these dimensions is decisive for the way cost efficient governance modes are assigned to the transaction. The decision-maker is supposed to be bounded rational (bounded rationality- hierarchy extends the bounds on rationality by permitting the specialization of decision-making and economizing on communication expense) and sometimes display opportunistic behaviour (Williamson, 1975b). Transaction cost theory suggests that asset specificity, behavioural uncertainties, and environmental uncertainties create two main costs: market transaction costs and control costs (Williamson, 1985; Hennart, 1989; Williamson & Ouchi, 1981). Williamson & Ouchi (1981) also suggests that frequency of interaction is an important determinant of transaction costs; however, in entry mode studies, transactions are considered continuous, thus precluding the need for a separate measure of frequency (e.g., Brouthers & Brouthers, 2003).

Another interesting aspect of TCE theory is the importance of human factors, which are "altogether suppressed" in many IB theories (Williamson, 1975b). Williamson criticizes standard economic models are assuming that individuals regard transactions in a strictly neutral, instrumental, quid pro quo manner. He argues that individuals look instead for a favourable balance among related set of transactions, including attitudes and emotions. Williamson introduces a relatively loose concept of atmosphere, which can also be hardly understood by rational net gain terms of economics. He, however, admits that it is problematical, whether his approach can qualify as "economics". The suggestion to consider human factors seems to be particularly important in an IE context, where issues such behaviour of an entrepreneur or culture play a role.

In the context of FDI theories, TCE explains internationalisation with the argument that firms choose their optimal structure for each stage of production by evaluating the cost of economic transactions. As a result, firms choose the organisational form and location for which overall transaction costs are minimised. Transactions perceived to be high risk and requiring significant management time or other resource commitments are more likely to be internalised as part of hierarchically structured organisation (Williamson, 1975, 1981, 1985). FDI is perceived as a means of entering foreign markets in order to exploit firm specific assets. It is usually in the form of internally developed, intangible assets giving the firm some superior production, product, marketing or management knowledge (Williamson, 1975, 1981, 1985). If this competitive advantage cannot be exploited in the existing market the firm looks into expansion into a new market. The expansion takes place through horizontal or vertical integration.

The TCE approach has been subsequently modified by other researchers to include non-transaction cost benefits flowing from increased control or integration, such as coordination of strategies in multinational corporations (Hill, Hwang, & Kim, 1990; Kobrin, 1988), to extend market power (Teece, 1981), and to obtain a larger share of the foreign enterprise's profit (Anderson & Gatington, 1986), and to include asset specificity of transactions (Mahoney, 1992). TCE has been widely used in studying international business (Bacrev & Tsuji, 2001; Pangarkar & Klein, 2004; Shane, 1992, 1993a and b). Although all the above studies demonstrate the robustness of the TCE model, they can be criticized for a high degree of abstraction, and for the inability to effectively measure the transaction costs (Andersen, 1997). The abstraction of the theory becomes even more acute in the case of an SME, for which the pure market transaction is somewhat less likely, and a pure hierarchy method, may not be an option for the entrepreneur. Given the relatively small size of most entrepreneurial firms and the subsequent scarcity of excess resources possessed by such firms, the entrepreneurial firm may need to leverage its available resources in order to make international expansion. Thus, SMEs typically resort to one of the hybrid entry strategies (e.g. export agent, licensing, joint ventures, strategic alliances) (McDougall, Shane, & Oviatt, 1994b). TCE has been applied in relation to SME foreign investment and evaluated as a sound theoretical basis for exploring entrepreneurial intentional entry strategies and their consequences (Zacharakis, 1997).

It seems accurate that firms seek to minimize their transaction costs through the right

choice of organisational form or location. SMEs tend to have much flatter structure than large companies and it is difficult to consider them as highly complicated hierarchical organisations. Theory suggests that companies should seek ways to minimise transaction costs, possibly relying on hybrid entry strategies, and balance the behavioural uncertainties, and environmental uncertainties (market transaction costs and control costs). The TCE concept of "atmosphere" might help to understand, how the business relationships develop as balanced and mutual relationships.

2.1.4 Internalization Theory

Internalization Theory was developed by Peter Buckley and Mark Casson (Buckley, 1982, 1988; Buckley & Casson, 1976, 1985, 1998). It is also seen as the development of the market imperfection theory (Hymer, 1960), and is associated with TCE. According to the theory the MNE makes a market under its own governance when natural markets are imperfect or missing. A firm has certain advantages (technology, marketing, management know-how), which she does not want to transfer to another firm via contract, therefore it chooses to invest in its own subsidiaries. It brings the direct operations of the firm under common ownership and controls the activities conducted by intermediate markets that link the firm to customers. A firm will gain in creating their own internal market such that transactions can be carried out at a lower cost within the firm, which allows maintaining control and better and safer return on investment. In particular, Buckley and Casson sought to identify the types of cross-border market failures that might cause firms to prefer FDI rather than contractual. Buckley and Casson (1985) argue that knowledge is cheap and riskless when transmitted internally but not externally, which makes it easy to transmit across internal boarders but not externally.

Buckley's and Casson's research represents a step forward in explaining internationalization patterns and a behaviour of a firm, its advantages vis-à-vis other firms and its attempts to maximise returns from foreign markets. The weakness of the theory lies in lack of attention given to specific cross-border market failures, which makes it equally applicable to any diversified domestic enterprise and weakens the international perspective of the study (Dunning, 2003). The main weakness from the perspective of IE is that it does not apply to entrepreneurship (Casson, 1984). SMEs have much smaller resources, which do not allow for building the complex hierarchical

structure. Also none of the entrepreneurship studies seems to explain entrepreneurial decisions with the need for internalization.

2.1.5 The Competitive Advantage of Nations

The discussion of IB theories can be enriched by the thoughts coming from Porter (1980, 1981, 1985, 1986, 1990, 1996, 2000) in his theory of national competitive advantage. He studied 100 industries in 10 nations and came up with the factors which might facilitate or prevent the creation of competitive advantage. They are constituted as a diamond (1990):

Factor conditions: a nation's position in factors of production (labour, capital, infrastructure, education), usually created by governments.

Demand conditions: nature of domestic demand for product/service (size of industry segments, sophistication of demand, how saturated is the market, the rate of growth of economy)

Related and supporting industries (supplier industries and related industries that are internationally competitive).

Firm strategy, structure and rivalry (how companies are created, managed and the nature of domestic rivalry).

Porter suggests that the diamond could be developed by two additional variables: chance and government. Porter's thesis is that these factors interact with each other to create conditions where innovation and improved competitiveness occurs.

Porter does not explicitly recognise the role of an entrepreneur, but his theory gave a push to cluster development all over the world. As he stresses in his later research global economic changes have diminished in many ways the traditional roles and advantages of a location (Porter, 2000). Clusters, however, represent a new unit of competitive analysis along with industry and firm. As SMEs have a proven record of participation in clusters, it seems to be relevant to consider Porter's arguments while looking at factors relevant in international entrepreneurship.

2.1.6 Theory of Growth

The recognition of a firm potential in shaping international trade has been recognized by the theory of growth (Penrose, 1959; Teece, 1977, 1981). A behavioural oriented theory, which assumes that internationalization, is an alternative way of growth for firms. Penrose differentiates between two categories of economies: economies of scale and growth. She argues that economies of scale are a characteristic of large companies, because of size they can perform something more efficiently than a smaller firm (Penrose, 1959). Thus economies of size may be attained in the form of production economies, managerial economies (administrative, marketing, purchasing, financing or research development economies), economies of operation and expansion (Penrose, 1959). Consequently, those economies may be responsible for lower costs in the production and distribution of the existing products of larger firms, but also for lower costs and competitive advantage enabling larger firms to expand in certain directions (Penrose, 1959). Economies of growth are derived from the unique collection of services available to and create for the firm an advantage over other firms in bringing new products to the market a firm. Penrose suggests that economies of growth may exist at all firm sizes (1959). The theory of growth have been explored in the context of multinational companies (Kogut, 1988; Kogut & Zandler, 1993).

The view that factors of production are immobile have also changed with the rapid pace of globalization. New research shows, however, that firms increasingly seek to supplement their ownership advantages by seeing location-specific assets in other countries than their own, they may seek to locate some extent of their inventory activities where there is a high level of agglomeration of innovation in their industry (Kummerle, 1999). The other side of the coin is that SMEs with greater technological advantages use different modes of entry than SMEs without such advantages. For example, Burgel & Murray (2000) found a positive relationship between R&D intensity and the use of equity modes of entry for their sample of U.K. start-up companies in high technology industries. Similarly, Osborne (1996) found that New Zealand SMEs that possessed a higher ability to develop complex technically differentiated products tended to use equity entry modes, while companies selling undifferentiated commodities used non-equity modes.

The theory of growth has also been picked up in the context of internationalization of SMEs by Jones (1999), who like Casson (1992) suggests a look at "internationalization of small firms as part of their overall corporate growth" (Jones, 1999, p.16). She concludes in her study of small high-technology companies, that the scope of international development is tremendous and encompasses decisions relating to the nature of the firm's business, resource needs, and development opportunities; processes of development including evolutionary development, network development and planned strategic growth; and patterns of development including combinations of types of links and business activity; configurations of activity; and geographic and chronological concentration or spread. An entrepreneurial firm taking internationalization decisions is more inclined to benefit from the economies of growth. They can attain it in the form of production economies, managerial economies (administrative, marketing, purchasing, financing or research development economies), and economies of operation and expansion.

2.1.7 School of Innovation-Diffusion

There are many models of innovation-diffusion (Harvey, 1979; Lekvall & Wahlbin, 1973; Reid, 1981; Robertson, 1971; Rogers, 1962; Zaltman & Stiff, 1973). Zaltman et al. (1973) suggests that innovation adoption occurs, when amongst a series of options innovation is the most acceptable alternative, at the given point. Robertson (1971) differentiates eight sub-processes that combine to create adoption process: (a) problem recognition, (b) awareness, (c) comprehension, (d) attitude, (e) legitimizing, (f) trial, (g) adoption, and (h) dissonance. One of the classical innovation-diffusion models has been developed by Lekvall and Wahlbin (1973). They stress that the concept of an individual resistance to innovation is based on the notion that the prospective adopter has to go through a mental process before deciding whether or not to adopt an innovation. This process, which is usually termed the adoption process, can be seen as incorporation of the possible de-internationalization step. The possibility of de-internationalization increases the dynamism of the potential model.

Harvey (1979) argues that innovators look for information more intensively then non innovators as a result of evaluative conflict. The innovation is accompanied by considerable financial, performance, social and safety risks that require high ego-involvement. According to Harvey the decision making process for an innovation is

complex and it possess both positively-and negatively-valued beliefs which result in a psychological situation of high evaluative conflict (1979). An individual who is in this conflict searches for external information, which would help to resolve this conflict. Consequently, high levels of evaluative conflict will lead to high levels of information search. If we look analogically at a decision to develop a relation with international strategic partner, it is not free from conflict. The conflict is not only embedded in the decision making process to go into a relationship, but the tendency to conflict is sustained in the whole life cycle of a relationship. Even in strongly collaborative relationships the conflict is present, it is endemic in any trading relationship. What distinguishes the collaborating relationship from any other relationships is the manner in which conflicts are resolved (Spekman, 1988). As a result the business partners will consider that going into strategic international relations should bring advantage. The partnership selection process is a determination of the strategic resources that would benefit from the advantages of closer ties with a strategic partner (Spekman, 1988).

The utilization of innovation-diffusion model in internationalization decisions was first considered by Simmonds and Smith (1968), but significant advances were made by Bilkey and Tesar (1977), Cavusgil (1980), Reid (1981) and Czinkota (1982). They all have considered the internationalization of a firm to be an adoption process. These models are partly based on the product life cycle model by Vernon (1966) and consider each next stage as an innovation for the firm. Bilkey and Tesar, Reid, and Czinkota however limit their models to explaining export activities, whereas Cavugil's model includes other entry modes. Bilkey and Tesar have concluded that international development is characterized by six distinct stages and that decision making at each stage was affected by various factors. Bilkey and Tesar (1977) identified six stages ranging from firms whose management had no interest in exporting to those whose management explored the feasibility of exporting to other more psychological distant countries.

Cavusgil (1980) proposed five stages (Figure 2.1) described as: domestic marketing, pre-export involvement, experimental involvement, active involvement, and, committed involvement. Cavusgil and Nevin (1981) found that the behaviour of firms is influenced by internal determinants such as expectations of management (about the effects of exporting on firm's growth), level of commitment, the environment, marketing (market planning, policy toward exports, and systematic exploration), differential firm

advantages (firm's size, technology intensiveness, and possession of a unique product) and the strength of managerial aspirations (for growth and for security of markets). The result strongly supports the argument that a lack of exporting is due to anti-export attitudes of top-management. Cavusgil (1984) limited his analysis in subsequent studies, for example analysing just three stages: experimental involvement, active involvement, and committed involvement. He argues that despite an incremental character of internationalization decisions, not all firms will travel the entire internationalization path. The justification given for the incremental character of internationalization is the greater perceived risk associated with international business decisions, the tentative nature of managerial expectations, and the greater level of genuine uncertainty. Cavusgil argues that these circumstances generate a very cautious type of management, one that creates incremental rather than total commitments to international markets.

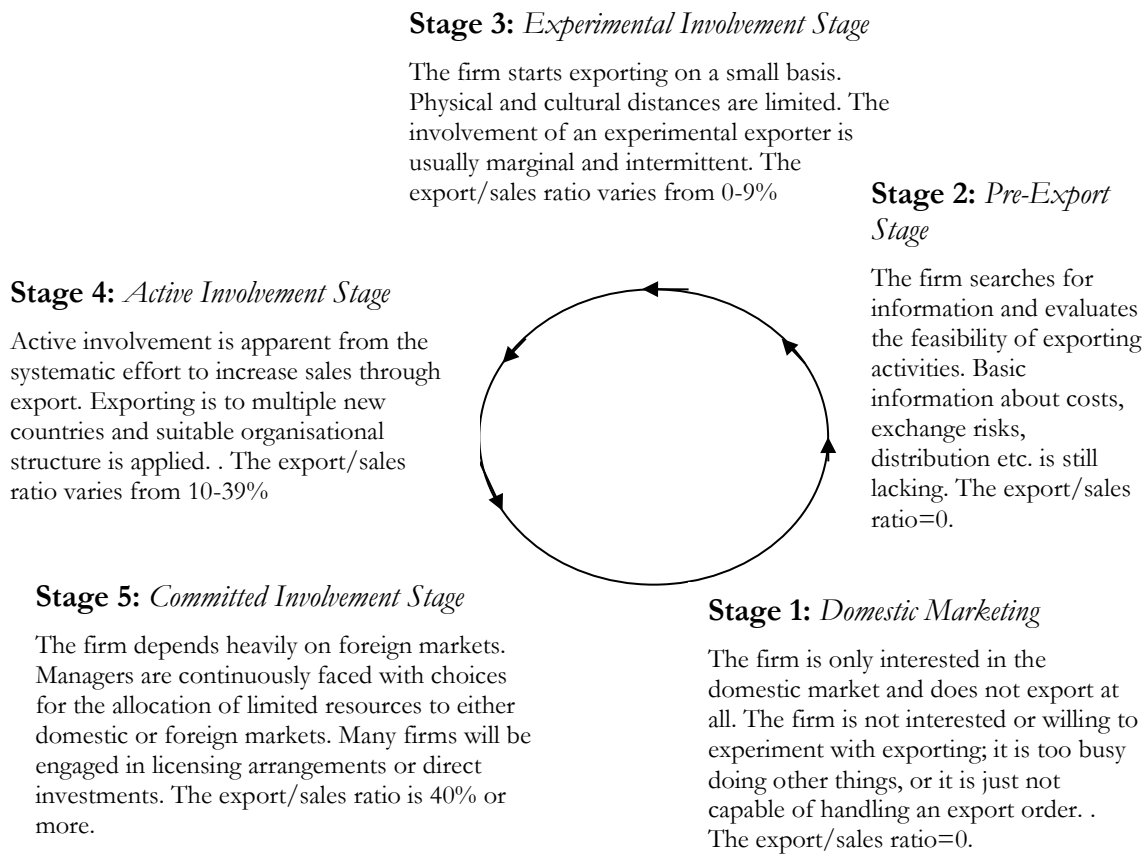

Figure 2.1 Stages of Internationalization Process adapted by the author from Cavusgil (1980, p.175)

The use of an innovation-diffusion model for internationalisation has been criticized by various researchers, because firms face several stages beyond export adoption, namely other forms of internationalization (joint ventures, FDI, etc.). Hedlund and Kverneland (1984) found that firms sometimes leapfrog stages. Internationalisation might result through various ways, often not following predetermined stages, but resulting from a strategic choice based on foreign market conditions, managerial philosophy or the firms resources (Turnbull, 1987).

The use of innovation-diffusion theory for SME internationalisation has been discussed by Gankema et al. (1997), who empirically tested and confirmed the applicability of Cavusgil's model for SMEs. In his subsequent research, Cavusgil argued that the model still holds for European manufacturing SMEs, and it takes approximately 2 years for a company to progress from one stage to the other. Bell (1995) also confirmed that the I-model was consistent with the approach of small software companies in Finland, Ireland and Norway. McDougall et al. (1994), however argued that the found out that the I-model does not apply to all companies as some are international from inception, and as such they do not follow an incremental pattern.

Companies have the choice to freely adopt a stage of internationalization or reject it. The behaviour of the firm becomes more flexible, adjusting more rapidly to fast changes in the market. The "born-global" companies increasing show the new tendency that the risk-averse and incremental nature of internationalization adopted by traditional process theories is losing validity. Instead the innovation-diffusion theory provides insight into the likelihood of success or failure of new products, services, and ideas. Theories of innovation-diffusion are generally concerned with the behavioural, social structural, information search, and cognitive processes in which the individual engages as one psychologically moves toward acceptance or rejection of an innovation.

2.1.8 Stage Models

The next family of IB theories dealing with internationalization is the behavioural school of stage models (Ansoff, 1965; Cyert & March, 1963; Luostarinen, 1977). Stage Models, often described as the Uppsala School, argue that the attitudes and perceptions of managers are influenced and shaped by incremental involvement in an internationalization pattern of evolution (Johanson & Vahlne, 1977, 1990; Johanson &

Wiedesheim-Paul, 1975). The main assumption in the Uppsala model is that the firm first develops in the domestic market and that the internationalization is the consequence of a series of incremental steps (Johanson & Wiedesheim-Paul, 1975). This main assumption is followed by various concepts of stages of internationalization. Johanson and Vahlne (1977) refined the model in which the output of a cycle of events forms the basis of an input to the next. They argue that this process is based on a path of logical steps:

> "…gradual acquisition, integration and use of knowledge about foreign markets operations, and on its successively increasing commitment to foreign markets"(Johanson & Vahlne, 1977)

The main reason for the incremental character of the internationalization process can be seen in factors such as permanent change and subsequent uncertainty. Johanson and Vahle (Figure 2.2) argue that these factors constitute the main characteristics of international, as distinct from domestic, operations. Permanent change in the company's internal and external environment requires it to be flexible and adjust to new problems. Each new discontinuity can be regarded as an essentially unprecedented and unparalleled case. Johanson and Vahle (1977) define the internationalization process as all the decisions taken in a process, such as decision to start exporting, to establish export channels, to start selling, to establish a subsidiary and so forth. They argue that all the decisions have common characteristics which are important to the subsequent internationalization. Subsequently the model focuses on these common traits.

The incremental adjustments have certain characteristics in common, which occur in every stage of the internationalization. The model (Figure 2.2) illustrates the mechanism for internationalization and distinguishes between state and change dimensions of the cycle. The state aspect incorporates market commitment (the amount of resources committed and the degree of commitment to foreign markets) and market knowledge (knowledge about foreign markets and operations). The change aspect represents commitment decisions (decisions to commit resources to international involvement) and current activities (performance of current business activities).

Market commitment and market knowledge are directly related, because knowledge as a resource can strengthen or weaken the commitment to a specific market. Current activities influence also directly commitment decisions, because marketing investment

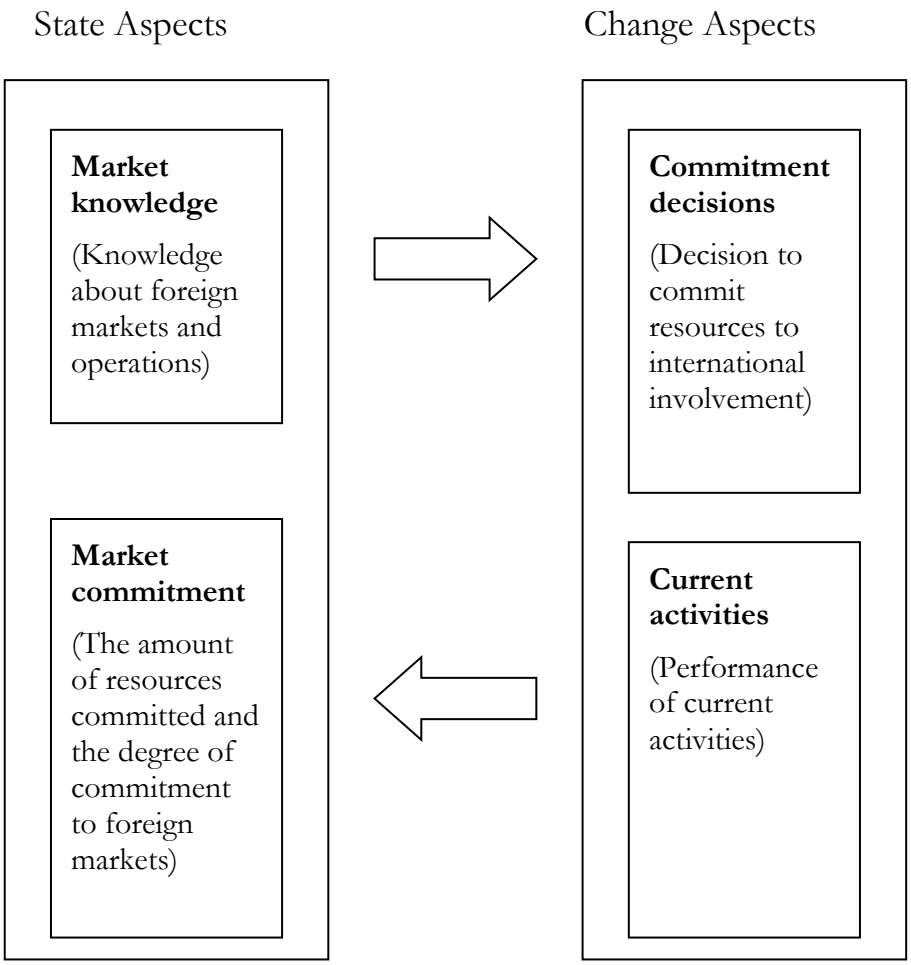

Figure 2.2 The Basic Mechanism for Internationalisation: State and Change Aspects. Source: adapted by the author from Johanson and Vahlne (1977), p.26

increases the marketing commitment. It is suggested that the more complicated and the more differentiated the product is, the larger the total commitment of the firm. Johanson and Vahle (1977) suggest that commitment decisions generally consist of activities that mean an extension of the boundaries of the organization and an increase in commitment to the market.

Over time Johanson and Vahlne shifted away from arguments used in explaining the state and change aspects. They started to argue that the analysis of international activities of companies should be looked at from the perspective of individual decisions and not as a continuous process (Johanson & Vahlne, 1992). They argue that knowledge is an ever changing outcome of action. Furthermore, they do not view actors taking the

decisions as autonomous, rather they are embedded in a network setting which provides them with both opportunities and constrains. This shift towards network theory, which emerged as a new field of research in the 1990s, suggests that their model should be widened to include networks. The Uppsala model assumes that firms gradually commit themselves and learn about, foreign markets and operations. The basic conclusions of these studies is that a firm's internationalization is a gradual process which is the result of an interplay between two separate, but closely related processes, knowledge development process and commitment process. International expansion is inhibited by the lack of knowledge about foreign markets and such experience can mainly be acquired through experience from practical operations abroad (Forsgren & Johanson, 1992). Internationalization in this perspective is a growth process.

Stage models have been heavily criticized in the literature. Hedlund and Kverneland (1984) found that firms sometimes leapfrog stage. Melin (1992) states that the U-models exclude other strategic options during the process of internationalization, that the models are too deterministic and limited to early stages of internationalization. The main weakness of the stage models emerges from a relatively rigid view on how the decision to internationalize is taken. Mason and Mitroff (1981) have reported that the persistent problem in strategy formulation is the rigidity of the assumptions of strategic decision-makers about the nature of their business and the solution to their problems. It seems that confidence in logical, systematic steps hinders the development of the theory of internationalization.

Sullivan and Bauerschmidt (1990) found stages model to be too general and dismissive of nation-specific factors, which moderate the internationalization process. They suggest that structural dimensions – government programs, industry competition, and market demand – promote or inhibit internationalization. Therefore the research by Johanson and Vahle, which was based just in one country and the subsequent research based mainly in the Scandinavian block are not representative enough. Similar criticism can be found by Hofstede (1983), who argues that the cultural relativity supports the need for cautious generalization. He argues that national cultures moderate management process and it is naïve to assume away the "stubbornness of national differences" in interpreting how managers perceive incentives and barriers to internationalization. Cross-cultural studies are desirable as they might lead to universal validation of the internationalization concept (Samiee, Walters, & DuBois, 1993). Furthermore, others

have subsequently found that the incremental internationalization thesis fails to fully explain the nature and character of international involvement (Gripsrud, 1990; Sharma & Johanson, 1987; Turnbull, 1987). Gripsrud (1990) points out that the stage models do not analyse how firms develop their attitudes toward foreign markets which presumably influence their decisions

An additional strong argument against the validity of stage models is the existence of "born global" companies. "Born global" firms are, by definition, global more or less from the start (i.e. they have not followed the slow and gradual steps). In addition, some firms will de-internationalize or externalize and inward and outward linkages will underpin this process of internationalization (Fletcher, 2001). Despite the "born global" firm and its activities emerging as a research area (Riddle & Gillespie, 2003), it seems that the risk-averse and incremental nature of internationalization described by traditional process theory may be inadequate for explaining this phenomena.

Bonaccorsi and Dalli (1990) question the application of stage models to SMEs because they found that small exporting firms do not adopt integrated organizational forms. The opposite is claimed by Bradley (1984), who argues that a three stage model is appropriate for the internationalization process of small companies. Firms in a first stage are called "potential exporters", firms that have not yet exported any of their goods or services. Firms in the second stage are labelled "passive exporters", first that have been exporting only upon request from abroad without taking any initiative of their own. Firms in the third stage are considered "active exporters", firms showing continuous effort to increase their export activities. Bradley defends the possibility that in some situations incremental stages can be appropriate for SMEs. Welch and Luostrinen (1988) also recognised that although not all firms necessarily follow the pattern, the stage theory is consistent with the behaviour of many SMEs. They see the "Uppsala model" as focused more on understanding the general patterns in the process of internationalization at a firm level. This view is based on the idea that managing the internationalization process is more a matter of understanding the forces driving and hindering the process than making specific strategic decisions about the internationalization (Forsgren & Johanson, 1992). This entails questions regarding the gradual accumulation of international market knowledge, and rather than focusing how to exploit firm-specific competitive advantages, it directs attention to the processes of developing international knowledge base.

The inadequacy of internationalisation models of large companies in IE is particularly apparent in the context of management practices as these differ in SMEs and large firms (Banks, 1990; Beamish, 1990; Denis, 1990). Reuber and Fisher (1997, 1999, 2002) found that a management team's knowledge and experience is very important in the export development process of small companies. Based on a study of small Canadian software firms, they concluded that the teams' level of international knowledge and experience has a positive influence on the firm's degree of internationalisation and that firms with experienced management team can skip stages 1 and 2 with positive effect on subsequent export performance.

Baird et al. (1994) argue that international strategies for large companies have received considerable research attention, while the international strategic options of small firms have not been studied in depth. In researching three strategies and their usefulness in SME internationalisation they concluded that small firms that are internationally oriented view exporting, foreign alliances, and foreign equity investments as a single international strategy. Entry options of large companies such as wholly owned subsidiaries or establishing large scale manufacturing operations in host countries appear to be less appropriate options for SMEs. Instead they choose global strategy options that fit their scope of operations. They suggest that entrepreneurship research should focus on finding strategies, which help to overcome the conditions unique to SMEs and which are effective in such situations.

In summary, the IB review illustrated certain patterns in the world economy as well as how those patterns influence companies and countries. In order to explore those patters further this review will look at IE literature to identify areas of possible importance to internationalization. The arguments in the international business literature, as tested on large companies, cannot be taken to be applicable to SMEs. The role of this research is to explore which aspects of these models might be relevant to SMEs. At the same time, this research does not challenge the validity of traditional economic theory or many other schools discussed. It points out that the international trade theories did not consider an SME as a relevant international business player. FDI and the Eclectic Paradigm started considering an SME as a business actor, which can compete on the basis of foreign location. Both TCE and internalization theory cannot be properly applied to SMEs, as they lack the scale and hierarchy of large companies, and relay on much flatter structures. The Competitive Advantage of Nations explains the macro

factors of trade. The School of Innovation-Diffusion can be used in the context of SMEs, but the incremental approach to the stages does not fully explain flexible and erratic international behaviours of SMEs. The arguments against the applicability of the stage models are very similar. In sum, none of the IB theories reviewed is suitable to explain fully SME internationalisation. The next section of the review will look at more theory focusing on SMEs, International Entrepreneurship.

2.2 International Entrepreneurship and Internationalization

Entrepreneurship research on international issues has historically largely concerned itself with (1) the impact of public policies on small firm exporting (Hardy, 1987; Rossman, 1984), (2) entrepreneurs and entrepreneurial activates in various counties (Ohe, Honjo, Oliva, & MacMillan, 1991) and (3) comparisons between small-firm exporters and non-exporters (Ali & Swiercz, 1991; O'Rourke, 1985). At the same time, scholars in the field of entrepreneurship have questioned the applicability of existing internationalization models stemming from IB literature, pointing out that SMEs cannot, or do not need to follow all the options in the internationalization process outlined in the literature on large companies (Baird et al., 1994; Banks, 1990; Beamish, 1990; Dana et al., 1999a, b; Denis, 1990; Rao & Naidu, 1992; Reuber & Fischer, 1997).

Some researchers argue that in some cases models from IB literature hold for SMEs (Bell, 1995). In a study of small software companies in Finland, Ireland, and Norway, Bell (1995) concluded "a major limitation of "all" stage theories in their use of linear models to try to explain complex, dynamic, interactive and frequently non-linear behaviour" (Bell, 1995). In this respect he suggested, that researchers use of "network" approaches but with consideration that those do not offer much insight into the mechanisms adopted by firms to identify new non-network contacts. Despite partial confirmation of usefulness of stage models and network theory, Bell (1995) demonstrates that none of the theories adequately reflect the internationalisation process of small software companies.

As none of the IB theories capture fully the changes in SMEs internationalisation, in order to establish a theoretical base, a field called International Entrepreneurship (IE) developed (Giamartino, McDougall, & Bird, 1993). IE undertook the task of capturing the international changes and trends happening in the international position of SMEs

(Baird et al., 1994; Bonaccorsi, 1992; Etemad & Wright, 2003; Giamartino et al., 1993; McDougall, 1996; McDougall et al., 1994; Ruzzier et al., 2007, De Clercq et al., 2012). Despite the research in the new field has been prolific, it did not establish an agreed definition of IE.

The answer to what has yet to be defined as IE is combined with an answer to the question of what is internationalisation. One of the first to address the problem of a definition of internationalisation was Welsh and Loustrinnen (1988, 1990), stressing that it should definitely include inward and outward movement. Each internationalisation decision has a variety of unique causative elements. Welsh and Loustrinnen (1988, 1990) stress that the character of decisions is incremental (1988). They are also arguing that an inward movement can be treated as the beginning of a relationship, which is important as it has a chance to grow in the future (1990).

One of the first to use the term international entrepreneurship was Patricia McDougall (1989). Less than a decade after Wright and Ricks (Wright & Ricks, 1994) noted the growing importance of international entrepreneurship as an emerging research issue in international business the field expanded. There is a growing body of research in the area, special conferences on international entrepreneurship, special issues of several academic journals devoted to the topic, and an academic journal devoted to the subject of international entrepreneurship has been launched (Acs, Dana, & Jones, 2003)[4].

Oviatt and McDougall defined International Entrepreneurship first as:

> "A combination of innovative, proactive, and risk-seeking behaviour that crosses national borders and is intended to create value in organisations"(2000).

They have subsequently broadened the definition to:

> "We define international entrepreneurship as the discovery, enactment, evaluation, and exploitation of opportunities- across national borders -to create future goods and services. The scholarly study of international entrepreneurship attempts to answer questions about how, by whom, and with what effects those opportunities are acted upon. It includes two branches: (1) the study of entrepreneurial activity that itself crosses national borders and (2) the

[4] The Journal of International Entrepreneurship was launched in 2003.

> comparison of domestic entrepreneurial activities in multiple countries." (Oviatt and McDougall, 2005: 159)

Zahara and George (2002) stressed that internationalisation can be treated as entrepreneurial behaviour and seen as the "process of creatively discovering and exploiting opportunities that lie outside a firm's domestic markets and in pursuit of foreign markets." (p.261). Sapienza (2006) on the other hand suggests that internationalisation should be seen as a strategic choice, which is a result of an organizational process, and the focus of IE research should be on explaining the consequences for young firms, and not on exploring the decision to internationalise. Acs and Young (2003) after reviewing theoretical developments in IE, have stressed that the new area of IE should be enriched by a diversity of disciplines, and should include more use of theory from the IB literature.

Despite the need in the SME sector to understand how to adapt to the changes in the world economy, it has been argued that the existing theory of international entrepreneurship is still at its infancy (Acs et al., 2003; Baird et al., 1994; McDougall et al., 2003). More recent views suggest, however, that IE field can be perceived already as rich, but should be expanded to include theoretical ideas from institutional theory, cultural psychology, organisational behaviour and multinational economics (Jones and Coviello, 2005; Jones et al., 2011).

In order to respond to this call this research will adopt not only the latest definition of IE (Oviatt and McDougall, 2005), but will also look at previous research related to internationalisation of SMEs, research that emerged from IB as well as current research in IE to create a holistic picture of SMEs international behaviours and the factors affecting them. Considering that current SME international activities are wider than traditional entrepreneurship research on international issues, and also international business theories are insufficient to capture the dynamics of entrepreneurial internationalization, IE is filling this gap.

2.3 The existing models in IE literature

As Jones and Coviello (2005) suggested the research in international entrepreneurship faces the difficulty of creating "precise" models and those "more general", as there is a need to understand macro and micro levels of analysis.

Jones and Coviello (2005) presented a conceptual dual model of internationalisation, one that is general in nature, and one that is more precise in nature. In the general model an external and internal environmental change leads to the adoption of an entry mode in a selected country, and this reflects a form of innovation. They look at behaviour in time, using four key constructs: entrepreneur, firm, environment and performance. Subsequently they have used international business, entrepreneurship and international entrepreneurship to construct a detailed model. They suggest several contextual constructs, which can be subsumed under the key construct. As they suggest themselves, this model is so wide, that is not testable. They have developed it to stimulate international entrepreneurship researchers in developing narrower and more precise, context-focused models for empirical investigation.

Etamad (2004) has proposed a theoretically-grounded framework of International Entrepreneurship (Figure 2.3). As it can be seen in the model the environment facing SMEs and interacting with them is complex and naturally each layer is embedded, and possibly nested, in the next layer with mutual inter-relations and interactions. All layers will interact with their commonly shared environment. The interactive model by Etamed is consistent with a sociological view (Aldrich, 1986, 1979) of entrepreneurship, that is an entrepreneur does not take rational and isolated decisions in a vacuum. Instead he/she is influenced by the environment. Also Andersson (2004) argues that the firm's environment plays an important role, in particular that firms in different industries have different international patterns, because the environment affects their strategies. A similar view that SME internationalization decisions depends on the context in which they are taken is represented by Hutchinson et al. (2007). They study internationalization motives and facilitating factors among smaller retail companies, and conclude that a strong company brand identity is the most significant motive for expansion, but also other internal (global vision, mind-set, entrepreneurial personality, informal relationships) and external (business contacts in foreign markets, and government assistance support) factors facilitate the international decision-making process. As they stress the findings do not purport to generalise, they reflect specific nature and motives in those particular cases.

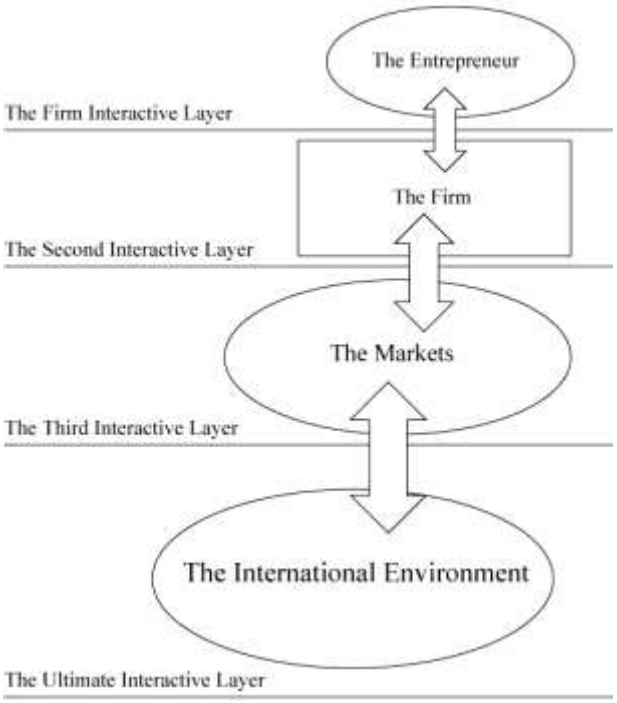

Figure 2.3 The schematic representation of the four interacting layers in the grounded framework (adapted from Etemad, 2004)

Another conceptual approach towards IE is Andersson's framework (2000), which takes an entrepreneurial perspective on internationalisation. Andersson treats internationalisation as part of a strategy. The decisive factors are the firm (e.g. organisational structure, product development, learning, corporate culture, core competence, firm advantages, and transaction costs), meso-scale factors (e.g. players near the firm such as customers, suppliers, competitors, industry structure, networks), and macro considerations (concepts and events at national and global level, such as factor conditions and psychic distance). Andersson argues that an entrepreneur's impression of the macro environment is more important than the facts, when it comes to choosing international strategies, and that a strong individual can act contrary to industrial wisdom. According to Andersson (2010), the dominant factor among all of the context factors discussed is the entrepreneur. Andersson differentiates three types of entrepreneur, namely the marketing entrepreneur, the structure entrepreneur and the technical entrepreneur. He argues that internationalisation is a consequence of different entrepreneurial actions. This argument suggests that different entrepreneur types may appear at different stages in the life cycle of a company. Interestingly, he also stresses

that one problem with the current theories and models on IE is their focus on generic models that suit "all" firms (Andersson, 2000, p.79). He suggests that is better to find categories of companies that behave in similar way.

Sapienza (2006) in his conceptual model sees the internationalisation of SMEs as a strategic choice that it influences organisational processes. He suggests that internationalisation (ceteris paribus) increases risks of failure but also increases opportunities for growth.

Ratten et al (2008) suggest a model (Figure 2.4) for IE in Europe. They suggest that the dominant factors are government policy and the state of the economy. They argue that resources, networks and policy are relevant to the conditions of market competitiveness, industry sector, economy and other factors (like political structure and culture). The greater the intersection of the three factors the greater benefits for the internationalising SME and speed of internationalisation. They suggest that this model will apply to the established economies in EU, and application of it in the transition economies would be premature.

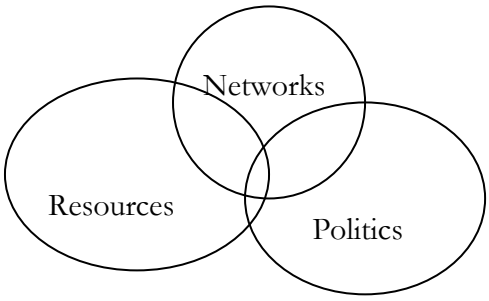

Figure 2.4 Internationalisation model by Ratten et al, 2008

A broader framework is suggested by Ruzzier (2007), who suggested a conceptual model consisting of: product, mode, market, time and performance. He subsequently conducted questionnaires in Slovenia show correlation between the suggested factors.

Also empirical in nature is the model of IE suggested by Welch et al. (2004). Based on a single case study they argue that in IE it is possible to "stretch" a mode of internationalisation, like exporting. In the case discussed the company kept changing commitments over 75 years without a switch in operation mode, the central facilitator of this sustained mode of operations was a wide net of relevant network relationships.

The company was involved in lots of political negotiations, the company was constantly engaged in a process of trying to anticipate political and related market developments, and built a capacity to respond through such avenues as building new political alliances, which might be called upon in the future. They were preparing in such way for the penetration of new markets, for e.g. they were hiring Australian government officials with experience in international trade negotiations.

Vatne (1995) provides a model that summarizes the relationship between networks and SME internationalization. This model sees the internationalization process as an entrepreneurial process that is embedded in an institutional and social web that supports the firm in terms of access to information, human capital, finance, and so on. Entrepreneurs use their personal contact networks to gain knowledge, and seek out and mobilize new partnerships that help the firm to grow and expand into foreign markets. If a firm is located in a region that is short of an important factor, or is populated by non-dynamic firms that are weak in terms of internationalization, local networking will not in itself overcome these limitation. However in some industries firms are more independent of local support. This explains why some small firms grow and internationalize even when those around them are not similarly successful. Similarly, Loane and Bell (2006) argue that literature tends to focus on existing networks of firms, and there is a growing evidence that many rapid international entrepreneurs have to build cross-national networks. They investigate the networks of internationalising entrepreneurial firms in Australia, Canada, Ireland and New Zealand.

Also the strong indication that networks are the most relevant factor in internationalisation of SMEs can be seen in the evolution of the Uppsala model. Johanson and Vahlne started working on a new conceptualisation capturing SME internationalisation (2003). In 2003 they proposed a conceptual network model of internationalisation. They see internationalisation as the interplay between environmental learning and commitment. They suggest that there is a strong similarity between internationalisation and entrepreneurship processes in that they both take place under conditions of uncertainty. They have continued their work in the direction of networks and in 2009 proposed the Business Network Internationalisation Process Model (Figure 2.5.) (Johanson and Vahlne, 2009). The model is a modification of the Uppsala model from 1977. They have developed the original model by adding sub-processes: trust-building, opportunity identification/exploitation; and by placing them

in the network context. The network view stresses the embededdness in a web of relationships with various other parties within this environment including customers, suppliers, and governmental authorities and so on. As time goes on the number of mutual experiences grows, the parties adjust to one another and the degree of their interdependence increases. This kind of context is very different from that of neo-classical economies, which sees firms as independently controlling their own destinies.

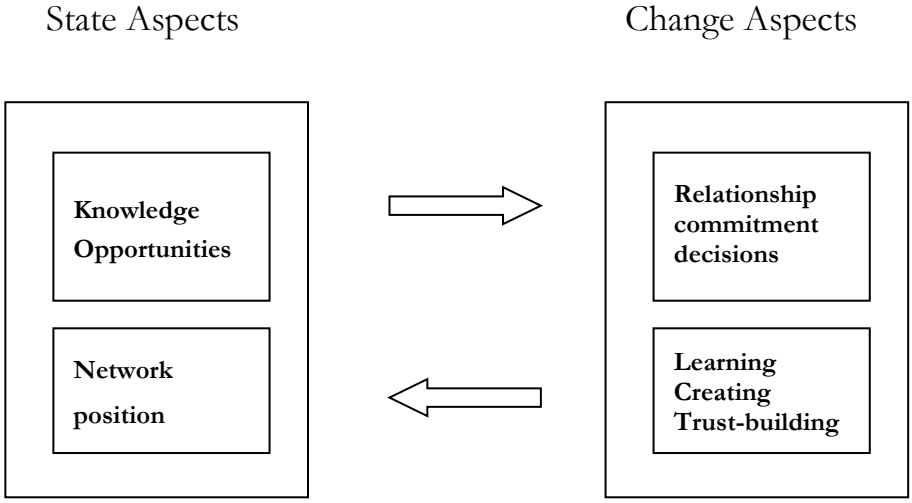

Figure 2.5 The Business Network Internationalization Process Model after Johanson/Vahlne (2009)

Johanson and Vahlne (2009) suggest that the model from 1977 had to be modified, because economic and regulatory environments changed dramatically and company behaviour has become different in many respects. Their new model builds on network literature in internationalisation studies (Welch & Welch, 1996).

In 1977 Johanson and Vahlne assumed that developing knowledge is fundamental to a firm's internationalisation, in particular the knowledge that grows out of experience. In 2009 they have acknowledged that:

> "the general internationalisation knowledge that encompasses several kinds of experience, including: foreign market entry, mode-specific core business, alliance,

acquisition, and other specific kinds of internationalisation experience, is probably more important than we have assumed in 1977." (p.1416)

They had not considered in 1977 that interaction of network actors can result in new knowledge too. In 2009 they accepted that the 1977 model was limited, and did not consider how complex the process of learning is.

Johanson and Vahlne (2009) have taken most of the critique in the 1977 model into the account, acknowledging that most criticisms were appropriate. The business network model is supposed to address the failings of the 1977 model. The model conceptualises internationalisation as outcome of firm's actions to strengthen its network position. As networks are borderless the distinction between market entry and expansion in a market is not that relevant. Each network member has certain internationalisation knowledge, knows of opportunities and has certain network position. Each network member undertakes the process of learning, creating knowledge and building trust. The relationship commitment decisions will either strengthen or weaken existing relationships. Each relationship is characterised by certain levels of knowledge, trust, and commitment. Opportunities are seen as a subset of knowledge, and are considered as the most important element of knowledge, that drives the internationalisation process. The factors identified by Johanson and Vahlne can be divided into: knowledge and learning, trust and commitment building and opportunity development.

2.4 Biotechnology sector

Several studies (Braennback, et al, 2007; Evers et al., 2012; Gassmann and Keup, 2007; Lindstrand et al., 2011; Tolstoy and Agndal, 2010) suggest that the internationalisation process of SMEs is specific in biotechnology industry For many firms biotechnology is a global industry. Such firms focus in most cases on R&D. Many firms are founded and managed by university scientists. Some founders may have prior business experience, while others may seek to overcome their managerial inexperience by hiring managers with business experience. As suggested by Braennback, et al. (2007), many R&D biotechnology firms focus on developing products, first raising funds through formal venture capital or an initial public offering to enable the firm to develop a treatment, diagnostic, or drug beyond phase I or phase II clinical trials. At this point, the firm may enter into a strategic alliance with a larger pharmaceutical company or license the

product candidate to a larger pharmaceutical firm, which would conduct the phase III clinical trials and ultimately commercialise the product on the world market. The R&D process is long and can take up to 15 years from discovery to final commercialisation (Oliver, 2000). The creation of alliances like technology ventures is typical in biotechnology.

Braennback, et al. (2007) find that these firms do not always employ a proactive international strategy which is characteristic of other " "born" global firms. They suggest that entrepreneurial biotechnology firms seldom follow a logical, clearly defined path, as they have to face global as well as local forces both on the supply side as well as the market side. The supply of systematic knowledge and markets for end products of such firms are global, but markets for venture capital remain localised. These conflicting forces mean that these firms cannot be categorised as "born global" biotechnology firms, and that further research is required to explore their internationalisation.

Gassmann and Keup (2007) argue that their case studies of biotechnology firms show that such firms do not follow a "conventional" business model of developing, producing and selling a product, as some of them do not even produce their own products but instead take advantage of international value chains. They found associations in relation to: homogeneity of product or service, the scope and extent of intellectual property protection, the embeddedness in global communities and social networks, the ability to replace ownership of tangible assets, access to the usage of tangible assets. They called for more empirical studies investigating behaviour of biotechnology companies.

Lindstrand et al. (2011) found that in the initial phase of internationalisation biotechnology SMEs are disadvantaged in their ability to acquire foreign market knowledge due to their by their lack of industrial connections; that it is difficult for theses firms to understand venture capitalists, and vice versa,; and that some firms are better at overcoming those difficulties than others. They suggest that social capital can affect positively the international expansion of biotechnology firms. Social capital comes from academic networks, and can also come from CEOs or management teams with international business experience. They find that in the case of biotechnology SMEs foreign market knowledge consists both of market-specific knowledge and internationalisation knowledge, and considering that market knowledge cannot be

transferred between different markets, developing social capital to deal with rapidly changing market conditions is indispensable. The major finding confirms that biotechnology SMEs and their management teams need to understand that the acquisition of useful foreign market knowledge and financial resources depend on their social capital and needs to be tailored to the firm's current situation, and also change during the internationalisation process for resource acquisition to continue. They also suggest that meeting these conditions does not always result in a successful continued internationalisation.

Evers et al. (2012) explored, in Ireland, Sweden and Denmark, the role of stakeholders in building the market capability of international new ventures. They found that different stakeholder groups can influence how international new ventures build their marketing capability to respond effectively to the dynamic nature of international markets in which they operate. They suggest that different stakeholders can influence the learning process of the firm and can determine the nature of dynamic marketing capabilities of international new ventures.

All the studies reviewed above suggest the need for an exploration of the internationalisation process in the biotechnology companies.

2.5 Chapter Summary

The overall objective of this study to explain the internationalisation process in SMEs in the Irish Life Sciences sector (Research Objective 1).

As we could see in the research background section, globalisation opens new horizons to SMEs. The process of globalisation of economies has stimulated both the emergence of opportunities as well as challenges for SMEs. The global interconnections and linkages between states, societies, and organisations causes that business decisions/ actions in one part of the world have consequences in other places (Acs & Yeung, 1999). Therefore, companies compete not only against rivals in their own league but also against continual stream of newcomers (Schwab & Smadja, 1994). As a result, firms have to become more international in outlook and aware of international changes (Kirby & Kaiser, 2005) to be able to compete and cooperate in the international context (Dunning, 1995). The understanding of the industry context is perceived as vital to internationalisation of SMEs (Chetty & Cambell-Hunt, 2003; Dana et al., 1999b; Dana,

2001; Etemad, 2004a). The review suggests that the macro level, the world economy affects the firm level more than ever, in that national economies are interconnected and firms take advantage of this bigger, more accessible marketplace. However, firms are exposed to more intensive competition than in the past, when they were operating mainly on local level.

The idea of interlinked layers is used in this research, where the internationalisation process is perceived as grounded in a specific situation, dependent on various circumstances in the total system (internal and external company environment). The literature review suggests that context matters to the internationalisation process of SMEs. This research therefore employs a multilevel perspective. Three levels that emerge from the literature review are the firm's environment (mainly the industry), the entrepreneur and the company. Therefore, the second objective of this research is as follows:

Research Objective 2 it to apply a multilevel approach, incorporating the entrepreneur, the firm, and the firm's environment, to the study of SME internationalisation.

This study is an exploratory study of the factors influencing the internationalisation process in SMEs in Irish Life Sciences sector, which is reflected in objective 3 of the study:

Research Objective 3: To identify factors influencing the internationalisation process in SMEs and explore how these factors affects the processes.

Chapter III Methodology

This chapter is divided into two sections. The first discusses the research method appropriate in the context of internationalisation of SMEs that informed this study. The second outlines the details of the study in terms of data sources.

3.1 Research Methodology

The research method approach needs to be appropriate for the context of SME internationalisation in Life Science sector in Ireland. The methods adopted for this research are based upon an examination of the existing qualitative methods employed.

The positivist philosophy believes that there is a single, external and objective reality to any research question regardless of the researchers (Carson et al., 2001). The positivist researcher takes a structural approach in conducting research by initially identifying research topic, constructing appropriate questions and hypotheses and adapting suitable research methodology. A positivist research seeks objectivity and uses consistently rational and logical approaches to research. Subsequently statistical and mathematical techniques are adopted to uncover single and objective reality. The goal of positivist research is to make time and context free generalizations. They believe that this is possible because human actions can be explained as a result of real causes that precedes their behaviour (Carson et al., 2001).

In contrast, interpretivists believe that reality is relative and multiple. According to this philosophy of research, there can be more than one reality and more than a single structured way of accessing such realities. The knowledge generated from such research is perceived through socially constructed and subjective interpretations (Carson et al., 2001). Since interpretivist research knowledge is expected to generate from value-laden socially constructed interpretations, researchers follow more personal and flexible research structures than in the positivist paradigm. Their research approaches have to be more receptive to meanings in human interaction and be capable of making sense of what is perceived as multiple realities. Interpretivist researchers enter the field with some sort of prior insight about the research topic and assume this is insufficient to develop a fixed research design due to complex, multiple and unpredictable nature of what is perceived as reality. During the data collection stage the researcher and his

informants are independent and interact with each other and construct a collaborative account of perceived reality. Such researchers remain open to new ideas throughout the study and let the study develop with the help of the informants. The goal of interpretivist research is to understand and interpret human behaviour rather than to generalise and predict causes and effects. For an interpretivist researcher it is important to understand motives, meanings, reasons and other subjective experiences.

Considering that the objective of this research is to identify factors influencing internationalisation process in SMEs and explore how these factors affect the processes, the interpretivist approach is adopted in this research.Entrepreneurship is intertwined with a complex set of contiguous and overlapping constructs. Furthermore, the phenomenon has been investigated from disciplines as varied as marketing, management studies, anthropology, industrial economics, sociology, psychology, history and anthropology (Brockhaus, 1987; Chandler & Lyon., 2001; Gartner, 1989; Low & MacMillan, 1988; Volery, 2004). Each of these disciplines has its own paradigm, units of analysis, assumptions and research biases. Given this disciplinary diversity, it is not surprising that theory development in entrepreneurship relies on a broad array of research methods (Chandler & Lyon., 2001; Volery, 2004), which include field methods (Snow & Thomas, 1994) (such as surveys, case studies and action research), computer data bases, simulations and combinations of various approaches (Volery, 2004). This diversity of research methods in entrepreneurship is perceived as necessary considering that entrepreneurship is one of the youngest paradigms in the management sciences (Bygrave, 1988; Chandler & Lyon, 2001). Bygrave (1988) stressed that if entrepreneurship is to grow in stature as a separate discipline, then it must develop its own distinctive methods and theories:

> "If we force sophisticated models from advanced fields such as economics on to entrepreneurship, we may be investigating contrived problems because they can't be analysed with complicated mathematical technology. Instead, we should be studying central questions with appropriate tools, whether they be simple or complex." (Bygrave, 1988, p.2).

Chandler and Lyon (2001) additionally stress that as entrepreneurship theory develops, increasingly sophisticated methodology is being employed. They argue that researchers, should put greater emphasis on multiple sources of data sets, on reliability and validity

issues, the development of more sophisticated models and subsequent analysis, and more longitudinal research.

These problems are also faced by the even younger area of research, International Entrepreneurship (Coviello & Jones, 2004; Volery, 2004), which is increasingly visible, yet McDougall and Oviatt (2000) argue that work in the area lacks a unifying and clear methodological direction. Volery (2004) stressed that many studies in IE have attempted to test theories borrowed from other fields of research, before establishing a solid theoretical framework for entrepreneurship. In a response to this calls for clear methodological direction, Coviello and Jones (2004) offered a review and assessment of methodological issues in international entrepreneurship research. They have suggested, that the field of IE should strive for more rigor and should minimize the tendency towards methodological simplicity; researchers should also construct their investigations with a sense of pluralism and an appreciation of the various methodological approaches that might best capture the dynamic processes characterising IE, such as not only interviews and questionnaires, but also observations, archival analysis and simulations, amongst others (Volery, 2004).

Coviello and Jones (2004) suggest that by integrating entrepreneurship and internationalization models, it is possible to develop constructs and measures that are robust, validated, reliable, and are clearly positioned within the domain of IE. In a search for this integrated research method one needs to create a structure, which would facilitate the process.

3.1.1 Purpose/questions

The general purpose of the research is to develop empirically-based conceptual framework. From the literature review, a number of opportunities emerging from the gaps in existing knowledge have been identified for research. This research follows a call for context specific study as called for by Thoams et. al (2003) and Andersson (2004). The aim of this research can be qualified as exploratory descriptive research.

Research questions may shift during the research process. At the extreme, some researchers (Bettenhausen & Murnighan, 1986; Gersick, 1988) have converted theory-testing research into theory-building research by taking advantage of serendipitous findings. In these studies, the research focus emerged after the data collection had

begun. As Bettenhausen and Murnighan (1986, p. 352) wrote: "we observed the outcomes of an experiment on group decision making and coalition formation. Our observations of the groups indicated that the unique character of each of the groups seemed to overwhelm our other manipulations." These authors proceeded to switch their research focus to a theory-building study of group norms.

3.1.2 Research strategy

An appropriate research strategy should best reflect the research purpose of the study. The methodology adopted should reflect the objectives of the research. A wide variety of research methods are applied in the literature on International Entrepreneurship, something that constitutes a reflection of both the highly complex nature of the research issue itself and the very diverse research objectives being addressed (Rialp, Rialp, & Knight, 2005). In this context, specific mention should be made of the usual distinction observed between two different methodological approaches, quantitative and qualitative.

Quantitative research is associated with quantitative explanations which test for hypotheses or generalisations (Hayter, 1997). These studies aim typically at identifying general patterns characterizing the specific behaviour and subsequent performance of the firm, usually in contrast with ventures, and/or those adopting a very formal hypothesis-building/testing approach. In conducting such research efforts tend to rely significantly on medium-to-large-scale, aggregate mail survey data as their basic research technique (Rialp et al., 2005). The use of formal, standardised questionnaires allows for obtaining a highly structured and consistent database, collected from a representative sample of respondents.

Qualitative research, in contrast, is focused on obtaining information on the underlying meanings and processes which shape behaviour. This typically incorporates the use of less formal, less standardised and more interactive interviews, case studies, histories, which generate qualitative information (Sayer and Morgan, 1985; Healey, 1991; Rialp et al., 2005). Qualitative research tends to be favoured by authors, who attempt to undertake complex and rather context specific issues related to internationalization (Bell, McNaughton, & Young, 2001; Blomstermo, Eriksson, & Sharma, 2004;

Blomstermo, Sharma, & Sallis, 2006; Etemad, 2004b; Larimo, 2003; McDougall et al., 1994a; Rialp et al., 2005)

As a research strategy, the case study is used in many complex situations of individual, group, organisational, social, political, and related phenomena. Therefore it has been a common research strategy in psychology, sociology, political science, social work , and business (Gauri & Gronhuang, 2002). The main quality of case studies arises out of the desire to understand complex social phenomena, to retain the holistic and meaningful characteristics of real-life events - such as individual life cycles, organisational and managerial processes, neighbourhood change, international relations, or the maturation of industries (Yin, 2003).

Eisenhardt (1989) and Yin (1989), among others, suggest that case-based research allows dynamic decision-making processes to be much more deeply investigated. In particular, this approach can be especially useful for research in which existing theories for explaining current phenomena, seem to be inadequate or incomplete or cross-industry biases, small size of samples, and resistance to (usually cross-sectional) survey methods could cause crucial empirical problems.

According to Mitchell (1983) the dominant influence of quantitative methods has meant that representativeness has come to mean typicality in the sense of a statistically reliable random sample from a population. The purpose of the case study approach is, in contrast, to expand and generalize theories (analytical generalizations) by a process of inference and not to enumerate frequencies (statistical generalizations) (Yin, 1989). Thus, Yin (1989) suggests that "case studies are the preferred strategy when how and why questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real life context". Yin's (2003) definition stresses the need to consider contextual conditions follows:

> A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.
>
> In order to capture the technical characteristics, including data collection and data analysis strategies the definition can be extended to a technical part.

The case study copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result

The case study relies on multiple sources of evidence, with data needing to provide converge in a triangulating fashion.

As a result the case study benefits from prior development of theoretical propositions to guide data collection and analysis." (Yin, 2003)

The case methodology suggested by (Yin, 2003) and Eisenhardt (1989) are appropriate because existing theories of IE incomplete and research needs to focus on how and why questions.

3.1.3 Research Design

This issue is generally poorly addressed in the IE literature (Coviello & Jones, 2004). As Paulin et al (1982) point out, the research design dimension, whilst complementing the research strategy, focuses more on the degree and formality of research methods and structure. Volery (2004) argues that it is not the selection of field method but the degree of formality and wideness of research method and the analysis techniques employed that accounts for the value of a research approach. For example, open-ended or semi-structured interviews can be analysed using a host of different methods, ranging from traditional textual content analysis to sophisticated computer-based statistical packages.

Eisenhardt (1989) suggests that a prior specification of constructs can help to shape the initial design of theory-building research. If these constructs prove important as the study progresses, then researchers have a firmer empirical grounding for the emergent theory. For example, in a study of strategic decision making in top management teams Bourgeois and Eisenhardt (1989) identified several constructs (e.g. conflict, power) from the literature on decision making. These constructs were explicitly included in the interview protocol and questionnaires. When several of this constructs did emerge as related to the decision process, there were strong, triangulated measures on which to ground the emergent theory. Eisenhardt (1989) notes also that it is most important, that theory-building research is begun as close as possible to the ideal of no theory under consideration and no hypothesis to test. Thus, investigators should formulate a research problem and possible specify some potentially important variables However, they

should avoid thinking about specific relationships between variables and theories as much as possible, especially at the outset of the process.

The use of case research including qualitative techniques is deemed most appropriate for this research, considering that "richness" of theoretical exploration is most likely to be obtained through this method. According to Banoma (1985) case research is not based on some "objective reality", and is context reflective and sensitive. He noted further that:

> "…the goal of data collection in case research is not quantification or even enumeration, but rather: description, classification, theory development, and limited theory testing. In a word, the goal is understanding." (Banoma, 1985, p.201).

Suggested data sources can include: documents, archival records, interviews, direct observation, participant-observation, and physical artefacts.

A research design shows how the researcher got from literature review, which created initial questions for obtaining data. The literature suggestions should be treated only as a guideline during interviews in order to allow a real-life free flow of information. Following suggestions by Eisenhardt (1989) this research specified certain constructs, which have inspired creation of questions. The focus of the study is on empirical investigation and exploration, despite some of the relationships have been confirmed in other studies reviewed in the second chapter.

3.1.4 Case selection

Researchers emphasize that the process of selecting cases is important. Some argue that that the number of cases is not an important issue (Eisenhardt, 1989; Glaser, 1978; Yin, 1981), while others suggest that the more cases studied the better (Yin, 2003). What is essential is that cases are selected from an appropriate population, which does not have to be random:

> "…the concept of population is crucial, because the population defines the set of entities from which the research sample is drawn. The cases may be chosen to replicate previous cases or extend emergent theory…While the cases may be

> chosen randomly, the random selection is neither necessary nor even preferable (Eisenhardt, 1989)

According to Yin (2003) it is vital that a unique case or an array of multiple cases are identified properly prior to formal data collection. The screening may consist of querying people knowledgeable about each case candidate. When the eligible number of candidates is large, a two-stage screening procedure is applicable. The first stage should consist of collecting relevant quantitative data about the entire pool from some archival source (data bases) of a central organisation; the second stage can then follow the screening procedure based on contact with knowledgeable people.

The next step after selecting suitable cases is the consideration of the actual content of the research design. The task of designing case studies should be guided by a plan that is a research design. Unfortunately, case study research designs have not been codified (Yin, 2003), but it can be generally described as a logical plan for getting from here to there, where "here" may be defined as the initial set of questions to be answered, and "there" is some set of conclusions. The main purpose of the design is to help to avoid the situation in which the evidence does not address the initial research questions.

The unit of analysis for a case might be a country's economy, an industry in the world market place, etc. Each unit of analysis would call for a slightly different research design and data collection strategy. And also when one finally arrives at the definition of a unit of analysis, "closure" does not have to be permanent, as the unit can be revisited as a result of discoveries arising during data collection (Yin, 2003).

3.1.5 Within- and cross-case analysis

Within-case analysis typically involves detailed case study write-ups for each site. The write-ups should follow an analytic progression from describing to explaining as suggested by Rein and Schon (1977), from telling a first story about a specified situation (what happened, and then what happened?), to constructing a map (formalizing the elements of the story, locating key variables), to building a theory or model (how the variables are connected, how they influence each other). The process begins with a text, with the researcher trying out coding categories on it, then moving to identify themes and trends, and then to testing hunches and findings, aiming first to delineate the "deep

structure" and then to integrate the data into an exploratory framework (Miles & Huberman, 1994).

The key to good cross-case analysis is counteracting information-processing biases. It is crucial to have understood the dynamics of each particular case before proceeding to cross-case analysis. One tactic is to select categories or dimensions, and then to look for within-group similarities coupled with intergroup differences. While looking at dimensions and categories the researcher has to avoid aggregation, cases cannot be simply lumped together, summarising similarities; and differences, they need to be considered in their social and psychological context (Mishler, 1989). The generation of explanations is based on cycling back and forth between, or synthesising, strategies aimed at understanding case dynamics and at seeing the effects of key variables (Miles & Huberman, 1994). In order to explore possible errors possible deviant cases can be studied (Miles & Huberman, 1994). Additionally without forcing explanations the researcher should look for typologies, trying to avoid preconceptions (Glaser, 1992).

3.1.6 Interpreting Findings

From the within- and cross-case analysis and overall impressions, tentative themes, concepts, and possibly relationships between variables begin to emerge. As a result the central idea is that researchers constantly compare theory and data. Linking data to proposed initially literature can be done in various ways; one of them is "pattern matching", memoing, according to criteria for interpreting study findings.

A memo is write-up of ideas about codes and their relationships as they strike the analyst's momentary ideation based on data with perhaps a little conceptual elaboration (Glaser, 1978). Memos don't report data, they tie together different pieces of data into recognizable cluster, often to show that those data are instances of a general concept (Miles & Huberman, 1994).

Pattern coding is part of first level coding, it can be used in at least three ways: they can be added in tentative form to the list of codes and tried out with the set of transcribed field notes or documents to see whether they fit (Lincoln & Guba, 1985); next from the codes written up in the form of a memo expanded into pattern codes; and also previously established pattern codes can be checked out in a subsequent wave of data collection (Miles & Huberman, 1994). It is useful in the process of coding to display

core, main codes and sub-codes (including pattern codes) on a single sheet of paper. This funnelling procedure is most rewarding during final within-case and cross-analysis report writing.

3.2 Research Study

This section will discuss the research study undertaken in this thesis. This is structured in terms of research purpose, strategy, design, and interpreting findings. An overview of the research study can be seen in Figure 3.1.

3.2.1 Research purpose

The objectives of this research are:

Research Objective 1: to explain the internationalisation process in SMEs in the Irish Life Sciences sector.

Research Objective 2: to apply a multilevel approach, incorporating the entrepreneur, the firm, and the firm's environment, to the study of SME internationalisation.

Research Objective 3: to identify factors influencing the internationalisation process in SMEs and explore how these factors affect the processes.

Given that the research purpose/problem has received little attention in the literature, both the literature and empirical data considering highly context specific SME internationalisation is limited, this research is exploratory in nature. At the same time, the literature on the internationalisation process of both large and small companies provides a theoretical and empirical base for comparative examination. That is, it allows for the identification and examination of deviating patterns in small firm internationalisation, as well as key influencing factors.

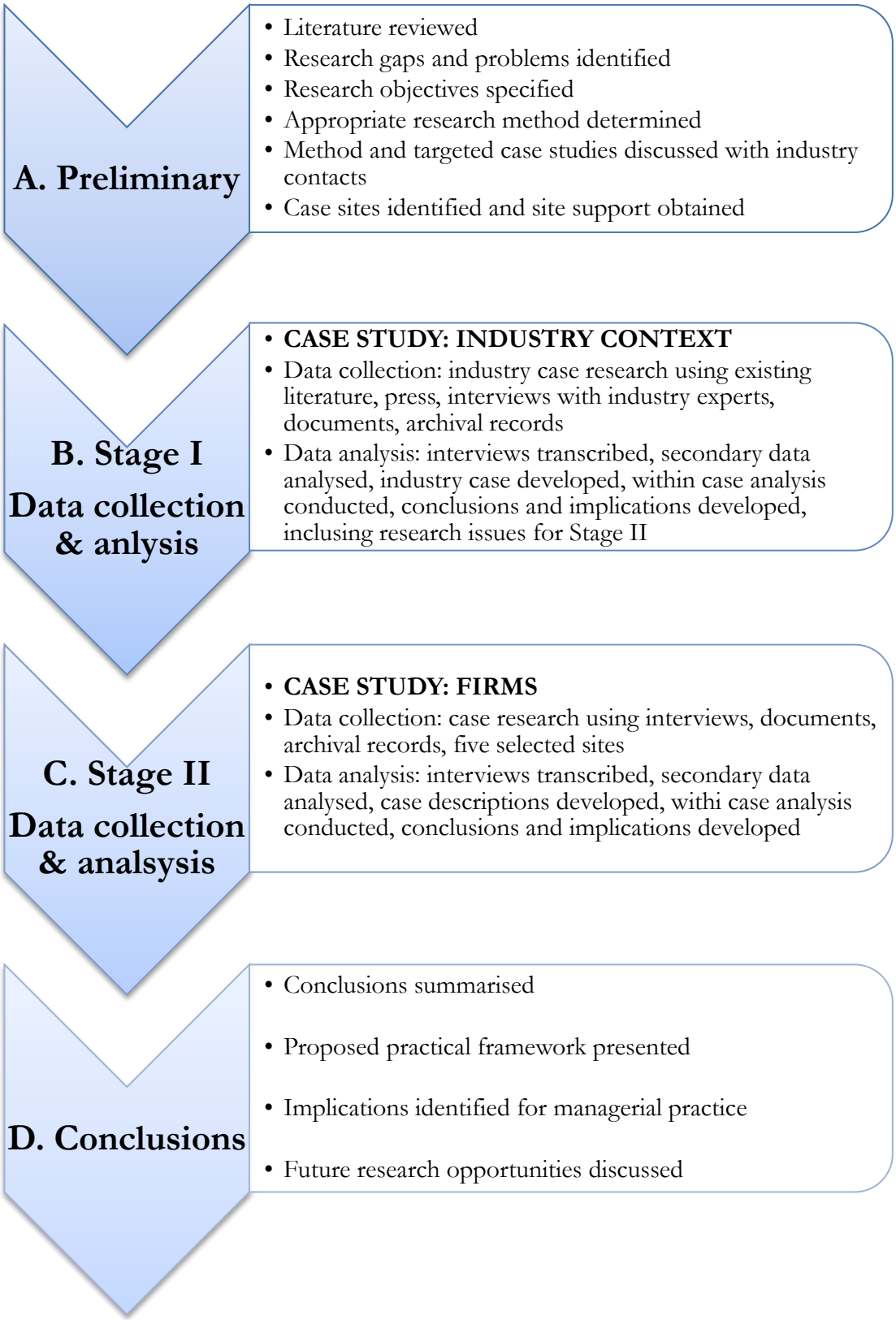

Figure 3.1 The Research Study

3.2.2 Research strategy

In order to address the highly context specific questions of this research the most suitable strategy to uncover the meanings and processes which shape behaviour is the case study method. The case study method allows an understanding of complex and context specific issues related to internationalisation process. Considering that this research is asking mainly "how" questions, a qualitative method, and case studies in particular, appear appropriate as a strategy.

The cases use multiple sources of evidence to allow for triangulation of data. Five company cases, where both archival records, secondary data such as press/company reports, and interviews are presented. In order to explore the context, in which the companies operate the industry case is created. Such case is built on secondary data (publications, industry reports) and interviews with Irish industry experts.

3.2.3 Access to data and case selection

The first screening procedure was initiated in January 2010. Negotiations were undertaken with the Irish business organisations that support the Life Sciences Sector in order to access their data bases. Access to these data bases was not obtained. Therefore the researcher built two data bases, one specifying all the MNE in Irish Life Sciences sector present in Ireland, the second outlining the SMEs in the Irish Life Sciences sector.

The data bases were built based on internet research, information acquired from the CRO (Companies Registration Office), EI Irish Healthcare Directory 2009, information obtained from IDA Ireland, and information obtained from the FAME data base. Cross-referencing of various information sources resulted in the creation of 111 SMEs and 124 MNEs active (in 2010) in Ireland. Further checks on the companies in the databases resulted in the exclusion of the companies that were linked with each other (for example subsidiary or a holding company for another company). This process resulted in the database of MNE reducing to 94 companies.

The data base of 111 SMEs was narrowed down after evaluating to what extent the companies were international; some were focused on the local market. In cases where there was insufficient information to clarify if the firm had international activity I

contacted the firm by phone. This involved phone calls to 70 companies. After the phone calls the data base was reduced down to 84 companies. The group of international SMEs was then divided into groups: 1970s, 1980s, 1990s, 2000+, based on the date of establishment.

In the next stage I contacted various organisations associated with the bio-technology sector in order to establish interviews with various industry experts. This was to create a pool of primary data for the industry case. The industry case is meant to create the context, the picture of the Irish life sciences industry, in which the chosen case companies are embedded.

Several telephone conversations with various organisations were conducted: IBEC (Irish Business and Employers' Confederation); ISME (Irish Small and Medium Enterprises Association); Irish Pharmaceutical Healthcare Association; IDA (Industry Development Agency), EI (Enterprise Ireland); Biotechnology Professors at Trinity College Dublin, University College Dublin, University College Cork, Dublin City University, University of Limerick, NUI Galway; Export Association, Dublin Chamber of Commerce, Irish BioIndustry Association.

Following the creation of the SME data base the second screening stage commenced. A meeting with a knowledgeable in the Life Sciences sector consultant, Mr Michael Gillen was arranged. He represents an organisation called Pharmachemical Ireland, an association of both pharmaceutical and chemical companies based in Ireland. I discussed with Mr Gillen the complete list of SMEs in order to identify the most suitable cases for research into SME internationalisation. A group of 10 companies was identified. Mr Gillen provided me with an introduction to each of the companies, which was hugely helpful in gaining access. As a result of the initial contacts with each of the companies, five of the ten agreed to participate in the research.

The data obtained represents multiple sources of evidence converging on the same facts/findings. In sum for the purpose of stage 1 and 2 of this research, five major data sources were used:

Interviews – in depth, taped personal interviews with key decision-makers in the firm's internationalisation process or with key representatives of academic/industrial organisations working in the industry;

Documents – administrative documents (e.g. checklists, business plans), previous studies of the case sites (where available), news items, industry articles, etc;

Archival records – organisational charts and budgets over time (where available), personnel data;

Direct observation – observations made by the researcher during the visits to the companies; and

Data bases – created by the researcher for indigenous and foreign companies operating in Irish life sciences sector.

3.2.4 Research design

A. Data sources

The data sources in this research are knowledge-intensive Irish SMEs belonging to Irish life sciences sector in particular. This study accepts the findings by Boter & Holmquist (1996) suggesting that to capture effectively the essence of internationalisation of small companies one needs to conduct an analysis, which includes industry, company and individuals running the company. This multi-level approach reflects the fact that in many respects small firms are linked with the environment and are woven into the tight network in a specific industry. Small companies are usually also dependent on certain individuals –the owner manger – and have limited resources. A situation of multi-dependence seems obvious for the small firm, which further underlines the importance of using multilevel approach when studying this category of company.

The interviews were conducted in the companies and with experts external to each company working with them included in-depth questions formulated to cover company history, current situation, internationalisation process, management, individual aspects related to CEOs and teams, and aspects related to industry in Ireland and internationalisation. The interviews with industry experts covered the questions related to the Irish industry, as well as the links between small and large companies.

The units of analysis in this research are: industry, firm and entrepreneur. The units of analysis are defined below:

Industry: Life Science Industry in Ireland. The aim of this section is to draw a picture of the Life Sciences industry. The most recent studies of strategic decision making have stressed that a decision has an objective and subjective side (e.g. Pangiotou, 2008). The perspective of a manager is subjective, their cognition is limited, and managers struggle to generate a picture of their environment. An industry study will show that all the objective links, such as policy, culture and legal influences, co-shape the internationalization process of SMEs in Ireland. Knowing the objective background, the context of each story will enrich the explanation of why certain internationalization patterns have emerged and looking at the context will be helpful in interpreting patterns emerging from case studies.

The empirical analysis is based on a dataset that comprises data derived from a database compiled as part of the project. This data is combined with interviews of 12 industry experts representing government support agencies such as the IDA (Industrial Development Authority) and EI (Enterprise Ireland), private research organizations, Pharmachemical Ireland, Irish BioIndustry Association, Trade Advisory Board to the Minister of Trade, Irish Government's Foresight Committee in Biotechnology, and Professors in Life Sciences in Ireland. Due to the need for confidentiality, the names of all participants are undisclosed and listed as Experts 1-12.

Irish entrepreneurs are not very active internationally in comparison to other small countries such as New Zealand or Israel. Only about 3% of all the exports from Ireland are Irish with the remainder coming from foreign companies based in the country. Ireland is treated by MNE's as an export platform subcontracting low value-added, low skilled manufacturing activities for the European markets and assembly and packaging. Multinationals have contributed to the development of a domestic industry by supplying skills and reputation. However, with the exception of a few successful firms, the majority of domestic firms have not developed the potential for technological and marketing linkages with multinationals, suggesting a weak absorptive capacity (Girvatana, 2005).

The Life Sciences sector is a part of the pharmachemical industry and includes the chemical and pharmaceutical industries, although these are usually considered separately because of their distinctive characteristics. In Ireland, both industries are interlinked and quite often small plants deal with both chemical and pharmaceutical products. As a

consequence, both will be discussed jointly in this research. The focus of this research is the Life Sciences industry. It is defined in Ireland as therapeutics, pharmaceuticals, diagnostics and medical devices, although internationally the definition is much broader. Similarly bio-technology in Ireland has limited scope. One of the industry experts explained:

> "In the US bio-tech means only bio-tech pharma, in Ireland, EI is happy to include in bio-tech all three categories:
>
> 1. bio-tech pharma – pharmaceuticals, mainly dealing with molecules
> 2. diagnostics – various medical tests
> 3. medical devices- catheters etc." (Expert 9)

Firm. The European Commission (Commission, 2003) and the World Bank (2003) use statistical concepts to define SMEs. The EU defines an SME as a company that has fewer than 250 employees, with either annual revenue not exceeding €50 million or an annual balance sheet total not exceeding €43 million. In addition, it must be independent, which means that less than 25% is owned by one enterprise (or jointly by several enterprises) falling outside the definition of an SME or a micro-enterprise, whichever may apply. This threshold may be exceeded in the following two cases:

> when the enterprise is held by public investment corporations, venture capital companies or institutional investors, provided no control is exercised over the enterprise;
>
> when the capital is spread in such a way that an enterprise can legitimately declare that it is not owned up to 25 % by one or more enterprises falling outside the definitions of an SME (2003)

The definition used currently by the SME Department of the World Bank works is: microenterprises to 10 employees, total assets of up to $10,000 and total annual sales of up to $100,000; small enterprises to 50 employees, total assets and total sales of up to $3 million; medium size enterprise up to 300 employees, total assets and total sales of up to $ 15 million.

Considering that the research is based in the EU, it seems appropriate to adopt the pictured above EU definition of an SME when selecting companies for the study.

The entrepreneur/owner. Individual sample elements were upper-level mangers (CEOs) or owners of the company and Irish industry experts. On the company and individual level they included Managing Director, Chief Executive or Chief Financial Officer, as well as Board members, where possible. Using these executives ensured respondents who were best able to express company intentions, polices, and procedures. Also it was anticipated that most of these elements were directly involved in decision making with regards to internationalisation, and should have been able to provide responses based on personal experience.

B. Stage 1 of the research

Stage one of the research utilises the case study method to examine the phenomenon of SME internationalisation in Irish Life science sector, looking at the Irish Life Sciences industry as a context for SME internationalisation. As the unit of analysis is an SME in Irish Life Sciences sector, the industry case is unable to give answers about this process in individual cases, but it creates a canvas for understanding the process.

Stage one was based on evidence coming from various publications related to this industry, two data bases created (indigenous SMEs and foreign MNE in Ireland) as well as interviews with 12 industry experts. The interviews with 12 industry experts were undertaken in 2010:

IDA - Business Development Manager Life Sciences (Expert 1)

Professor of Pharmaceutical Chemistry, University College Cork (Expert 2)

Development Advisor at Enterprise Ireland **(**Expert 3)

Consultant at Circa, specialist in biotechnology and life science (Expert 4)

Senior Development Advisor at Enterprise Ireland **(**Expert 5)

Development Advisor at Enterprise Ireland (Life Sciences, Biotechnology) (Expert 6)

Development Advisor at Enterprise Ireland (Expert 7)

Senior Executive at Pharmachemical Ireland (Expert 8)

Chairman at Irish BioIndustry Association (Expert 9)

Senior Investment Advisor at Enterprise Ireland **(**Expert 10)

2008 Ernst & Young Entrepreneur of the Year (Expert 11)

Professor at UCD (Chemistry and Chemical Biology) (Expert 12)

The experts were asked about the Life Sciences industry in Ireland from its formation to the current state. They were asked to comment on differences between home markets and foreign markets in terms of the level of industrial development, level of education, cultural differences and differences between foreign owned companies and indigenous SMEs. They were asked to give their opinion about the interaction of multinationals based in Ireland and indigenous SMEs. They were asked to comment on business support available to both groups, but with emphasis on internationalisation of indigenous SMEs.

The sources of evidence were multiple, and cross-referencing the interviews with publications found in press, as well as information coming from the two data bases allowed for the inclusion of a broader range of historical, attitudinal and observational issues. More importantly it allowed for within-method triangulation in the research effort by focusing on converging lines of inquiry, which results in enhanced construct validity.

The industry case study database includes:

verbatim, typed transcripts of interviews

recordings of the interviews (approximately 10 hours)

summary notes based on case transcripts

publications related to the Life Sciences industry

data base of 94 MNE foreign companies based in Ireland and 84 indigenous SMEs based in Ireland

The industry case report can be found in chapter 4, under section 4.1

C. Stage 2 of the research

Stage 2 of the research also uses the case study method to examine SME internationalisation in Irish life sciences industry. Stage two is the core of the research conducted in this study as it is focussed on the firms.

Yin's (2003, p.83) "Three Principles of Data Collection" are followed in this research in that:

multiples sources of evidence are used;

a case study data base is created; and

a chain of evidence is maintained.

The way the principles have been applied is discussed below after the study questions, unit of analysis, and the logic linking data to literature.

Stage two was based on evidence coming five case studies of companies. Each case study is based on interviews (Table.3.1) with key decision makers in the company, such as CEOs, owners, senior managers or board members. In order to validate the information obtained from the company, I conducted interviews with EI consultants in charge of support for the specific companies.

Table 3.1 Overview of the interviews conducted in each of the cases

Firm A	Firm B	Firm C	Firm D	Firm E
CEO, Case A x 2	CEO, Case B x 3	CEO, Case C x 4	CEO, Case D x 3	CEO, Case E x 2
	Manager, Case B x 1	Manager, Case C x 1	CFO, Case D x 1	Board member, Case E x 1
Consultant, Case A x1	Consultant, Case B x 1	Consultant, Case C x 1	Consultant, Case D x 1	Consultant, Case E x 1

Each case study includes:

recordings of the interviews;

verbatim, typed transcripts of interviews;

summary notes based on case transcripts;

publications related to each company, if available.

The descriptive case analysis of the five case companies can be found in the section 4.2

D. Pattern guidelines

The literature guided the creation of the study objectives. Based on these objectives the following structure of the case study was developed. It is presented by major headings and key points:

Background of the company: For example, location, products and services, financial situation, senior management, operations, how the organisation works, interaction between the team and the entrepreneur.

Routes to internationalisation: Variables possibly relevant for company internationalization (Based on the constructs suggested in chapter II: Firm's Environment, Network Development, Knowledge, Learning, Experience, Commitment and Trust Building, Entrepreneurial Characteristics.

Prior experience of the founder: Background and the characteristics of the entrepreneur/owner, as well as a description of his way of problem solving/learning.

Industry: The position of the company in the industry context.

The interviews were designed to be free flowing, with the interviewer trying to pick-up on relevant to company internationalisation variables. This allowed for the possibility of new ideas emerging during the interviews. In conducting the interviews no answers were imposed or suggested to the interviewee. I had to sometimes to "talk back" to label particular topics they talked about or confirm understanding of the problem. Overall, I focused on trying to understand internationalisation and all the relevant factors represented by the respondents. The name of a firm and personnel are disguised and financial data may be altered to ensure confidentiality.

E. Analysis

The analysis of transcripts allowed for ideas to appear during the process. They were registered as memos throughout the whole process of data analysis. Memos allowed for the tying together of codes and ideas, as relationships between concepts appeared spontaneously during analysis, e.g. "trust" was strongly linked to commitment in most

interviews. Memos helped to establish linkages appearing between codes and sub-themes, and themes.

The analysis of transcripts into codes was repeated multiple times to look for themes, that might emerge. Many memos did not lead to the development of a theme. If several elements seemed to link, the researcher double-checked it with existing literature to discover the possibility of a joint theme connecting them.

Many codes appeared during the first stage of analysis: industry, networks, culture, learning, international markets, human resources, team work, company environment, product, experience, trust, local Irish context, partners/collaborators, technology, finance, communication, passion/satisfaction, flexibility, image, credibility, control, cluster, size, perseverance, family, etc. Several of these codes appeared very rarely, and therefore have been omitted as less relevant. The codes were helpful in identifying sub-themes, which lead subsequently to identification of major themes appearing across cases. The main method was finding sufficient contrasts between the patterns and the way themes were linking. The themes were contrasted with the overall case knowledge and understanding of the industry context to identify linkages.

3.3 Design reliability and validity

For both stages of the research, the issue of reliability and validity must be considered, where:

Reliability: demonstrating that the operations of the study can be repeated with the same results, i.e. the results are stable, dependable, and predictable;

Validity: demonstrating that the data is unbiased and relevant to the characteristics being measured.

To address these issues, key sources were consulted in the case research literature (Eisenhardt, 1989; Yin, 1981, 2003), and qualitative research literature (Miles & Huberman, 1994).

To ensure reliability, procedures suggested by Eisenhardt (1989), Yin (2003), and Miles and Huberman (1994) were followed, as previously discussed. Stage I and II interviews were recorded and transcribed verbatim, allowing for external investigation of the data.

To ensure internal validity, a variety of analytical techniques were employed. This is particularly relevant in the explanatory areas of the research (e.g. the examination of SME internationalisation patterns as compared to the literature). In Stage II, pattern-matching and explanation-building techniques were utilised, as per Yin (2003) and Eisenhardt (1989). That is, to ensure stronger internal validity and generalizability in formulating relevant variables, emerging concepts were tied with existing literature. Conflicting findings provided an opportunity for conceptual development, and similar findings helped provide stronger internal validity, and wider generalisation (Eisenhardt, 1989). Pattern matching also occurred in Stage I data analysis where Stage II data was matched back to the findings of Stage I.

To ensure external or criterion validity, the research followed Eisenhardt's recommendation for replication logic in the form of a series of five in depth case studies (Stage II). This was preceded by the context specific industry study. Also, the relationships between constructs in each of the Stage II cases were verified through cross-site analysis (Miles & Huberman, 1994). This approach focused on analytical generalisation whereby the replications were used to develop conceptual frameworks related to SME internationalisation. Stage I was used to refine the Stage II findings.

To ensure construct validity for Stage I and II, multiple sources of evidence were used (Yin, 1981, 2003), and a chain of evidence developed. Thus, external investigation of the research is able to trace the data analysis procedures with clear derivation of evidence from research questions to the study's conclusion. To this end, specific interviews and documents are cited, as are the circumstances of their collection

Transparency has been ensured by an explicit, clear and open explanation of the literture initially guiding the research, as well as the use of clear methods and procedures applied to the access and generation of data. There was a conscious examination of research strategies, selection of participants and decisions made in collecting and interpreting data. It is clear why a qualitative inquiry with a replicable process of data collection were applied. The researcher constantly reflected on the research process. Collecting data in a naturalistic settings such as companies required adjustments to procedures; for example, some respondents did not want to be tape-recorded.

Chapter IV Case Data

As noted in the previous chapter, this research comprises two stages. The first stage involves secondary and primary research into the Life Sciences industry in Ireland. The purpose of this first stage is to develop an understanding of the context in which the case companies operate. The second stage involves a multi-site case methodology focusing on five SME firms in the Irish Life Sciences industry. The main research objective relates to how SMEs internationalize.

This chapter presents the results of Stage I and Stage II of the research. It begins by presenting the industry context. This is followed by the presentation of five case studies. The thematic analysis extracted from the case studies is presented in Chapter 5.

4.1 Industry context

The local Irish context is very specific, and studying internationalisation in a context allows for an understanding of the forces that influence local industry, what are the local effects, how SMEs respond to internationalisation. The industry context is about realising both competitive advantages and challenges faced by Irish entrepreneurs. Irish Life Sciences SMEs face environmental conditions that are complex and uncertain. In order to understand the complexity they face, the researcher must be aware of the nature of the local environment. One critical and indispensable way of achieving environmental awareness is through conducting local industry studies, i.e. the gathering of accurate environmental information.

4.1.1 International pharmachemical industry

The chemical industry is central to modern world economy, converting raw materials (oil, natural gas, air, water, metals, and minerals) into more than 70,000 different products (Morris, 2003). Chemical industries can be traced back to Middle Eastern artisans, who refined alkali and limestone for the production of glass as early as 7,000 BC. In the 6th century BC the Phoenicians were producing soap and by the 10th century AD the Chinese had developed black powder, a primitive explosive. In the middle ages, alchemists produced small amounts of chemicals and by 1635 the Pilgrims in Massachusetts were producing saltpetre for gunpowder and chemicals for tanning

(Morris, 2003). However, large-scale chemical industries did not begin until the 19th century as part of the Industrial Revolution. In 1823, the British entrepreneur James Muspratt started mass producing soda ash (needed for soap and glass) using a process developed by Nicolas Leblanc in 1790 (Morris, 2003). Advances in organic chemistry in the last half of the 19th century allowed companies to produce synthetic dyes from coal tar for the textile industry as early as the 1850s. In the 1890s, German companies began mass producing sulphuric acid and around the same time chemical companies began using the electrolytic method, which required large amounts of electricity and salt to create caustic soda and chlorine (Brock, 1992). Man-made fibres changed the textile industry when rayon (made from wood fibres) was introduced in 1914. The introduction of synthetic fertilizers by the American Cyanamid Company in 1909 led to a green revolution in agriculture that dramatically improved crop yields. Advances in the manufacture of plastics led to the invention of celluloid in 1869 and the creation of such products as nylon by Du Pont in 1928 (Brock, 1992). Research in organic chemistry in the 1910s allowed companies in the 1920s and 30s to begin producing chemicals for oil. Today, petrochemicals made from oil are the industry's largest sector. Synthetic rubber came into existence during World War II, when the war cut off supplies of rubber from Asia. Since the 1950s growing concern about toxic waste produced by chemical industries has led to increased government regulation (Brock, 1992).

The origins of pharmaceutical industry can be traced to the chemical industry, at the end of late eighteenth century in Switzerland in the dye sub-sector, when it was found that dye had antiseptic properties a number of these companies turned into pharmaceuticals, including Hoffman-La Roche, Sandoz, and Ciba-Geigey (Angell, 2004). Another origin is the drug store. The first known drug store was opened by Arabian pharmacists in Baghdad in 754 and many more soon began operating throughout the Islamic world and Europe. By the 19th century many of the drug stores in Europe and North America had developed into larger pharmaceutical companies. Most of the "Big Pharma" companies were founded by the end of the 19th century and beginning of 20th century. Key discoveries of the 1920s and 1930s (e.g. insulin and penicillin) became mass-manufactured and distributed and countries such as Switzerland, Germany, Italy, UK, US, Belgium, Netherlands developed strong industries (Angell, 2004). The industry expanded rapidly in 1960s and was followed by the introduction of tighter regulatory controls in countries, including introduction of a fixed

period for patents of branded products. Patents protecting both processing and manufacture, and specific products caused closures of small companies. The industry became increasingly concentrated, especially after a wave of mergers and take-overs took place in the 1990s (Angell, 2004).

4.1.2 Pharmachemical and Life Sciences industry in Ireland

Figure 4.1 describing the establishment of currently existing Irish SMEs is based on a database of 84 pharmachemical companies (the database was created through cross-referencing of the Fame database, Irish Companies Register Office and the EI Irish Healthcare Directory 2009). The companies are very diverse and as Expert 5 suggested they have little in common:

> "It is very difficult to get them into the boardroom to discuss anything, because they have nothing, most of them have nothing in common except that they are SMEs". It seems that the lack of cooperation between SMEs is one of the weaknesses of the indigenous life sciences sector and is difficult to resolve considering that the sector is quite small." (Expert 5)

The other part of the Life Sciences sector consists of MNC based in Ireland. It can be seen in Figure 4.2 how these companies settled in Ireland. The Figure 4.2 shows the establishment of currently existing foreign MNE in Ireland based on a database of 94 companies, created through cross-referencing the database of pharmaceutical and chemical companies in Ireland with the companies register office.

As can be seen in Figure 4.1 and 4.2 there was only limited activity of international pharmachemical companies before the 1930s. In 1934, an Irish pharmaceutical company, Ovelle Ltd, was established to develop and produce dermatological pharmaceutical and healthcare products. The next Irish pharmaceutical company was Pinewood established in 1937.

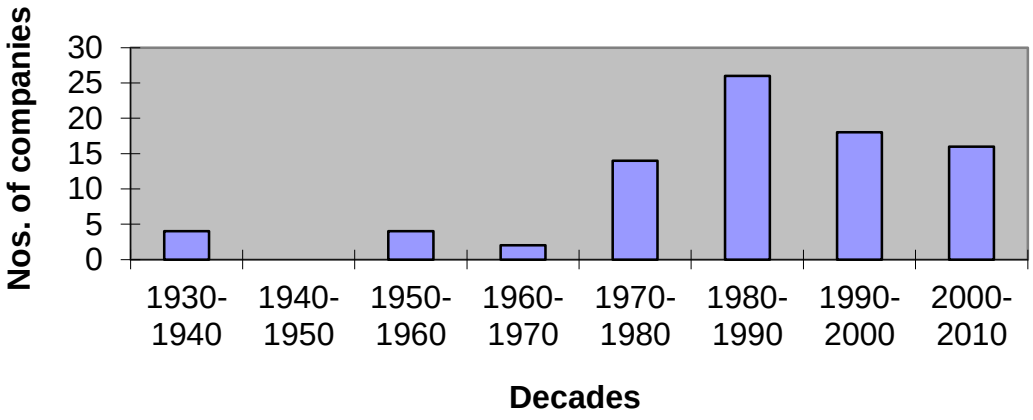

Figure 4.1 Irish owned SMEs in Life Sciences sector over time

A UK company Crown Berger Distribution Limited was also established in 1934 (the name changed to Akzo Nobel (CR9) Ltd in 2008), producing and distributing paints. The UK company Chares Tenanat Ltd operated in Ireland from 1810 and Dulux Paints Ireland Ltd from 1910, and Boc Gases arrived in Ireland in 1935.

> "There was one Irish pharma company Pinewood, established in 1937, which was grown and sold subsequently to an Indian company, but it was more an isolated case. Ireland never had much of an indigenous pharmaceutical industry, the real base was built by the multinationals that came in and most of those would have come in were like Pfizer, Mercer, Smithkline Beecham to manufacture the API's or the active pharmaceutical ingredients." (Expert 1)

The Irish economy was based mainly on its natural resource base (livestock and livestock products) at the time of Independence in 1922. Other industries served the small local economy or provided raw materials for export to more developed economies, particularly the UK. Over the next 40 years this situation did not change much. Irish emigration continued at a very high level, with approximately 50% of the people born in the country emigrated, and the government adopted an insular and conservative policy towards economic growth. The lack of industry can be seen in the balance of exports/imports for 1950, where only 1.5% of exports accounted for chemicals, metals and engineering products. At the same time imports were the opposite, 27.7% of imports were chemicals, metals and engineering products (Farley, 1973, p.613). This state was reflected by a very inward-looking Irish policy. For example, the Control of Manufacturers Act (1932) required that controlling powers and control of foreign companies establishing in Ireland should be given to Irish nationals. High import tariffs were also maintained, with values for chemicals as high as 40%.

This inward orientation continued into the first half of 1950s, but after the economic crisis in early 1950s the government started introducing more progressive policies, which attracted foreign capital. The most significant changes happened in 1958, when government abolished high import levies and published the Economic Development Plan, stressing the need for improved productivity in all sectors. As a consequence of this document, the government published two economic expansion programs for 1959-64 and for the remainder of the 1960s, in an attempt to attract foreign capital by introducing tax concessions for industrial exports. As a result, four major foreign companies arrived in the 1960s (Figure 4.2).

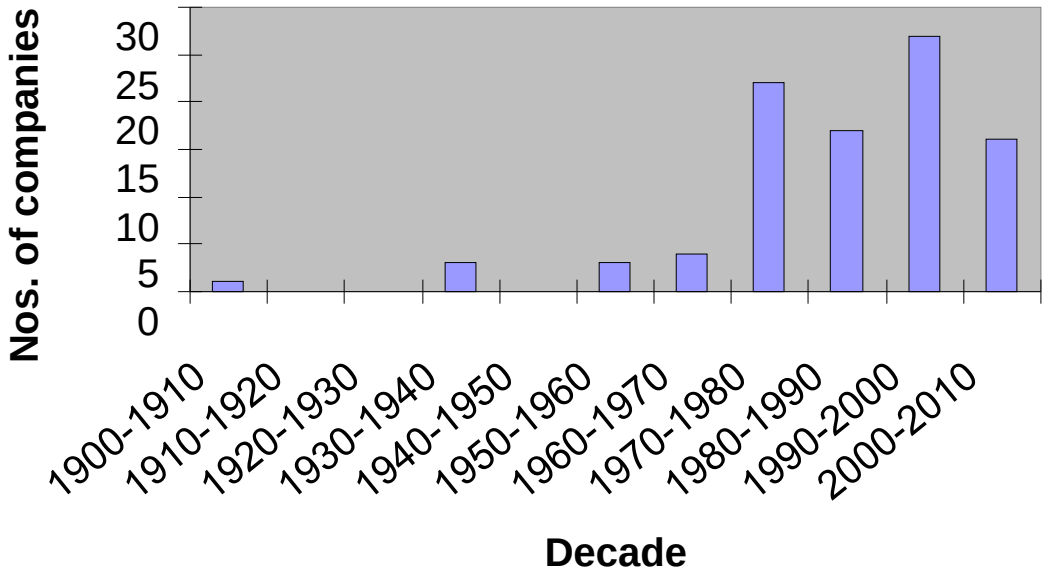

Figure 4.2 Foreign owned MNE based in Ireland over time.

The Big Pharma companies started arriving in Ireland in 1950s. Bristol Mayers Squibb Pharmaceuticals arrived in 1955, as did a French chemical company Evode Industries Ltd and GlaxoSmithKline Ltd. Rowa Pharmaceuticals established in 1959. A comparable number of Irish companies were also created including Albatros Ltd (1953), manufacturing fertilizers and nitrogen compounds, Irish Drugs Ltd (1953),

manufacturing animal healthcare and pesticides, and Manders Coatings and Inks Ltd (1955), manufacturing and distributing printing inks.

Irish SMEs at this time only dealt with chemical products, as the character of pharmaceutical companies was not conducive towards the creation of niches for SMEs. Most large companies were fully vertically consolidated at the time. They managed all the processes from early discovery and development, through to production, sales and marketing. These companies had (and continue to have) global sales and marketing networks, meaning they could recover development costs in as many countries as possible. At the time patents laws did not exist, which meant that MNE would only license their products in the markets where they had no direct presence and only to reputable companies. In other European countries like Italy and Germany, SMEs were flourishing by manufacturing and marketing copies of drugs developed by larger companies (Angell, 2004). This process did not take place in Ireland as the industry was still underdeveloped at the time. The government continued reforms by introducing capital grants to industrial producers in 1959, signing the Free Trade Agreement with the UK in 1965, and finally abolishing the Control of Manufacturers Act in 1968. As a result, the rate of growth in the pharmachemical accelerated reaching 40% between 1958 and 1966 (Broderick, 1967).

4.1.3 Industry consolidation

The pharmaceutical industry in Ireland grew rapidly in the 1970s due to favourable legal changes at the end of 1960s. Moreover, the newly established Industrial Development Authority (IDA) successfully set up a focused strategy for identifying emerging growth sectors and their star companies, and targeting potential foreign investors via an aggressive direct marketing approach (White, 2000). The chemical industry was one of the targeted industries. As a result, about 22 MNEs established their operations in Ireland and 14 Irish SMEs were established in the 1970s.

Internationally the industry consolidated as MNEs acquired companies in countries where they had no direct presence and stronger national units merged to form strong units better able to compete with expanding MNEs. Large MNEs would swap products at various stages of development to optimize their product range and would refuse to out-license, unless offered product in return. The stronger national companies would

in-license branded products in their home market from MNEs and other national companies.

4.1.4 The arrival of the Biotech Industry

From the early 1980s, a new force entered the pharmaceutical arena, namely biotechnology. Following the discovery of the DNA structure in 1953 and new knowledge of genetic blueprints that direct protein growth by messenger RNA, scientists were able to clone proteins in the laboratory. Knowledge of a specific protein function in the body (e.g. to stimulate infection-fighting cells or to block a destructive internal process) allowed physicians to induce desired reactions in patients by injecting biotechnology-produced cloned proteins into the body. Though biotech companies managed to create and patent many exciting new treatments in the 1980s, they tended to be small and lacking the structure and marketing skills to sell their products. This can be seen in rapid growth of the SME sector; 26 Irish owned SMEs were created in the 1980s and about 17 new MNEs established their operations in Ireland. This trend has continued throughout the 1990s and the 2000s. One expert described the development as:

> "The late 1990's and early 2000's when companies like the Wiren Facility in Grange Castle came in followed by companies like Central Core, Merck after just building a facility in Carol at the moment Eli Lily down in Kentz. So there is clearly a shift towards the biologics but that's also mirroring what is happening internationally." (Expert 1).

With the shift in the industry towards biotechnology the importance of small scale discovery research increased, which was conducted at the universities. The university research in Ireland faced, however, financial difficulties. The foreign MNEs based in Ireland showed little interest in R&D, but the international large multinationals would send consultants to Ireland to search for new academic ideas to buy:

> "The multinationals coming from abroad show interest in cooperating with the academics and they will see maybe for instance a particular level of expertise in Trinity College in Alzheimer's or that kind of area in the Institute of Neuroscience. GSK have done a project exactly along those lines where they have actually teamed up with the academics in Trinity. This cooperation does not come from local multinationals, rather from R&D centres looking for new products internationally." (Expert 1)

Expert 2, 3, 4, 12 also suggested that foreign multinationals operating in Ireland did not play any significant role in supporting the development of Irish indigenous industry or research. The financial difficulties at Irish universities contributed towards a relatively late development of academic recourses in Ireland:

> "There was no money for academic research in Ireland before 1999, academics were trying to fund PhDs from teaching, after that EI brought a small scheme to support research, and there were virtually no PhDs in engineering before 2000. PhDs currently have to travel internationally to gain the experience, as R&D in Ireland is weak. Industry is based on manufacturing. There are very limited benefits to SMEs. Process development became less important for SMEs with the change in the markets, and escape of the markets to India and China." (Expert 12)

The investment into research after 2000 created a rapid change in the position of Irish academia internationally and small research companies started to spin-out as a result of increased research activities:

> "It made all the difference. Suddenly there was money and the country began to invest in science (…). And you need only look at the metrics. In certain areas we're now competitive internationally, and immunology is the big one that we're involved in. It is staggering what we have achieved there. In the space of 10 years we went from nothing to third in the world.
>
> "The key metric in our game is what's called citations. So if you make a discovery, how do you know it's important? Someone mentions it, someone cites you in their work. Our average citation per paper in the 10-year period went up hugely and in 2009 we were ranked third behind the US and Switzerland, so that was a great achievement."
>
> Prof. Luke O'Neil in Business and Leadership magazine, 23.06.11," "Pioneering researcher Luke O'Neill on Ireland's life sciences sector transformation".

The Irish Government realised by the late 1990S that it was time to fund scientific research, and commissioned a major study into the sector. The result was the establishment of the Technology Foresight Fund, with an allocated budget at the time of €646m (Expert 4). SFI was established in 2000 to administer the fund. The academic experts suggest, however, that it takes time to create a strong academic pool:

> "This is a long-game sector. When you look at the financial side of it, many people don't like funding science because it's too long, there's no immediate

> reward. Plus, it's risky because you're trying to discover brand new things. You're trying to create brand new knowledge, so it's difficult; people have to have a lot of patience. One of the challenges we will face now is sustaining this progress in an economic downturn."
>
> Prof. Luke O'Neil in Business and Leadership magazine, 23.06.11," "Pioneering researcher Luke O'Neill on Ireland's life sciences sector transformation

Several experts agreed with Prof. O'Neil in that they identified the major challenge for the Life Sciences sector in Ireland as the lack of finance, but also that scientists do not have enough small R&D companies to learn the business side of running a company (Experts 12 and 2). According to Expert 12, prior to Enterprise Ireland (EI) increasing its available supports for R&D and the establishment of SFI in 2000, there was limited support for R&D in Ireland. The lack of government and agency support of industrial or academic research was a significant factor in preventing the development of the indigenous life sciences development. Prof. Luke O'Neil, a specialist in biotechnology in Trinity College in Dublin argues:

> "I believe the job of government is to fund the risky basic research, because venture capital won't. However, then you must have a system through which that can be commercialised and that's not the job for government. That's a job for the private sector to take on and that's the way it should flow really. If you don't have the latter, then that key part of the chain is missing and that government investment is not fully realised."
>
> (Source: Business and Leadership magazine, 23.06.11, "Pioneering researcher Luke O'Neill on Ireland's life sciences sector transformation")

The availability of funding for academia through government is also closely linked with the aspect supporting research development both in academia and in SMEs through the availability of venture capital (VC) in Ireland, which means government funding becomes effective if it is combined with availability of private venture capital funding.

> "…the first VC group Growcorp was created in 2000. Their focus was on opportunities in therapeutics, pharmaceuticals, diagnostics and medical devices. Similar focus on life sciences has Seroba Bioventures. The majority of VC is available in US, and this is one of the reasons why the companies very early on create international links" (Expert 8).
>
> "Life sciences are very risky for VCs, the least risk is involved with device companies, which do not require as expensive clinical trials and the risk reduces

> as the process progresses. With biotech, like pharmaceuticals, as you go through the process risk increases. You can get very promising results in Phase I and Phase II and then it can go wrong in Phase III, at which stage you might have spent €40 million" (Expert 9).

> "The most attractive exit strategies for VCs are IPOs and trade sales. IPOs are very difficult in Ireland at the moment, so the prevailing model is a trade sale" (Expert 10).

The finance pressures on SMEs usually trigger the need to sell a company. Indigenous Irish SMEs have a tendency not to grow in this sector for too long, because they have to follow the model as:

> "…there is a window in there typically around 5 years, when investors would like to get a return on their original investment …they kind of put pressure on a company to sell." (Expert 11)

As can be seen historically, both R&D in academia and in SMEs started relatively late in Ireland at the end of the 1990s. This was mainly due to the lack of governmental funding as well as a lack of VC. This finding suggests that in order to kick-start the creation of SMEs in biotechnology, governmental funding or VC for SMEs and academic research are needed. In a way, it can be seen in the subsequent development in Ireland, that this issue started to be addressed. The situation changed slowly, mainly through an increase in funding for academia. The process of accumulating in Ireland academic expertise is, however, quite slow. Foreign owned MNEs tend to look for academic expertise to hire, while SMEs do not have as much opportunity to tap into this knowledge pool. According to several Experts, it seems more likely that academic postgraduates in Ireland will find first employment abroad and gain their relevant business development experience, and some of them are likely to return to Ireland to establish an SME in life sciences sector. SMEs in life sciences sector in Ireland are still quite low in numbers and definitely lacking an overlap of expertise with other SMEs, which makes cooperation difficult if not impossible. They tend to focus on narrow niches relating to particular diseases, e.g. diabetes or kidney tests, which are clustered internationally rather than locally. They also become in most cases international from inception as they require VC to invest in research, and most VC is available abroad. Considering that VCs impose deadlines on companies related to the return on

investment, such companies usually do not remain independent, but are sold at a certain point. Trade sales are currently the most popular exit option for VCs in Ireland.

4.1.5 Current pharmachemical industry in Ireland

The chemical and pharmaceutical sector in Ireland is not typical of those in other countries, with virtually no petrochemical industry and very little production of bulk chemicals (Expert 4). The sector in Ireland is currently characterized by new state-of-the-art manufacturing facilities producing high-tech, high-value specialty chemical and pharmaceutical products for export. In most economies chemicals and pharmaceuticals are classified separately, but in Ireland these sectors are interlinked as companies tend to do both. The recent trend in chemical industry shows increased influence of bio-technology on the chemical industry.

According to Forfas, based on databases of EI, IDA, Shannon Development and Udaras na Gaeltachta, there were 114 Irish-owned firms and 146 foreign owned firms in the Irish pharma-chemical industry in 2009. The numbers identified by these support agencies are higher than those published by the Irish Central Statistics Office, which gives 201 companies (foreign and Irish) in the pharmachemical industry, based on 2007 statistics.

The picture of the industry is, however, not monolithic. The SMEs and MNEs involved in life sciences in Ireland belong to two different worlds as suggested both by industry experts as well as presented by the statistical data:

> "Well, there are two different corners of one big industry in Ireland, that's what they are" (Expert 4).

As it can be seen in Table 4.1 and Table 4.2 the number enterprises increased between 2000 and 2008, and total exports have been growing steadily (Table 4.2). Looking, however, at the growth of employment in SMEs and MNEs (Table 4.2), it can be seen that the main growth occurred in multinationals. Table 4.2 only refers to firms that are clients of agencies. It seems that the SMEs were unable to take advantage of the industry growth that was mainly based in MNEs in Ireland for manufacturing and formulation purposes. In order to further analyse the historical development in the industry, two databases have been created. The first shows the historical establishment

of SMEs (Figure 4.1) and the second shows the establishment of MNCs in Ireland (Figure 4.2). Figure 4.3 and 4.4 show the geographical locations of both SMEs and MNEs in the Life Sciences sector in Ireland.

Table 4.1 CSO: External Trade Report, 21 January 2010

Exports	Jan- Oct 2008 € million	Jan-Oct 2009 € million
Chemicals and pharmaceuticals	36,891.8	40,662.4
Total Exports	72,041.8	70,943.2

Table 4.2 Forfas Annual Employment Survey, 2009

Forfas Annual Employment Survey **Chemicals Sector**				
	Employment		**Plants**	
	Foreign	**Irish**	**Foreign**	**Irish**
2000	19,185	3,616	136	180
2001	19,983	3,717	137	182
2002	20,347	3,480	131	178
2003	20,803	3,162	131	166
2004	21,279	3,196	131	160
2005	21,315	3,502	127	160
2006	21,257	3,686	126	170
2007	21,527	3,421	122	165
2008	21,230	3,366	120	164
All Enterprise Agency client firms				

Figure 4.3 Irish owned SMEs in Life Sciences sector in Ireland according to EI Life Sciences Directory 2007

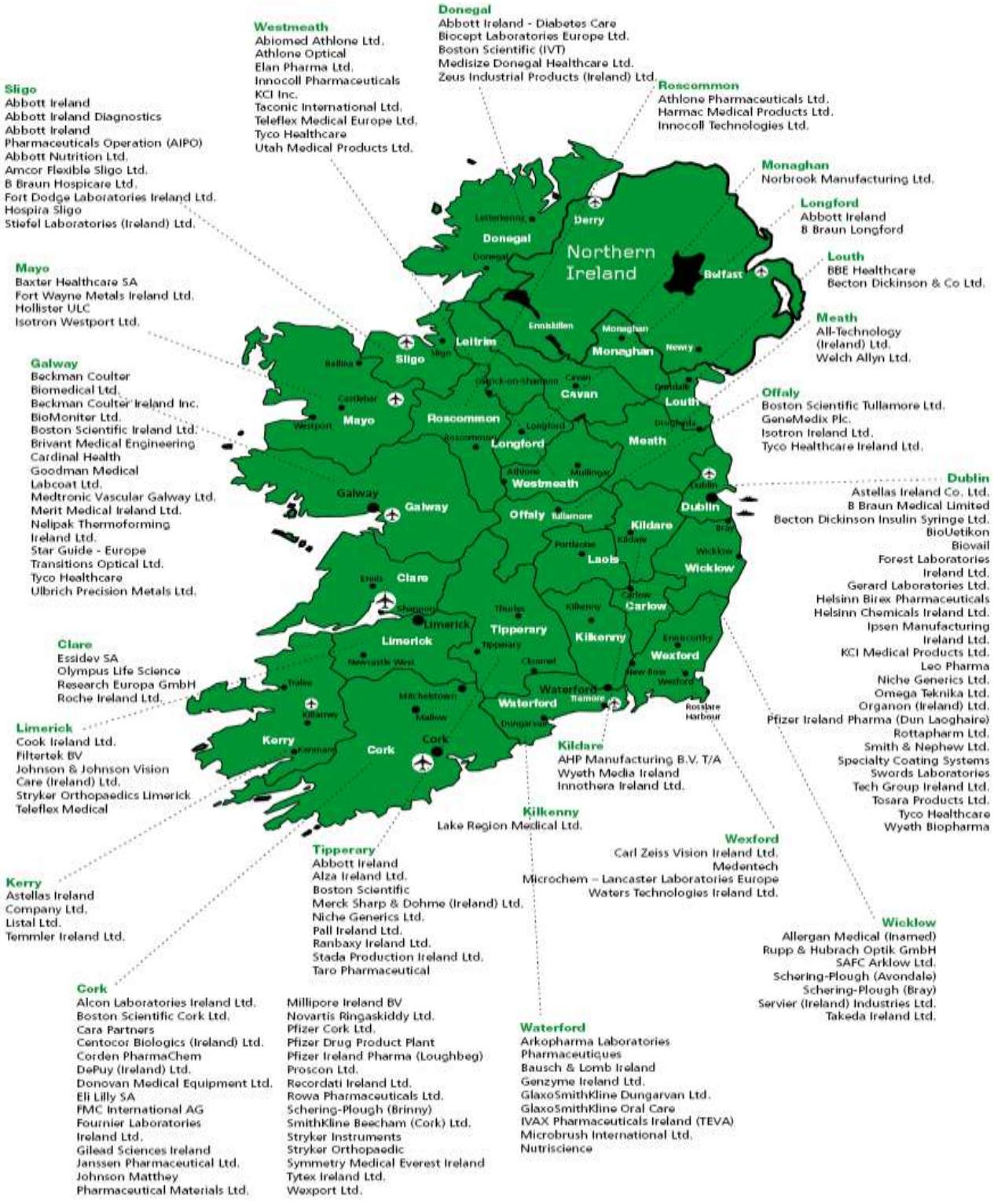

Figure 4.4 MNEs in Life Sciences sector in Ireland, according to EI Life Sciences Directory 2007

FDI (Foreign Direct Investment) for the pharmaceutical sector in Ireland started with arrival of Squibb (now Bristol-Myers Squibb) being the first pharmaceutical company to locate in Ireland in 1964.

> "This sector has been built up from a greenfield start 30 years ago and by now, out of the world's top 15 pharmaceutical around 13 companies have their presence in Ireland. The companies include such familiar names as Johnson & Johnson, Lilly, Merck Sharp & Dohme and Schering-Plough. The growth of these worldwide companies in Ireland has also provided sub-contracting opportunities for Irish companies" (Expert 8).

As it could be seen in the previous analysis, the development of MNEs has not been parallel with the development in the SMEs in this sector. Furthermore there are strong differences within the indigenous SME Life Sciences sector. Expert 5 saw a clear split in the SMEs active in the Life Sciences:

> "…it is probably 20%, 80%, where 20% of the companies that EI deals with, have really formed out of the relationships with the local multinationals. That they had some contact, they had something to sell, they had some service to provide, and they are in there. And then they've used that relationship to leverage business elsewhere or to grow. The other 80% just don't know where to go, how to get into the large pharma in Ireland. And to be absolutely honest we do not really know how to get into large pharma in Ireland either. And it is something that we are working on, traditionally the IDA and Enterprise Ireland have been in their own little boxes and there wasn't enough cooperation, very little cooperation. But I would say in the last 18 months maybe we are doing a lot more stuff together." (Expert 5)

Another problem faced by SMEs seemed to emerge from the lack of sufficient governmental support for SMEs:

> "Ireland has lots of micro companies, hardly any big ones, and they do not get enough support in terms of finance and sub-support. The support agencies are very disjointed. The Colm McCarthy report 2008 developed for the Department of Enterprise, Trade and Employment suggests substantial savings across various agencies through consolidation. The valuable suggestions from the report have not been introduced." (Expert 3).

The graphic presentation from EI's publication in Figures 4.3 and 4.4 suggest that there are clusters in Dublin, Galway, and Cork. There are also publications such as Egeraat (2006, 2007) that suggest that there are geographical clusters around these locations in

the pharmaceutical industry. The interviews conducted with industry experts suggest that the lack of Life Sciences clusters creates a problem for SMEs and limits the potential to develop industry in Ireland. One expert stated:

> "There is the biotech sector's problem. I mean there aren't enough clusters here in Ireland (…). Ireland is a very small economy and the chances are that you could not develop a biotech industry which could be internally subsidised, so it is not possible (…).
>
> I think there is an awful lot of these talks about clusters. The only really obvious cluster in Ireland is the medical devices in Galway, but there is still very little interaction between those companies. There is a lot of informal contacts between them.(…).I do not believe that the concept of cluster within Ireland is as important as it used to be. Irish SMEs are involved in international virtual clusters, as they are currently more important than physical clusters." (Expert 4)

The analysis of the interviews with industry experts and the databases of secondary data suggest that the Life Sciences sector in Ireland is definitely not uniform, but consists of mainly MNEs manufacturing and formulating drugs in Ireland. The second group consists of a relatively small number of SMEs that partially cooperate with local MNEs, but mainly operate internationally from inception. The SMEs are also less likely to need external finance if the companies operate in areas requiring less research. The number of SMEs cooperating with local MNE's is quite low at ca. 20%, and EI faces a difficulty to increase this cooperation. There is a chance that increased cooperation between the agencies will result in higher cooperation between MNC and SMEs. SMEs competitiveness is likely to improve through better finance options and sub-support offered by various agencies, which again requires higher cooperation between those organisations. Currently SMEs gain finance mainly from international VCs and rely on international, virtual clusters of Life Sciences companies. Considering that the Irish market is too small to become fully self-sufficient, both the Irish academic and business milieu becomes strongly internationally connected early on. The process of internationalization of academic and business activities is strongly supported by networks of Irish-based scientists and business people. The strong academic network is based for example on the "Wild Geese"- an initiative recently launched in the States comprising a network of Irish-American scientists and Irish scientists based in the US. The network aims to provide support for Ireland's scientific community in North America and to connect Irish scientists around the world. Prof. Luke O'Neil stated:

> "You wouldn't believe the number of Irish people in senior positions in US science. Examples are the "Wild Geese" or National Association of Health (NAH), the biggest health association in the world, with a multi-billion dollar budget. Its director is a guy called Francis Collins, an Irish-American. You see this throughout American public and private life, but you see it in science too."
>
> Source: Business and Leadership magazine, 23.06.11," "Pioneering researcher Luke O'Neill on Ireland's life sciences sector transformation.

In the international business world the Irish network is referred to as "the Murphia, or the Irish Mafia", and according to several respondents it is hugely supportive internationally to Irish business people:

> "There is a big Irish Mafia, the Murphia, within the companies in the States. It is a very supportive and strong network of people and what they say is, it will get you through the door but after that it is up to you." (Expert 4)

4.1.6 Industry data from case companies

The data obtained from the industry case is also supported by the information emerging from the 5 SME case studies. It suggests that company internationalization is influenced by what is happening in the industry. However, considering that only circa 20% of SMEs have involvement with local MNEs, the remaining 80% would be more dependent on what is happening in the industry internationally. The industry is very international and, considering the facts that R&D companies are hardly present in Ireland and it is difficult to create links with local MNEs, SMEs have had to pursue international contacts from the beginning. All CEOs stated that the industry is international and the lack of industry in Ireland forced them to look for contacts and business partners internationally.

The industry also dictates how business is done; it is very conservative and legalized, and trust and credibility are extremely important in this sector, with business conducted very slowly and carefully. There are periods when the industry becomes more progressive, and it becomes easier to get approval for products and finance, but the current stage is quite conservative and finance is quite limited. In the past, the style of developing international business was to focus on one product, while now the style is to develop a portfolio of technology partnerships:

> "The pharma/bio-technology industry is very conservative, which means that it is very difficult to get products approved, but in the pharma industry the pendulum always swings from conservative to liberal. At the moment it is in a conservative stage, which is driven by the high-profile products that have been taken off the market. This suppresses creativity in business. The style of running a business is also different, 5 years ago the style was to focus on one big deal and try to do it yourself, now the style is to go more into technology-partnerships. The industry dictates now to focus rather on a portfolio of products. Company D has a very broad scope of strategies to cover this need." (CEO, Case D)

The industry has also become more centralized since 2004/2005. Large Pharma, which are the main customers for small R&D companies, have centralized their operations and it has become more difficult for SMEs to bid for contracts as they have to compete with hundreds of other small companies:

> "Large Pharma industry is increasingly centralizing. The process started 2004/2005 e.g. Pfizer would have instead of 30 R&D centres only six centres around the world. The industry is also very slow, the product life cycles are slow, as there is quite a lot of risk involved. Large pharma relies more on dealings, few companies do everything themselves in house, everybody needs to be approved and registered with appropriate authorities. As a result people are slow to make a change, they are afraid to make a mistake, as products can be easily recalled. It is a conservative sector, as it is heavily regulated. It is not that you just walk into an opportunity, there is a life path that leads to it." (CEO, Case E)

The conservatism of the industry creates a disadvantage for companies just starting to operate in the market, but once they are established they can benefit from the fact that competition is also not quick to establish.

> "The industry is very fragmented, all the SMEs and also large companies have their narrow specializations, for example kidney, autoimmune disorders, diabetes, etc. In those niches the circles of scientists and companies can be quite narrow, and companies tend to know each other quite well internationally. There is very little overlap in the niches in Ireland, there are hardly any clusters which can support each other in Ireland. The only exceptions are medical devices in the area of Galway." (Expert 4)

> "The only cluster of SMEs has been created in medical devices around Galway, which is possible as they are less complex, and it's probably easier to get a medical device in the market than it would be pharmaceutical because obviously of the clinical trials you need are massive investment both in pharma and bio-technology." (Expert 1)

> "The bio world is small - bio tends to be clustered like in Boston. In Ireland there is hardly any overlap between the companies, but even internationally you keep meeting the same people." (Manager, Case B)

The Life Sciences industry is slow to change and is conservative, where companies tend to work in narrow niches, and therefore tend to know their niche quite well and the players involved, even on an international scale. Some niches, such as medical devices are cheaper resources and more accessible than others. Considering the lack of finance available in Ireland, medical devices have become the strongest representation of SMEs based in Ireland. There seems to be a strong need to widen the pool of SMEs in the sector in Ireland. The complaint from the business people is that academics do not show much initiative in commercializing their research. The numbers of R&D SMEs are quite low:

> "Minister Mary Harney said in 2002 that they would invest a lot of money in Ireland, but after returning to Ireland in 2009 I have found that there was still not much happening. The government put a lot of funding into academics in Ireland, but they show no interest in commercialization, they have no incentive to translate research into business." (Manager, Case B)

As it could be seen in the previous two sections, the lack of interest from academics to commercialize their work is partly conditioned by the fact that they tend to lack business development skills. They are likely to normally acquire such skills internationally before they show entrepreneurial initiative in Ireland.

The data suggests that the weakness of indigenous Life Sciences industry has created a major push for internationalization for existing SMEs. This is largely because scientists have had to emigrate to gain business development experience in small companies and learn how to commercialize knowledge. All the CEOs and owners went through a learning process of how to run a small R&D company prior to establishing their own international businesses. The lack of an indigenous sector has also strongly limited the possibility to find businesses locally in Ireland. For example CEO, Case E confirmed that 20% of the initial income around the year 2000 came from local requests for process development, but the majority of business came from international customers.

During the interviews, the CEOs tended to agree that the indigenous bio industry does not exist, or is too weak, and that the existence of large Pharma in Ireland has not benefited SMEs:

> "There is not enough companies to form partnerships with, the industry is not Irish it is international, and that is where the contacts are."(CEO, Case C)

> "The local large pharma industry is not beneficial to SMEs at all, it is all happening internationally. The only support coming from Ireland is the graduates, but hardly any graduates with applied science experience, international business development experience, which is vital for R&D SMEs." (CEO, Case B)

> "The Large Pharma will probably downgrade further over time, as the tendency is towards China/India, all Poland needs to do is to say corporation tax 5% and most of the business will leave. Entrepreneurs are less likely to leave as Ireland is their home." (Manager, Case C)

The Life Sciences industry is international and the situation in which there is weak base of indigenous small companies in Ireland is partly based on the fact that there is not enough scientists with both applied science and international business development experience. The existing strong MNE presence in Ireland does not create benefits for small companies, as there is no overlap between the small R&D and large manufacturing companies based in Ireland. The industry is very fragmented, so even internationally active SMEs tend to deal with a narrow cluster of companies and scientists abroad.

Internationalisation is directly affected by the dynamics taking place in the industry, such as the centralisation of the Life Sciences companies internationally. Currently, it is very difficult to get finance and get approval, as the industry is at a conservative period in its development. Irish industry is quite young and not that strongly developed. The reasons seem complex, the investment in academic research is very young, and because there is hardly any R&D industry in Ireland, PhDs cannot get applied science and business development knowledge in Ireland. This was the situation for all the CEOs in the case companies, had gained the experience through years of working internationally first, both in MNEs, but also very importantly small international R&D companies.

The situation of the Irish underdeveloped indigenous industry creates a special requirement for particular international experience to fill the gap created by the industry shortcomings in Ireland. This situation also explains why Irish indigenous SMEs have to look for partnerships and finance internationally.

The Life Science industry is very international, and continues to change, despite it being a slow changing and conservative industry. The industry tends to cluster, with examples of clusters in Boston, Philadelphia, BioValley in Europe, Oxford, Shanghai and Sydney. In the case of Ireland the physical clustering is extremely limited, the only cluster exists around Galway in medical devices, and even in this cluster the interactions between companies are limited. Internationalisation becomes a necessity for SMEs, as they have to look for experience, finance and partnerships in international, virtual networks, like Boston, Oxford or Shanghai.

The weakness of the indigenous Life Sciences industry points to fundamental lack of international competitiveness, reflecting deep-rooted structural deficiencies in respect of international business development skills, as well as more immediate cost and finance related constrains. Despite these deficiencies, however, some SMEs are quite successful. The case companies presented below represent some of the most internationally successful Irish indigenous SMEs.

The industry case study revealed why Ireland was not part of the period of major development in pharmaceutical companies during the 19th Century and earlier. The case study showed that a change commenced in the 1960s which coincided with the liberalisation of law, which was characterised by a slow inflow of FDI pharmaceutical companies. These companies, however, treated Ireland more like an export platform, and did not engage in developing the indigenous sector in any meaningful way. Governmental investment in research science in 2000 finally allowed the number of locally educated and scientists to grow, but because there was a very weak pool of local R&D companies, graduates had to travel abroad to acquire applied science and international business development skills. Some of the Irish emigrants and some of the foreign entrepreneurs came back to Ireland with the necessary acquired skills to set up local R&D companies. The pool of those companies is still very small, but it grows steady and is likely to increase the competitive position of the Irish indigenous sector over time. These drivers and barriers to internationalisation have determined to what

extent and in what period Irish international SMEs started appearing. This was mainly after 2000 with the advent of biotechology in Ireland and the availability of associated funding for research.

4.2 Firm Case Studies.

Information collected from five case studies forms the empirical base of Stage II of his research. A brief overview of the five firms is presented here, as well as short case summaries. Each case firm belongs to Ireland's group of indigenous Life Sciences companies serving international markets. The relevant company and CEO's demographics are summarized in Table 4.3.

Table 4.3 Summary of Case Firms Demographics

Firm	Product area	Age	Employees	CEO's Experience	CEO's Education
A	Pharmaceutical, Supplements	30 years	15	Technical/Management	Chemical
B	R&D Bio-tech	6 years	14	Technical/Management	PhD Bio-tech
C	Diagnostics	3 years	7	Technical/Management	PhD Zoology Bio-chem.
D	Pharmaceutical	8 years	50	Management	Economics
E	Pharmaceutical	11 years	20	Technical/Management	PhD Organic Chemistry

4.2.1 Company A

Company A was originally a US company established in 1970s, a few years after the lead drug was discovered by a scientist in Chicago. In 1981 they established a bulk pharmaceutical facility in Ireland, mainly for tax reasons. All of the production was exported. They had a second company in Costa Rica. The current owner bought the company in 1989 with two others and became the sole owner in 2002. Company A invested in a third of another company in order to learn sales and marketing and subsequently bought the remainder of the company. Company A consisted of two companies; one focusing on distribution to pharmacies and hospitals, selling their own food supplements and diagnostic tests, but also third party products. The second company was based on the immunology drug acquired from the US company (the

original business bought from the US multinational), which had a strong network of around 40 distributors all around the world. In 2006, Company A created a third unit, to act as a holding company for both units.

Company A evolved from 1989. It used to manufacture the lead drug, which was distributed world-wide and employed around 30 people. Subsequently as the company was unsuccessful in running clinical trials, it downgraded keeping only the CEO. As a result between 2009 and 2010 there was only the CEO, a few scientists, and an administrator. The manufacturing of all the products was subcontracted, in some cases to local Irish producers, but also to Swiss and Portuguese manufacturing companies. In 2010, the company consisted of a holding company for both the company selling the lead drug and the company selling the food supplements and diagnostic products. Company A held only IP rights; it did not perform any production on their own.

> "We just run the sales, marketing, regulatory affairs; we do R & D here as well." (CEO, Case A)

CEO, Case A became the sole owner of the company in 2002. He tended to employ sales reps in the UK and Germany to sell the food supplements and diagnostic products. The lead drug was sold via existing distribution channels.

The main drug was not selling well for several years, because it was an old drug, and in order to be sustained and competitive in the international market it would require new clinical trials to extend the specifications of the drug. Company A tried to get FDA approval to extend the research, but this was unsuccessful for at least a decade. The Consultant, Case A argued in 2010 that the company was likely to die, if it did not reform. As he predicted the main component of the company was finally sold in 2011 following the retirement of the CEO, Case A and a lack of prospects to improve the specifications for the lead drug. The drug was still available, but mainly in less economically developed countries, where approved drugs can often be out of date and below the standards accepted in developed economies. The holding company A still sustained one of the companies, but focused only on food products (Vitamins and Supplements), which did not give very high returns on sales, but also did not require such expensive R&D like in case of prescription drugs. The son and daughter of CEO, Case A were destined to inherit the company. CEO, Case A still remained active in the

management side of the business, introducing his son into his future role as an owner. They sold the main company selling the proscription drug, and the family still run the food supplement company.

a) Route to internationalisation

The company operations were always strongly international (Table 4.8). The pharmaceutical company had 40 distributors world-wide and the food supplements/diagnostics company were sold in Ireland, UK and Germany, with efforts to expand into Scandinavian countries.

Their main product, a 30 year old drug was sold via a network of 40 distributors world-wide, but these networks were acquired with the company from a US MNE based in Ireland by CEO, Case A. Consultant, Case A suggested that in order to sustain this product internationally, Company A needed to invest in R&D to widen the specifications for this product. At the same time Company A was selling a simpler line of products based on diagnostic products and food supplements in US, Europe and was planning to target the Middle East. Some of the diagnostic products and food supplements were licensed in from other companies to widen the portfolio of products offered. Internationalisation happened mainly via networking, attending specialist conferences, but also by sustaining sales reps in some countries, such as the UK and Germany. For example, the CEO stated:

> "We have consultants in the UK and the North of Ireland and also in the South, a lot of these would be university based"

> "It was a German product, I said would you transfer the licence to me, and they were happy with that."

> "We manufacture in France, Italy, UK, Portugal, and whenever the manufacturer can meet the quality requirements and the cost. (…) We have got no manufacturing facilities of our own, we contract out everything."

> "At the end of the day this business is all about contacts, networking and using your instincts (…), you've got to use a lot of common sense." (CEO, Case A)

The Consultant to Case A stated:

> "They only sell the products internationally, the production is partly contract manufactured here in Ireland. Most of the remainder of the products and the rest of the supply chain is conducted overseas."

Consultant, Case A argued that they had grown a lot in recent years, although the year prior to the interview had been quite static and that to increase sales they needed to invest in R&D for the main product. CEO A sold the majority of the company in 2011. This decision was justified by the CEO that he intended to retire and did not have a suitable successor to take over the business. He intended to sustain only the part of business that was responsible for diagnostic products and food supplements.

Table 4.4 Internationalisation incidents in company A

Year	Key Internationalisation Incidents
1989	Acquisition of US company with 40 international distributors
1990	Running an unsuccessful clinical trial in US
1990	Research collaboration with Scandinavian pharma company-unsuccessful
1994	Company A aquires exclusively distribution channels
2001	Manufacture of lead drug contracted to Swiss company
2003	Launch of diagnostic products and food supplements in UK and Ireland
2006	Establishing a sales rep in Germany for diagnostic products and food supplements

b) Prior experience of the founder

CEO, Case A did not acquire a scientific education, although his background was technical/chemical. Before he started working for a pharmaceutical company, he worked with refrigeration systems. He was employed in an US company in Ireland, which was the predecessor of Company A. He also had technical knowledge of reactors for chemical production, and at that time (1987) had good knowledge of how to run the production system.

He did not have much experience of working outside of Ireland. He started learning about running the pharmaceutical company in 1987, managing international sales and marketing when he became a general manger in Company A. It was a company that had international headquarters (subsidiaries in US, Ireland and South America), as well as sales in 40 countries around the world.

c) Industry

Company A tapped into two different markets, the immune modulating drugs and food supplements. Consultant, Case A feared that the part of the company A carrying the lead drug would decline if the company did not change the existing product or acquire a new one:

> "I do not have a strong opinion about company A. I think it is a company that could die if it does not change the main product or acquire a new product (…) Sales have been consequently eroded, they are losing market share." (Consultant, Case A)

In the face of unsuccessful research on modifying the lead drug, CEO, Case A decided to sell the part of the company carrying the lead drug.

Company A produced and sold simple medical devices products and food supplements. The markets for both of these products were saturated, and the company therefore focused strongly on sales and marketing in an effort to secure a market share. According to CEO, Case A, products sales had not been very high.

4.2.2 Company B

Company B was founded in 2004 by CEO, Case B and three academics. It grew from one employee in 2004 (for the first 6 months) to 20 in 2009, and subsequently shrank to 15 in 2010. The company was still at the stage of research and managed to secure millions of Euros of funding for research. They had number of partnerships and license agreements with international companies: Pfizer, Merck, Sharon Cahill and Organon and CSL in Australia.

Company B was a typical contract research company, where major pharma companies invested from the start in the company, in order to develop the existing technology into major breakthrough drugs. The company focused only on research and fund raising to continue the research. In 2010 they had 15 employees, 4 of them scientists and the rest management staff coordinated the research. They had subcontracted elements of manufacturing needed for clinical trials to foreign companies in Switzerland and China.

The team focused on managing projects internationally, as well as presenting at appropriate conferences. At the time the company carried two products, while two

other products had been unsuccessful and therefore discontinued. The model of the company was to operate as an R&D company and once the level of clinical trials had been reached, the company was to be sold in order to properly market the product.

a) Routes to internationalisation

Company B was international from inception as the initial venture capital came from Swiss, US and Irish investors. The company was focusing on research collaborations with US, Swiss, Chinese, Australian companies, as well as several academic collaborations, which were driven by three academic founders from Ireland (Table 4.4). The international links were strengthened by several rounds of funding by various Irish and international investors, including the European Commission in 2011.

Table 4.4 Internationalisation incidents in company B

Year	Internationalisation incident
2004	Establishment of company B- Irish, US, Swiss investors founded it jointly, 6.25 m funding
2006	Collaboration with Wyeth to develop new compounds
2006	3 new deals with undisclosed pharma companies
2009	Subcontracting Swiss company to manufacture for clinical trails
2009	18 m EUR funding from Novartis Venture Fund, Fountain Healthcare Partners, Inventages Venture Capital and Seroba Kernel Life Sciences
2011	5.9 m from European Commission to fund research

The aim of company B was to achieve phase II of clinical trials of its drugs, after this period the drugs were to be transferred to large pharma companies, which would have the resources to finalise the drug research and its marketing. The company was likely to be dissolved in 2013 or 2014.

The company had built an international network of business contacts outside of Ireland. The local Irish contacts were irrelevant in the internationalisation process. The only local support came from the Irish business support organisation EI. The Irish context was relevant in recruiting human resources; the focus was on recruiting high quality business people with international experience in and science graduates from Irish universities. VCs owned over 50% of the company. The company also had several academic collaborations, where academics from South Africa, Australia among others, tried their antibodies in their own research. The company retained the IP, but the

scientists caught use the antibodies for free. Quite often collaborations were short term; running for the duration of a specific project. For example, Company B hired a Swiss team to create a product. Once this had been achieved the production of this product moved to China due to cost benefits. CEO, Case B saw the tendency to use China for manufacturing generally as the future for SMEs in bio-tech.

Company B was established similarly as Company D on a based on a pre-owned technology. A group of academics had a cutting edge technology resulting from their academic research. They came across CEO, Case B, who took on the task of commercialisation of their research and the formation of a company. He raised the initial funding in Ireland, with seed capital coming from EI. After working for half a year on his own, he had hired a team of people to work with and started intensive international networking to both partner for research as well as finding more venture capital. The company's internationalisation was based on management of research projects internationally:

> "80% of company costs are spent internationally.(…)We are spending in Ireland only the costs of human resources who are managing the projects. We have become experts in managing the projects outside Ireland, as most of the research we do is international, all the clinical development that we do is international, all the manufacturing is international, and all our future studies will be pretty much…" (CEO, Case B)

Company B tended to subcontract clinical trials and manufacturing, also some research was based in countries where scientists were resident like Australia or Switzerland. CEO, Case B started engaging with Chinese companies as he saw the value of both Chinese and Asian market as future markets. He sought to understand how the Chinese operate and do business. Company B, however, was not likely to grow as it had been established to bring the research to particular level, and considering that the investors wanted to get a return on their investment, it was not likely past 2014 (CEO, Case B). The founders of Company B had less freedom in deciding about their international direction, as VCs owned more than 50% of the company and were actively involved in decision making. The main partnerships and VCs came from US, Europe and Australia. There was no sequential approach to internationalisation, more a simultaneous and quite intense process taking place via networking efforts by the CEO, Case B and

exploitation of academic and business contacts of academics co-owning the company. The process of internationalisation was rapid and involved a coordinated by CEO, Case B networking effort undertaken by many people involved in the company. Examples of international activities include:

> "We have contracted scientists in Switzerland to produce an acid for us." (Manager, Case B)

> "Novartis, Genentech have invested before. CEO, Case B would go around abroad (round trip) and collect all the investors and sign one giant contract. All of them get the same conditions; this is the standard way of dealing with investors." (Manager, Case B)

> "The company will be grown to certain degree and then sold, that is the model. Large pharma companies internally consolidate and cut a lot of their research, so they would pay a premium to companies like us to acquire them and add their products to their pipeline." (CEO, Case B)

> "We have negotiated lots of deals with academics (South Africa, Australia, and Ireland). They are based on material transfers, so people are saying I am interested in using your antibody in my disease model. If something comes up during use of our antibody, we would keep IP rights, academics tend to be not interested in commercialisation." (Manager, Case B)

> "We are attending lots of conferences, Chicago, Barcelona, San Francisco, London. Each of them has "speed dating" to partner with other businesses." (Manager, Case B)"

> The clinical trials will be done throughout hospitals in US and Europe." (CEO, Case B)

b) Prior experience of the founder

CEO, Case B is foreign, came to Ireland from abroad looking for an opportunity to set up a business. He chose Ireland because, in his opinion, all the biotechnology business takes place in Europe or US and Irish government increased investment into biotechnology. He felt close to Ireland as one of his grandfathers was an Irish immigrant. He came from a family with strong entrepreneurial traditions. His father run a car business and his grandfather also run a business:

> "Both my dad and granddad were both very strong and successful role models." (CEO, Case B)

He remembered that he started working for his father at the age of six cleaning stables, at 14 he worked in a supermarket and learned to save money. He kept working even during his college years, despite the fact that there was no financial need, because independence was very important for him. His PhD in biochemistry was part-funded by a company, and as part of this contract he was exposed to the commercial side of the business. Immediately after his PhD he worked successively for two small, international research companies, where he learned how to manage a small research company.

CEO, Case B had a very strong entrepreneurial family background and a real passion for biology and "making a difference". He was described by various industry experts as a high energy, pleasant to deal with business man/scientist. His historical development suggests that at the stage of his PhD in biochemistry, he had already managed to start learning about business, as his PhD was half funded by a private company and therefore required him to participate in management meetings and learn about the commercialisation side of the research. The company he worked for during his PhD went public during his research, which was a very memorable moment for him. From this moment onwards, he got greater exposure to international business. Manger B suggested that lots of the relevant contacts come through the main academic involved in the business, and in his opinion the academics were most likely to find the right scientific match, they do not have the time, however, to follow up with the commercialisation. CEO, Case B brought that commercial expertise with "excellent people skills, he is the life blood of Company B" (Manager, Case B), excellent in problem solving, never thinks about the problem, rather he thinks around it, moves quickly and is a very involved boss, who can "zoom in and out" in relation to his employees depending whether he is needed (Manager, Case B). CEO, Case B "is driven by finding solutions" (Manger, Case B).

CEO, Case B foresaw that he will establish a new SME after company B is dissolved. He was described by Manager, Case B as "a serial entrepreneur".

c) Industry

Company B focused on regulation of the human immune system. The company was identifying and developing new drugs and vaccines to treat and prevent autoimmune/inflammatory diseases, as well as infectious diseases. There were not many companies conducting research on such a high scale, as the research required was very expensive and required high quality research (Manager, Case B). The company worked directly for large pharma companies; they were the market for their services and would end up taking over the drugs in more advanced stages of research. Large pharma companies did not compete on the same level as SMEs discussed in this research.

4.2.3 Company C

Company C was an SME based in the Irish Life Sciences industry. It was founded in 2008 by CEO, Case C and EI. CEO, Case C was a serial entrepreneur; Company C was a spin-out off from a company that was previously owned by him. Two employees from the previous company also joined the company on the basis of a share allocation. The company produced medical tests and diagnostic instruments. The company grew from three to seven employees in December 2010, when it underwent a friendly acquisition by a larger German-British bio-technology SME; since then it had continued trading as a stand-alone Irish subsidiary.

Company C was established by CEO, Case C and EI. The business model was quite simple; Company C ran research of their own technology, but in order to generate a revenue stream for operations it also ran sales of their own and third party products. The company obtained some seed funding from EI, but did not manage to obtain other venture capital. The company's clients consisted of pharma companies using diagnostic tests in their clinical trials, but also various labs and hospitals. Company C had a sales pipeline in the diagnostic sub-sector, totalling over €1.5 million per annum. The products of Company C were based on four in-house products and four third party products that are distributed internationally.

The company was very small, comprised of only seven employees. CEO, Case C provided business development, but his main strength was his technical knowledge, so he mainly worked with the scientific team. Manager, Case C oversaw the whole operation, doing what needs to be done, from business development to fixing a

photocopier. The remainder of the team were scientists working on developing the main technology. The development of technology for diagnostic tests was not as capital intensive as developing a new drug, therefore Company C had been able to sustain the operations with a relatively low level of funding.

In January 2009, large Pharma stopped spending and as a knock-on effect the sales of Company C dropped by 60-70%. It was impossible to keep funding research from the revenue line, so CEO, Case C started looking for venture capital. The negotiations with VCs to raise finance to fund research in Company C were unsuccessful. Manager, Case C argued that the "case was not compelling enough". In March 2009 they needed around €1.5 million to maintain research. Half of the money was provided by EI and half by five employees, including CEO, Case C, who all became new shareholders of the company. Company C was unsuccessful in raising more money for the next stage of research, and the only way to generate more equity was through the acquisition of the company. In December 2010, Company C was acquired for €7.5 million by a larger German-British SME and would remain as a stand-alone Irish subsidiary. Due to a decline in demand in 2009, the company never reached the scale of operations and revenue it intended to reach in 2008.

a) Routes to internationalisation

Company C was established in 2008 with a well-established revenue stream based on sales in US, Australia, Europe and Japan. International activities include: direct international sales, international sales through distributors, but also distribution of third party products through established distribution channels (Table 4.6). CEO, Case C argued that in establishing his distribution channels, what he needed to do first was "understand the market". He argues that understanding the market comes with the experience of working in international business:

> "Understanding who the key decision makers in a country are, how the product is reimbursed, who the opinion leaders in a country are and how it is sold."(CEO, Case C)

He also argues that international negotiations required emotional intelligence and flexibility. CEO, Case C admitted that:

> "If I have to push, I do it. It is important to negotiate with an appropriate style for each meeting." (CEO, Case C)

Company C had distributors or direct sales in Japan, Korea, US, Europe (France, Germany, UK, Benelux), India and Australia. The establishment of distribution channels took place between 2008 and 2010. In some cases, Company C continued to use the distribution channels established by the company previously owned by CEO, Case C. 60% of sales were direct to research customers. The approach to developing the relevant contacts in each of the countries was different. Japan took a long time to establish, as the business partners were very careful and building a trust relationship prior to doing business was relevant, but since the contract was signed they were committed and reliable. German partners had high technical requirements in negotiations; most people CEO, Case C dealt with had a PhD in the area. French partners had a very hierarchical approach to negotiations; getting approval of a "pope" (a person perceived as French authority in the area) opened the door to establishing business contacts.

CEO, Case C argued that the biggest mistake is "getting the wrong distributor and another mistake is not having enough idiot-proof clinical data to drive the value of the product".

Company C's products were less research intensive (diagnostic and test products) than in case of biotechnology companies, the focus is also on both marketing and direct sales as well as research. It allows looking at the company from more classical approach to internationalisation based on market entries. The company was a corporate spin-out of a previously ran company, which gave it an initial, international customer base. The key decision makers regularly travel internationally visiting existing customers, research collaborators and prospective clients. The internationalisation was started by establishing a direct distribution chain in US. It was subsequently maintained via on-going follow on meetings once a month to drive sales, to meet with partners, to speak at conferences. Internationalisation in the US was based on sales, business development, and search for new technologies to work with/partner with (CEO, Case C). CEO, Case C did not perceive Ireland as a market for its products; therefore the focus of the company was purely on international customers: CEO, Case C and Manager, Case C

reported that Ireland is not a market for Life Sciences and internationalisation is a necessity. CEO, Case C said that in his first company, he had a rule:

> "I had a rule in my company, that I did not allow even one phone call in Ireland, bio-technology business is purely international." (CEO, Case C)

Table 4.6 Internationalisation incidents in company C

Year	Internationalisation incident
2002	Establishment of Japanese distributor (Nosan Corporation)
2002	Establishment of US distributor (Kamiya Biomedical)
2005	Establishment of Australian distributor (Alere)
2008	Establishment of direct sales with customers in France
2008	Establishment of Korean distributor (Progen Inc)
2008	Establishment of distributor for Benelux countries. (VWR International Llc.
2008	Establishment of UK distributor (Seraquest Ltd)
2008	Establishment of direct sales in US
2010	Establishment of Australian distributor
2010	Establishment of German distributor (Biotrend-Germany)
2010	Establishment of Indian distributor (RAS Lifesciences)

CEO, Case C stated that at this stage of his professional career he did not get involved in a company unless he had a manager in place to run it. He argued that it was important how much one is involved into the company. He was aware that running a portfolio of companies did not allow him to get involved 100%. This is why he focused on finding trustworthy managers he could mentor and guide to run companies for him. He stated that mistakes also depend on how much you are involved into the company:

> "The involvement in the company depends on the portfolio of investment. If one has only one company then, especially at the beginning, one has to be 100% involved, as this is the only investment. As one increases the portfolio then it is necessary to delegate." (CEO, Case C)

Manager, Case C confirmed that CEO, Case C is not fully involved in Company C as he is involved in management of other companies he has invested in:

> "CEO, Case C likes the business development, but behind the scenes I am the person, who does a lot of the work, so I am also doing business development,

> sales and whatever is required (…), 12 hours a day is a given, you have to be 100% committed." (Manager, Case C)

The Manager, Case C argued that he was directly involved in establishing distribution channels, regularly talked at conferences, licensed in new products to increase the portfolio. His role was very diverse and included preparation of legal contracts, HR, office management, sales or even fixing a photocopier machine.

Consultant, Case C said that CEO, Case C is a stubborn man, who usually gets what he wants. His style of running a business sometimes alienated him, but overall it was quite effective for his business:

> "...never accepts 'no', he keeps going, which makes him very difficult to deal with. (…). He starts off in your face, dog-headed, pushes, sometimes he is unrealistic, but it is all good, because he tries to explore all avenues. If he was not like that, he would not be right for his company." (Consultant, Case C)

Consultant, Case C argued that CEO, Case C is an experienced serial entrepreneur. He had seen him working during international trade shows, and appreciated that he is a very good host, he hosted dinners and his own mini-conferences; he was a good speaker, but he was also very good one-to-one. Consultant, Case C said about CEO, Case C:

> "He would have accuracy, is very accurate when he is dealing with clients, so he knows, when he can't be like a bull; he might bully one person, but be much softer with another person. (…). He would have a reputation in the bio-community bigger than his company." (Consultant, Case C)

In both companies CEO, Case C had created a strong international position. He perceived Australia, US, Germany, France, UK, Italy and Spain as the major market for bio-technology. He did not value the new markets such as China, because he found them "too difficult". CEO, Case C is good at "playing the Irish card" (Manager, Case C), especially in the US, where "doors are opening, as there is a strong network of business men of Irish descent". CEO, Case C was perceived by Manager and Consultant, Case C and several industry experts as a very charismatic man with flare. After the acquisition, CEO, Case C became the Chief Technical Officer for the entire British-German company, which had subsidiaries in Ireland, Germany and the UK. The new role did not give CEO, Case C as much control, and required a lot of travelling

between the three countries, "it is quite tiring" (CEO, Case C), but it was an investment and CEO, Case C was determined to guard his investment for at least a year and then maybe retire from the executive role and focus on managing his portfolio of investments in different companies in a non-executive role. Consultant, Case C argued that CEO, Case C has not reached the growth he intended in the second company and it was also a contributing factor in deciding to sell the company:

> "CEO, Case C is a supreme technologist, and when you try to do the books, try to be HR, it is not as much fun anymore, you need size to delegate those not-fun jobs and he did not reach that in the second company." (Consultant, Case C)

Quotes illustrating international activities:

> "We produce products based on our in-house technology, but also buy in third party products for distribution." (CEO, Case C)

> "I did not allow even one phone call in Ireland." (CEO, Case C)

> "We visit people internationally and tell them about our technology with a view to licensing it; we go to major companies and talk about our products with a view to selling it; we go to major conferences and talk about the science of our profile, ultimately to sell it." (Manager, Case C)

> "I go to US once a month to drive sales, to meet with partners, to speak on conferences; it is a bit of everything." (Manager, Case C)

b) Prior experience of the founder

CEO, Case C has a PhD in Zoology and Biochemistry from University College Dublin. He finished his PhD in 1979 and worked first as a postdoctoral fellow in the US. In 1982, he returned to Ireland and was unemployed for 6 months. His former PhD supervisor was working on various projects and employed him as a postdoctoral researcher. During his post-doctorate he was head-hunted by an American MNE-Baxter Healthcare, which enabled him to enter the industry and "learn about it" (CEO, Case C). He was working as a research manager to set up a specific research group, to make monoclonal antibodies specific for different blood groups. He perceived this period as a "fantastic apprenticeship (…):

> "I had very good mentors. I was very lucky. I have learned a lot about business." (CEO, Case C)

After two years (from 1987-1991) he was Head of their European Research and Development group in Switzerland, he was appointed Director of R&D in their European headquarters in Switzerland. During this appointment he learned more about the business side and how to network, socialize, even how to "dine", which he argued "was extremely important for the networking side of the business"(CEO, Case C):

> "You need to learn, you need to understand how to put a structure on it (…). I was very lucky to work in a very structured company, which is a little bit frustrating sometimes, but you learn how to do financial reporting, how to manage, how to manage people, how to prepare projects internally."(CEO, Case C)

CEO, Case C decided to join a small company in Ireland for a year in order to learn how to run a small company:

> "When you are running a department in a very large organization, there are lots of things you don't learn. You don't learn about invoicing and shipping and more detailed financial issues". (CEO, Case C)

He was heading up sales, marketing and business development. After this period the company was acquired by a US MNE, and this is when he started his first company. The biggest challenge for him was the process of "reducing the idea to practice, but also managing people". He suggests that he made mistakes in people management at the beginning:

> "I would have rushed at the beginning; I would not have spent as much time discussing issues with people, or motivating them. I expected everybody to have the same motivation as I did, but this is not always true when you have 80 people. I have learned a lot about much better planning, better project management. I have generally improved in all the different aspects of running a business, because I have learned from my mistakes. You learn a lot about negotiations, I negotiate a lot of licenses." (CEO, Case C)

He argued that the learning process which occurred during the running of the first company helped him to avoid the same mistakes when establishing a second company: CEO's, Case C previous company grew to 80 employees within a 16 years period, and was sold in 2008 for €35 million.

c) Industry

The industry for diagnostic tests produced by Company C was constantly growing:

> "The disease was spreading with one in ten people in the world suffering from it in some form" (Manager, Case C).

The tests produced and sold by Company C helped in prevention and detection of various disease forms. Several large pharma companies had departments dedicated to this type of medical tests, but among small companies selling this type of products, Company C belonged to one of five companies operating in various parts of the world. The main customers of Company C consisted of large pharma companies, but around 30% of sales were direct to hospitals and labs world-wide (Manager, Case C). CEO, Case C suggested that the industry had global nature:

> "Medical research is a global activity with many researchers working together in international networks. Important findings travel quickly around the globe as a result of international conferences, journals, etc" (CEO, Case C).

4.2.4 Company D

Company D competed in the world market for research contracts on drugs, finding new application and delivery forms for existing drugs. Company D was founded in 2003 by CEO, Case D. The company was created after the acquisition of the main technology from another small pharmaceutical company based in Ireland. Company D grew from 1 employee in 2003, to 50 in 2010. Company D had a portfolio of seven drugs that it was working on. The products were positioned in various stages of research development; from the research stage, through pre-clinical stage, phase I, phase II and up to phase III of drug development.

Since 2003, Company D had been owned by US and Irish shareholders, as well Irish venture capitalists, who invested in the company. The ownership was further diluted after each round of fundraising, which included both Irish and international investors. Company D became a public company since Dec 2007, when it was listed on the Irish stock exchange. As this was a research company, fluctuations in turnover tended to be high; for example turnover for 2009 was €6.5 million, but only €1.5 million in 2008.

Financially the organisation required a constant inflow of capital to fund research. Before December 2007 this happened through several rounds of private funding, and after the listing in 2007, CEO, Case D raised money on the stock exchange. Additional funds came from research deals.

Company D was recognised for the excellent team of people, and for the team approach that was used in both presenting the company, as well as for creating innovation:

> "They have hired very well, they have the best specialist for each sector, like Richard Branson." (Consultant, Case D)

CEO, Case D had also faced challenges creating this strong, monolithic team culture, but the process of resolving the differences strengthened the company in the long term. Company D faced a challenge after acquiring a new facility, because part of the deal was to take over the staff of the facility. It created cultural clashes in quite a culturally monolithic team. Company D's strong focus on company culture allowed it to overcome these difficulties. Company D had a strong emphasis on constant research innovation, with the whole team being involved:

> "We would apply a screening process, we filter the ideas down. The whole team dealing with new product development is involved. The formal process is laid out, but there is always an element of creativity. Sometimes we would bring people from outside, put them together with our group and then brainstorm, trying to find ideas this way. We are deliberately trying to break the systematic approach, bring new people". (CEO, Case D)

a) Routes to internationalisation

The founders were CEO, Case D in Dublin and a Managing Director based in the US. Irish venture capital group Growcorp invested €1 million to buy the initial technology from another Irish company, which was the foundation of Company D in 2003. The company was already internationally-oriented at its inception, with locations in two countries. CEO, Case D spent 6 months raising finance; seed funding came from EI and foreign investors, which permitted the hiring of seven employees in April 2004. Case D was engaged on two products. The CEO kept looking for companies interested

in the research; this required a lot of discussions, meetings, mutual visits, due diligence check-ups and so forth. The process took up to two years:

> "It takes 2 to 5 years to make a deal, in this business it takes a long time to make a deal, most of the time is spent in discussion; eighteen months is an average time of deals. You prepare an offer and you keep bouncing back negotiating." (CEO, Case D)

Three new deals were signed in 2006. The new partners agreed to invest in years of research and development, clinical trials and the regulatory approval process required before the products would reach the market. They intended to keep the exclusive licensing rights once the product reached the market. Company D was getting milestone payments and royalties from the products, but was obliged to constantly report back to the partners on how the research was progressing and how the money was spent.

Company D raised €6 million in 2006 from EI and European Bioscience Fund, and also another €6 million from private investors. Looking for deals was an on-going process; Company D regularly attended bio-technology conferences, like "Bio", at which they presented the company, presented the processed technology, was looked for research partners, investors, or in cases of large pharma, both. Looking for VC was also an on-going process. The CEO travelled abroad to meet with VC groups, but he also explored Irish funding sources. Throughout 2007, Company D was preparing for listing the company. They got a UK stock broker and managed to raise more funds through the stock broker's private investors in the IPO round. It also took them months of communication with the Irish Stock Exchange to get the listing document approved. Company D finalized a major deal in 2008 with a large Dutch pharma company. Company D was supposed to develop a new delivery method for an existing drug in exchange for €45 million for delivery, as well as milestone payments during the process of research. In November/December 2010, Company D finalized deals with three new large European and US companies to develop a new delivery method for three more drugs. Company D's international research deals and international investors relations require on-going meetings, reports, and delivery of high quality research.

The business model of Company D was based on a diversified strategy; on one hand it was based on discovery breakthroughs to develop a new delivery method for some blockbuster drugs, and on the other hand it was working on discovery of new delivery

methods for niche drugs. Company D closed so called deals, which meant either contract research or a licence agreement between Company D and large pharma companies. The contracts were complex. They could divide the IP rights in some cases, in other cases an exclusive licence for the large pharma company was given once the drug reached phase III of development, or royalties from sales and milestone payments throughout the research process were offered to Company D. Due to confidentiality requirements, the details of these deals cannot be disclosed here. The business model also allowed for the funding of independent drug discovery through access to venture capital markets. Table 4.6 shows the historical sequence of internationalisation incidents. The listing on the Irish stock exchange was included as an internationalisation incident, because the shares were bought by the general public, that including foreign shareholders.

The strategy of the company was based on in-house research and on new delivery methods for existing drugs. To achieve this goal the company closed research deals with large pharma and also smaller pharma companies. Consultant, Case D saw a weakness in the strategy of Company D, as the portfolio of deals was very weak and all drugs were still in an early stage of development:

> "The entire revenue stream comes from one big relationship. If clinical trials do not work, they cannot enter phase II. If something goes wrong with this relationship, shares will go down, they will lose revenue stream. They need a proper portfolio of relationships." (Consultant, Case D)

Company D was also exclusively outward oriented. The company was developing new drugs, so the focus in internationalisation was on developing research collaborations and finding investors to fund the research. The company did not intend to establish direct distribution channels; the licences to fully developed products would be sold to large pharma companies. CEO, Case D described internationalisation as a necessity as the "Irish market is limited by size, financial and cultural issues". He travels a lot as:

> "Internationalisation can't be done through sitting by the desk, you have to go out there, meet people and learn."

The approach to internationalisation followed by the CEO, Case D focused on attendance at big international conferences such as Bio. He stressed that the rate of rejection at such conferences was very high (CEO, Case D):

> "you kiss a lot of frogs before you find a piece of business."

The business meetings tended to be prearranged, usually the initial meeting to find a business match took around 30 minutes and quite often the day was filled with such meetings. CEO, Case D compered them to a speed dating exercise. The informal networking took place via attendance at social occasions associated with the conferences.

Considering that there were hundreds of similar companies, CEO, Case D always tried to show how Company D was unique. He argued that it took up to 18 months to make a deal, depending on the track record of a company. The 18 months were spent on several meetings as well as conducted mainly by a larger company partnering with a small one due diligence check-ups. The large company investment is very uncertain considering that each drug development is a highly risky undertaking. The due diligence check-ups could be shortened if the small company had some well-established deals. Company D had benefited from signing new deals in 2010, which were contracted much faster considering that the company had already existing prestigious partners in large pharma. Even though Company D was very successful at signing deals, it experienced a slowdown in 2010 and need to focus on smaller deals as the industry became more competitive:

> "Internationalisation was achieved with hard work, intelligence and team work, and the challenge was to remain unique as a company. Internationalisation became more difficult now, as the bar for innovation has increased, as there is much less money out there." (CEO, Case D)

He also stressed that it was more challenging for an Irish company to become international, as the economy was small and isolated on an island, and the traditions in biotechnology were not as well established as they were in US or even the UK:

> "Internationalisation here is Ireland is different, as "we are alone here", so companies are not involved as much in group thinking like in US, where bio-cluster is stronger. In US there are more norm values, norm approaches; lots of

> companies are forced to adopt similar approaches because it is perceived wisdom." (CEO, Case D)

He also stressed that the model of internationalisation changed over time, at the time. The current model is that it is much more common to develop products in collaboration with other companies, which allows more flexibility and for smaller companies were able to do business internationally. The model before 2005 was based more on each company developing its own products without international partnerships, which created a pressure to invest heavily and take on quite high risks on its own. After 2005 technology partnerships became more popular:

> "5 years ago you had to develop your own product, so you had to raise a lot more money, and the company was forced into binary event, success or failure. Currently the model has changed into more technology partnership model." (CEO, Case D)

He saw some an advantage in his Irish location, based on a fact that companies did not have to conform as much as companies located in stronger bio-clusters; they were allowed more flexibility and creativity in running the company:

> "as companies are a bit out of sight here is Ireland, they do not get forced by investors to follow a particular model, we can "internationalise in a more independent manner." (CEO, Company D)

CFO, Case D confirmed that international presence was a necessity, as the cluster of bio companies in Ireland was too weak. Consultant, Case D argued that Company D has reached a significant level of international expansion, but he believed they should strengthen their portfolio of contacts to spread the risk in case any of the existing contracts fail. Examples of references to internationalisation activities:

> "You do what you call a road show, you would go to all the institutional investors, they all have a share allocated to invest in small public companies, some funds would be divided into industry, so for example some funds would be investing into life-sciences." (CEO, Case D)

> "Some of our clinical trials will be conducted abroad." (CEO, Case D)

> "The manufacturing was moved to China." (Manager, Case D)

"You go big, international meetings, e.g. Bio, where 25.000 go for meetings for a week. There are hundreds of meeting areas and you meet people for half an hour, kind of like speed-dating." (CEO, Case D)

Table 4.7 Internationalisation incidents in company D

Year	Internationalisation incident
2003	Establishment of Y registered in US and Ireland
2006	3 deals: 2 with US companies and 1 with UK company
2006	Raising €6 million funding from EI and European Bioscience Fund
2006	Raising €6 million from international private investors
2007	Raising IPO funding from international investors
Dec 07	Listing on Irish Stock Exchange
2008	Receiving prestigious US award
2008	A major deal with large Dutch pharma company
Nov 11	3 deals with European and US companies

Since the listing, Company D focused on delivering regular updates and reports for shareholders, press releases, running the research and innovation, and attending conferences. The internationalisation between the incidences described in the table is on-going. For example, it takes 2 to 5 years following the start of negotiations to reach a deal.

CEO, Case D stressed that trust building was the key to successful international business, despite the fact that legal aspects were also very important:

"The most important are the legal aspects; it always takes a long time. 80% of deals collapse because personal relationships do not work, not because of the technology; mainly because people do not trust each other. The main thing is to build trust as quickly as possible. If there is a lack of trust than you will come across problems and with lack of trust you will be not able to resolve them". (CEO, Case D)

Geographically Company D had worldwide connections, with headquarters both in North America and Ireland. Investors came from Europe and the US, as well as research collaborations with companies from Europe and North America.

b) Prior experience of the founder

CEO, Case D had a purely business education and worked for 20 years for big multinational Pharma companies, during which time he moved between different disciplines and countries.

> "I started off with a finance role, worked in sales and marketing, operations roles, but also R&D role; so I have managed to get an overview of all the functions in a business. In most departments I was working in a senior role." (CEO, Case D)

He had an entrepreneurial attitude to business and became frustrated with the reality of working in a large organisation:

> "I got to the stage, where you do not do things any more, you just go around shaking hands with everybody, you do not get involved in what happens, and that is also a frustration. (…) Entrepreneurial spirit was always there, but I got to the point in my career that it was possible to turn it into reality. I had the self-confidence, I have developed enough contacts. I had enough of frustration of work for a large company; there is lots of more satisfaction in running a small business". (CEO, Case D)

CEO, Case D followed a very structured and organised pattern when establishing his company. He knew what kind of culture and company he wanted to create and his previous experience taught him how to avoid creating a dysfunctional business:

> "I decided to build a culture, so while hiring people, I was screening for certain qualities. (…) I developed my opinion about how the business should be run by looking at dysfunctional business. This is how I realised how important culture was, as it is influencing the way things are done in a business". (CEO, Case D)

CEO, Case D from April 1999 to April 2003, served as a divisional director of a large, multinational company. Previously, he held positions as senior business development manager at this company in the USA. He also held the position of Division Director, Hospital Products and Nutritional Products Divisions, and Financial Director in this company in Ireland. Earlier in his career CEO, Case D held financial positions with Bayer Diagnostics Limited and Ernst & Young (Source: The listing document, 2007).

c) Industry

The biotechnology and pharmaceutical industries are characterised by rapidly advancing technologies, intense competition and a strong emphasis on proprietary products. Company D faced competition from many different sources, including commercial pharmaceutical and biotechnology enterprises, academic institutions, government agencies and private and public research institutions. The main technology owned by Company D is highly specialised. To the company's knowledge, only a handful of companies world-wide were developing directly competing technologies (The listing document 2007).

Many of the Company D's competitors had much greater financial resources and expertise in research and development, manufacturing, preclinical testing, clinical trials, regulatory approvals and marketing approved products. Smaller or early stage companies might also prove to be significant competitors, particularly through collaborative arrangements with large and established companies (CFO, Case D). There were also still significant differences among nation's healthcare systems, which made knowledge of the industry in different national contexts an important issue.

4.2.5 Company E

Company E was a contract research company, which offered a broad range of services in the generic pharmaceuticals market, provided small volume, niche products for pharma, bio-tech or generic drug companies. It was established in 2000, and grew from two employees to 20 in 2010. At the beginning it was just the CEO, Case E and one more chemist doing lab work for a large Pharma company. The company had several rounds of capital injections over the years, but the CEO and his wife remained the majority shareholders. The highest turnover reached in 2006, was €500, 000, while in the first year it was only €50,000.

Over the new shareholders came on board, such as EI, a venture capitalist and trade investors. The company moved into a new facility in 2003, and continued working on synthesising R&D materials for pharmaceutical companies, but also took customer's processes and improved and optimised them. Company E had changed strategic direction around 2006, they have realised that they could not compete for contracts from large pharma anymore, and decided to focus on high value niche products.

CEO, Case E worked on his own on business development; he got support from the board members and investors. The facility focused on technical/ lab work. CEO, Case E hired a manager to run the day to day operations of the lab.

a) Routes to internationalisation

Company E internationalisation is limited in so that far, they were selling mainly to US, UK and Canada (Table 4.7). This was influenced by the fact that they only had US approval, and most of their clients came through their US agent. Consultant, Case E argued that they had strong potential for international growth, but needed more investment in business development. The company operates in a very narrow niche, taking advantage of the high fragmentation of the pharma industry internationally before 2005. They had strong potential for growth, but at the moment they were limited as they lacked EU approval. Board member, Case E argued that even though CEO, Case E attended trade fairs and networking events; the investment in internationalisation was so far very limited (Board member, Case E). The company relied on long-standing relationships with the same customers, and repetitive orders from the same customers. The business operated at a full capacity:

> "We are essentially full for the rest of the year, maybe we will have maybe a little bit of capacity left at the end of the year…so we have to raise money to expand the facility (…). If we get 20 customers we could probably grow the business by 10 times." (CEO, Case E)

Company E had good prospects for further international development, and the key in their international strategy is the maintenance of a high reputation in the market place:

> "The pharma world is very conservative, so our success breeds success, the more products we develop, the more customers we have, the more business we get from those customers, for example now we are starting to get second and third products from the same customers." (CEO, Case E).

The main US distributor was established in 2006, through him the sales expanded to the UK in 2007. CEO, Case E managed with the support of his US distributor to establish 9 more customers in the US between 2006 and 2010.

Table 4.8 Internationalisation incidents in Company E

Year	Internationalisation incident
2002	Contract with US company
2006	Establishment of the US distributor
2006	Contract with UK company
2006-2010	Establishment of 9 new customers in US

In the first few years he was able to contract manufacture for large pharma companies, but since the centralisation of large pharma around 2005, the business was unsustainable and needed to change strategic direction to survive. Most of the business was international, with only 20% consisting of local customers. The first customers of the Company E were international. The company went through a major change around 2004/2005 as a result of changes in the world markets. Large Pharma became more centralised, it became difficult to receive orders, therefore the company started to specialise in low volume, high value products, which were quite often overseen by large manufacturing companies based in China or India; these countries tended to concentrate on high volume orders. The company's main customers were Irish, UK and US companies, but all of them produced for US market, as Company E had an approval for US market and was at the time trying to obtain approval for EU markets. Both the US and EU market approval opens the markets in Middle East and Asia, which seemed to be the long term internationalisation plan.

Examples of internationalisation activities included: direct sales, international distributors, international investors, networking at international trade fares and conferences:

> "We are also selling directly in the US". (CEO, Case E)

> "I have a distributor in the US". (CEO, Case E)

> "Our US partner invested in the company". (CEO, Case E)

> "I would have attended international trade fares and conferences". (CEO, Case E)

> "We have essentially piggy-backed on the relationship with our US agent, they have 12 companies that were suitable to buy from us (…). So over the course of three/four years we have developed new contacts. I have now got one to one relationship with 12 companies in the US through our US agent. We tend to meet them three times a year." (CEO, Case E)

b) Prior experience of the founder

CEO, Case E has a PhD in organic chemistry, and he worked for two years as a postdoctoral researcher in the UK. He subsequently worked in a lab in the manufacturing section of a company in Ireland for four years, two years for another pharma manufacturer in Cork, as well as five years for a multinational pharma company. In all three companies he worked as part of the lab teams focusing on manufacturing. The experience of working in the industry helped him to understand how a manufacturing process works:

> "When I worked in the industry I have learned about particular quality requirements, safety and environmental requirements, all these things. There are many sort of conflicting elements in manufacturing process that you have to understand, and how to resolve these problems and issues while working together to get a quality of products(...). That was perfect training for what I ended up doing." (CEO, Case E.)

In the second company he learned to manage a team of five people, in the first company he learned to deal with international suppliers and also attended two/three trade fares and conferences every year, which gave him some international exposure.

In 1999 he started working as a freelance consultant for a couple of his previous employers, but he always wanted to set up his own lab:

> "I always had an idea to set up a lab based, a technical business, so I started a lab with a friend in the UCD incubation unit in 2000". (CEO, Case E)

c) Industry

Company E specialised in manufacturing of high value added active ingredients. The fine chemical supplies market lied traditionally in UK, Europe, and the US. The pharma companies had increasingly used low-cost suppliers in India and China, but mainly for lower value added supplies. The interview suggested that pharma companies remained hesitant to outsource the later stage synthesis to companies in India and China,

doubting whether these companies have the requisite technical knowledge and can meet the health and safety standards required to supply the highly regulated EU, Japanese and North American markets. In addition, pharma companies are concerned that disclosed intellectual property may not be protected (CEO, Case D). The competition in this market is not as high, as some customers suggest that they had difficulty in finding a suitable supplier (CEO, Case E). Established relationships tend to last, as each supplier needs to be approved by the FDA, so it is difficult to change suppliers:

> "The approval in US is around 27 months at the moment, so over a course of maybe a year we are in development, and then we are waiting for two years for our client's product to be approved. In the meantime we are providing them with R&D material for their trails. Once they are approved we are their approved chemist, registered supplier. If they would not like our service, they cannot just switch like that it would take them up to three years to register an alternative." (CEO, Case E)

Company E has a strong portfolio of stable customers and does not face too strong competition internationally.

4.3 Chapter Summary

This chapter has examined the issue of SME internationalisation in the context of the Irish life science industry.

Ireland is host to one of the largest Life Science sectors in Europe, with significant international presence in research, development and manufacturing. Global Pharma companies started arriving in Ireland in the 1970s and today 13 of the top 15 global companies are based in the country. The industry generates almost one third of total Irish exports and employs over 52,000 people. Not surprisingly, Ireland is considered at the forefront of global medical innovation, but what does this really mean for the Irish economy? How sustainable is this competitive position in 2012?

A closer look at these statistics reveals that they do not fully reflect the value generated in the country by Pharma companies. In fact, a considerable amount of this value results from transfer pricing, where large Pharma firms take advantage of low corporation tax (12,5%) in Ireland. This occurs even though the majority of product value may have been generated outside of the country. Transfer pricing policies also

explain why very high-value exports are not properly reflected in employment figures in Ireland. This situation, however, is also precarious for the Irish economy, because it relies on Ireland maintaining this competitive corporation tax rate, which is not guaranteed.

Given future uncertainties, a far more reliable and sustainable industry base for economic growth could come from Irish owned companies. A pool of home grown Pharma companies has already emerged in Ireland following investment in academic and commercial research around after 2000. This group of firms has focused on R&D rather than manufacturing and, although still in its infancy and unable to cluster in Ireland, are international from inception. Unfortunately, this fertile group of entrepreneurial companies has faced a number of obstacles that have largely prevented the Irish owned sector from growing.

PhD graduates thus far have found it difficult to obtain vital Irish owned business development experience and have been forced to seek employment abroad. Many of these skilled entrepreneurs have returned to Ireland and set up companies knowing then how to do it. Another significant barrier is the cost of running such companies that require significant investment of funding. Because the pool of venture capital available in Ireland is still quite limited, this pushes companies abroad where they can find funding for vital research and clinical trials. Arguably, a third weakness of the Irish owned sector is linked to the lack of interest among academics in commercialising their research. The Irish owned Life Sciences industry is in its infancy and like every baby requires a lot of nurturing to grow. In Ireland's current economy, however, the vision of creating a strong Irish owned industry is extremely attractive.

The industry case looked not only at the very complex industrial environment Irish firms face, but also at the company and entrepreneurial level asking them about the Irish industry.

It can be seen in the case companies' descriptions that the international behaviour of the companies was very diverse. The cases cannot be fully compared in terms of their behaviours, as they represent different business models, which require particular behaviour. Companies A, C and E were producing products, either in-house or via contracting manufacturing out to third parties. As a result these three companies had distributors and direct sales abroad. Company C additionally sold third party products

through their distribution and sales channels. In the case of Company E selling through third parties was impossible as each product was unique and created for a particular client.

Companies B and D did not sell their own product, did not even intend to sell their own products, as their products were extremely specialised and required huge funding to reach the sales and marketing stage. Company B intended to dissolve once it reached phase III clinical trials, it would be fully taken over by large pharma companies that have invested in company B. Company D was going to either sell their products at phase three or licence them out to large pharma companies. It could be seen that both company B and D undertook internationalisation activities such as contract research, international fundraising and clinical trials abroad that are typical for their business model Company B showed evidence of developing international academic collaborations, which again corresponds with very high level of research required in the company. The research conducted in company B was the most cutting age and expensive drug research existing in the bio-pharma industry, which partly explains the level of academic collaborations. Company E had only one international investor so far, which while qualifying as international fund raising, it did not compare with the extremely high level of funds received by Company B, and the high, but of a much lower level, type of fundraising conducted by Company D. Company D became public, which also reflects that the main source of funding came now from international investors via stock exchange.

The industry case and the five company case studies can be summarised in terms of observations grouped under three headings: industry drivers and inhibitors to internationalisation; company drivers and inhibitors to internationalisation; and entrepreneurial drivers and inhibitors to internationalisation.

a) Industry drivers and inhibitors to internationalisation:

Ireland represents a specific environment for SMEs and these factors are relevant to understanding how SMEs develop and internationalise. These factors are as follows:

Life Sciences industry in Ireland is defined differently than in other markets. It includes bio-tech pharma, diagnostics and medical devices. This wide definition reflects the fact that Ireland is a very small country with weakly developed

indigenous industry. This underdeveloped market pushes the companies from the start to look for contacts abroad and expand internationally.

The Irish life sciences industry has two very different segments, namely multinationals and indigenous SMEs that are almost independent of each other.

The Irish market is too small for firms to become self-sufficient, so both multinationals and indigenous companies are oriented towards international customers.

Historically the Irish industry did not develop in parallel with the international industry development. It started much later and was based on a very weak indigenous pharmaceutical industry and strong multinational pharma industry, which arrived in Ireland in the 1960s and grew rapidly in the 1970s. The bio-technology industry arrived in Ireland in the late-1990s and early 2000s, which mirrored a change in international industry. The historical development of the firm's environment was preventing Irish SMEs from developing prior to late 1990s and 2000s.

The arrival of biotechnology stimulated the emergence of indigenous research and SMEs in bio-technology, considerably boosting the base of indigenous SMEs in the Irish Life Sciences industry. The Irish Life Sciences industry remains not typical of those in other countries; there is no petrochemical industry and virtually no bulk chemicals production, which hinders development of SME spinouts traditionally attached to such sub-sector.

The low number of indigenous companies in R&D is linked to the fact that graduate scientists are typically unable to gain applied research and business development skills in Ireland. They are forced to emigrate to gain such experience.

b) Company drivers and inhibitors to internationalisation:

The SMEs in this study were characterised by the following:

The firms all operated in pharma niches.

The firms all sold their products/research internationally. Company A and E had some small sales in Ireland, which was linked to the fact that their products were

not as research intensive, were simpler and there was a limited market for their products in Ireland.

The internationalisation process was characterised by the use of diverse sales channels, research relationships and international fund raising.

The firms typically became internationally oriented early on, because they were forced to look for customers, venture capital and/or research partnerships internationally.

The internationalisation process in all firms was rapid.

Four of the five firm required external funding. Only company A was funded with own funds. There was a low amount of Irish seed or vc funding present in the companies. The more expensive the research required in the company the higher the involvement of international venture capital and/or seed funding.

c) Entrepreneurial drivers and inhibitors to internationalisation:

The industry and the entrepreneurs in the study were characterised by the following:

All entrepreneurs seemed to have prior international experience acquired in international companies. This background possibly contributed to the later establishment of their own companies.

Those that are scientists had to emigrate to gain business development experience in bio-technology SMEs.

The drivers and inhibitors to SME internationalisation only confirm that the firm's environment plays an important role in SME internationalisation. In order to further investigate the two remaining levels of analysis, namely the entrepreneur and the firm, the next chapter will undertake thematic analysis of the five case companies to try and identify to what degree the multilevel perspective on internationalisation is important, and what factors may play a role.

Chapter V Analysis: Thematic analysis

The thematic analysis follows the suggestions by Braun and Clarke (2006). The researcher first familiarised herself with the dataset, which allowed for initial generation of codes. Codes are understood as brief verbal descriptions of small chunks of data. Similar codes were next grouped into potential sub-themes, and subthemes created a basis for the creation of themes. The process of creating sub-themes was pre-empted by the creation of memos and codes. The chapter undertakes thematic analysis of 23 interviews from five case companies (Table 4.3) including CEOs, Managers, Board members, EI consultants in charge of each company.

The research focuses on how companies internationalize. The researcher coded a factor as one that was linked to internationalization when it leads to strengthening directly or indirectly the firm's international position. Each theme section includes a table with examples of text and sub-themes that have been included in the theme.

5.1 Networks

Across all the case firms there was a strong emphasis on the role and importance of networks in the internationalisation process. From the CEOs perspective on the importance of networks in internationalisation, most international business happened as a result of (i) using their networks, (ii) developing their network in terms of new network partners, and (iii) managing relationships within their networks. For example, illustrating the importance of networks, respondents stated:

> "The whole business is about networking, networking is key." (CEO, Case A)

> "Stable customers tend to stay with you for years, and keep coming back." (CEO, Case E)

> "It is all about relationship building. Therefore it is more positive to have a portfolio of relationships, not just one strong relationship." (Consultant, Case D)

> "You go to big international meetings, where you meet hundreds of people looking for opportunities." (CEO, Case D)

What types of networks matter to internationalisation? The CEOs referred to different networks such as social networks, business networks, academic networks, and the network of Irish overseas. Some respondents indicated that their initial business came through social networks such as friendships:

> "My first customer was a friend I knew from university." (CEO, Case E)

Case C was a very clear example of an entrepreneur that used business networks including his local business networks, networks developed through attendance at business conferences, networks developed through organising his own private conferences, and the use of his EI consultant, whom he referred to as "his contact on the inside".

Some respondents suggested that academics cooperating with the companies or participating in the companies are a good source of contacts. Academic networks seem to be particularly relevant in the biotechnology sector, as firms may be based on technology coming from academic research and/or may hire highly qualified scientific staff. Quite often academics collaborate with companies on research projects, as in Cases B, C and D. For example:

> "…academics are a great source of contacts. We have a lot of academic collaborations, in South Africa, Australia and Dublin. We would allow them to use our antibody, but we can keep IP in case they succeed. These types of deals are possible, because academics tend not to be interested in commercialization. The contacts with Large Pharma tend to come through academics, as large Pharma tends to look for them." (Manager, Case B)

An important attribute of the networks referred to by the CEOs was access to the Irish Diaspora overseas. The interview data suggests that the Irish have one of the strongest networks internationally, with one respondent stating that the "Irish network internationally works miracles!" (CEO, Case E). The network of Irish overseas acts as is a type of a social network, gathering people of Irish descent living and working abroad and Irish business people from Ireland. One respondent referred to it as follows:

> "Murphia-Irish Mafia is very powerful internationally, and lots of business people find support this way, especially in the US." (Expert 4)

> One respondent suggested that some business people are better at "playing the Irish card" (Manger, Case C). He suggested that the CEO in Case C is very good at using this and that one has to use it.

How did networks develop? The respondents referred to how networks developed. The CEOs all stated that EI played an important facilitating role in the development of their networks. In addition to EI, international conferences, such as Bio, were important sources of new contacts and partners. For example:

> "The way I network is that I meet with business partners and we exhibit. I meet people at exhibitions, I meet current customers and I meet new customers. You meet them at meetings, they come to you after finding you on the web, but you also go into their country to visit them. There are lots of ways in which I have to network." (CEO, Case A)

> "…a huge help in terms of networking was EI. We are also getting new contacts through our investors, conferences such as Bio, using the Irish Network internationally. Also being involved in the Ernest and Young Entrepreneur of the year opened up a lot of networks."(CEO, Case B)

All of the CEOs and owners spoke of the need for socialising in order to build networks. Social networking took place through various social gatherings, friendships or gatherings of people of Irish decent. It involved activities such as golf, dinners and clubbing**.** For example:

> "…you need to go to dinners and functions, Every two weeks we would have a project meeting with our manufacturer." (CEO, Case B)

The idea of network multiplication appeared clearly in interviews with the CEOs in Cases B and C. Both of them suggested that participation in forums and business organisations opened doors to new networks, as networks are associated with other networks. For example, the CEO in Case C suggested that networking breeds networking, and becoming known allowed him to be invited to various circles:

> "Ireland is a small country, there are not many people here so I became well-known and regarded as an authority in matters of my business sector." (CEO, Case C)

Managing the network? Some respondents referred specifically to how they managed their network. For example:

> "We organise teleconferences every month, which helps managing our project contacts abroad." (Manager, Case B)

> "You listen to people; find that they have similar problems and similar issues." (CEO, Case E)

In all the case firms, socialising with business partners was an important way of strengthening relationships. For example, the CEO in Case C stressed that during socialising he also evaluates possible business partners:

> "When you play golf for four hours, you learn about them, for example some people cheat, so you know then it is better to avoid them.(…)." (CEO, Case C)

However, in contrast, one CEO did not consider that networks needed to be managed intensively. In this case, the CEO stated:

> "I do not think that networks are something that needs to be sustained; it is there, you call on it when you need it, they are "like good friends". For example, you send an email that you need to find somebody with a particular experience and 9 out of 10 times, you will get a response." (CEO, Case B)

What role did networks play in the internationalisation process? All the Cases suggested that the firms used their networks to internationalise (Table 5.1). In particular, the internationalisation and success of Case B seemed to be the result of their networks. The firm was founded as a network initiative, involving several people and interest groups, with Ireland as the base for a number of internationally coordinated projects. The networking was developed and managed by the academic founders of the company, by a business founder of the company and by experienced and well-connected employees, as well as investors and board members who were jointly driving the success of the company. In Cases A, C and E there was less of an emphasis on networks, though networking nevertheless was important to their internationalisation. These firms are strongly embedded in Ireland. They own Irish facilities and are run by CEOs with what appears to be a strong need for control over the business. In Case D there was the least emphasis on networking. This may partly reflect the fact that the

CEO seemed to be a quite private individual. The company is also listed on the Irish Stock Exchange and, therefore, privacy and careful management of any contacts with the public and the business world is required. Interestingly, the consultant in Case D suggested that the firm needed to improve on its ability to develop networks.

Networks were important in the case firms in that they acted as a source of knowledge, including knowledge about business development, research, funding or how to access contacts, and knowledge about new contacts during due diligence checks. Problems faced by CEOs were frequently handled by accessing knowledge from the network. For all cases, academics were an important source of contacts. The academic scientists had good academic network that quite often provided access to contacts relevant to business development and internationalisation. Academics are quite often targeted by Large Pharma companies sending so called "scouts" to Ireland to find new research to buy. Therefore, initial contacts established with academics are subsequently passed on to business development for further growth and management. For all case firms, using the international Irish network and "playing the Irish card" was important to their internationalisation process. In some of the cases, the CEO used their existing networks, including business, friends and academics, and networks they had developed during their previous experiences. In contrast, in the other cases there was a more active search for new contacts. This involved active engagement at conferences, meetings and forums related to their business niche.

The interview data suggests that the CEOs considered that network management was important and involved various activities including socialising, attending trade fares and conferences, actively searching for new contacts and managing existing relationships. Managing the network was important because it influenced the strength of the relationship within the network, and this in turn influenced the extent of knowledge flow within the network. The data suggests that from the perspective of the CEOs the parties learn from each other and adopt their routines. Through this approach they can match each other's needs and capabilities, thereby building inter-organisational routines and creating joint opportunities. Relationship development is, to a large extent, knowledge development, as parties learn about each other. However, they also create some form of joint knowledge and joint dynamics.

Table 5.1 Theme: Networks

	Sub-theme	Cases	Selected Quotes
Networks	***Types of networks***		My first business partner was a work colleague from my time in academia. (CEO, Case E)
	- Business	B, D, A, E	We keep research contacts with academics from UK and Northern Ireland. (CEO, Case A)
	- Social	B, C, E	Irish network internationally works miracles! (CEO, Case E)
	- Academic	A, E, B	
	- The Irish Diaspora internationally	C, E, B	
	Network development		…huge help in terms of networking was EI, we are also getting new contacts through our investors, conferences such as Bio, using the Irish Network internationally, also being involved in Ernest and Young Entrepreneur of the year opened up a lot of networks(CEO, Case B)
	- EI	B,C,E	You need to go to dinners, functions; every two weeks we would have a project meeting with our manufacturer. (CEO, Case B)
	- Conferences	A,B,C,D,E	Golf is a great sport, which allows you to understand people and get to know them on an informal basis.(CEO, Case C)
	- Social	B,C,E	As I became well-known in the business and political circles, I have been invited to participate in many organisations, be a member of many forums (CEO, Case C)
	- Network multiplication	B,C	
	Network management	A, B, C, D, E	The way I network is that I meet with business partners and we exhibit. I meet people at exhibitions, I meet current customers and I meet new customers. You meet them at meetings, they come to you after finding you on the web, but you also go into their country to visit them. (CEO, Case A)
			You go to big international meetings, where you meet hundreds of people looking for opportunities. (CEO, Case D)
			We organise teleconferences every months, which helps managing our projects contacts abroad (Manager, Case B)
			You listen to people; find that they have similar problems and similar issues. (CEO, Case E)

5.2 Trust building

Closely linked to the theme of networks is the theme of trust building, as both themes deal with relationship building. The boundaries between networks and trust building overlap to a certain degree, but trust stands out in the interviews as a separate consideration. Across all the cases there was a strong emphasis on the role and importance of building trust within business and with business partners. Illustrating the importance of trust the respondents stated:

> "You have to put time into building trust, both with employees and partners." (CEO, Case B)

> "Trust and getting to know people is important, as the industry is hugely regulated, and people are very cautious." (CEO, Case E)

What factors related to trust building matter to internationalisation? The data suggests that the process of trust building relies on certain factors, such as (i) getting to know people, (ii) relationship development and (iii) establishing credibility and delivering. The presence of all of these factors contributes to building trust in business relationships and influences positively the internationalisation process according to the field data.

Getting to know people

Several respondents reported that getting to know people was very important. Prior to the establishment of a relationship, they tried to assess trustworthiness and capability of a potential partner, to take references and to perform due diligence check-ups. CEO, Case D reported that it took less time to close subsequent deals once they had a business partnership with a well-known Pharma company, as people knew that this company performed complex check-ups. Another example comes from Case C:

> "Golf is a great sport, which allows you to understand people and to get to know them on an informal basis." (CEO, Case C)

> "As I became well-known in the business and political circles, I have been invited to participate in many organisations, be a member of many forums (…)." (CEO, Case C)

Relationship development.

Some respondents indicated the importance of relationship development, in particular that trust is developed over time as a relationship grows. For example, CEO, Case B stressed that you have to put time into building trust, both with employees and partners, and that the mechanisms of building trust are very similar. He suggested that his employees bring to his attention any problems and if they fail to do so, there is a trust issue. With partners trust relates more to issues of credibility or to the use of intuition when there is not enough time to develop a relationship of trust. Trust in business relationships is based on building a relationship and then delivering:

> "Each of company member is encouraged to develop business relationships. Even with our manufacturer we go and meet them every two weeks, have project meetings, go out and have dinner. (…) Trust is based on building a relationship and delivering (…). If there are problems, you have to work through that, or if a relationship is not delivering, we try to discontinue it amicably." (CEO, Case B)

CEO, Case E also stressed that the relationship building process helps to establish trust. This is also a reason why it is easier to create business relationships with friends where the trust has already been established. Quite often business comes through friends and long-standing business partners like the US distributor:

> "My first customer was a friend of mine, who I worked with in post-doctoral days. (…) It is all down to relationships with people you know." (CEO, Case E)

CEO, Case B suggested that if he does not have time to establish the relationship of trust, he relied on his intuition. Some suggested that once trust is established the costs to a company are reduced and the benefits grow as the positive opinion about the company and the entrepreneur becomes known in business circles. For example:

> "Trust is based on building a relationship and delivering. (…). If there are problems, you have to work through that, or if a relationship is not delivering, we try to discontinue it amicably." (CEO, Case B)

CEO, Case E emphasised that the need to build lasting relationship is also dictated by the conservative nature of the industry, where it takes long time to bring a product to the market, to obtain all the required legal permissions, and therefore people rarely

change suppliers. For example, both CFO, Case D and CEO, Case B suggested that credibility is vital in high risk business such as bio-tech. Image becomes even more important for a company which is listed on the stock exchange, as "the public should be regularly fed newsworthy items" (CEO, Case D). CEO, Case B confirmed that his company is quite private and it is not as important to create a public image, as the company is not listed. However, from his experience this would change if the company was listed. For example:

> "Trust is hugely important as the industry is hugely regulated and people are very cautious, it is a conservative industry." (CEO, Case E)

Establishing credibility and delivery

All CEOs suggested that building up credibility is one of the main factors that facilitate the establishment of trust. Credibility was built through a process of consistent delivery according with agreement and expectations of a business partner, for example:

> "I would call each customer back within twenty minutes, which also creates credibility and strengthens the existing relationships with clients." (CEO, Case E)

> "With partners it comes more to credibility." (CEO, Case B)

> "Company E became quite successful as they have an "incredible record of compliance". People always come back to you, delivery is very important." (Consultant, Case E)

> "It is important not to promise too much, as it can effect company's credibility in the future, because once they are your investors they will follow you and you need to be able to deliver." (CFO, Case D)

The data suggests that it is also important that customers and partners can see the manner in which a company addresses problems. For example, CFO, Case D suggested that when you sell you have to present a strong image of a company: "say that there are risks, say what you have done to de-risk it"

CEO, Case D suggested that the longer the company is around the more credible it becomes, and the deals from 2010 followed much faster than previously as Company D is perceived as quite credible.

In all the cases the theme of trust building was very important. The factors relevant to building of trust are: getting to know people, relationship building and focusing on the credibility of the entrepreneur and the organisation as well as consistent delivery. The sub-theme of getting to know people is explicitly evident in Cases C, D and E. The sub-theme of relationship building confirms that trust in business partners grows as a relationship develops. All companies reported that they worked actively on developing and strengthening relationships over time, and that this results in a stronger sense of trust in such relationships. Among the sub-themes that contributed to building trust, in all the cases there was the need to create a credible image of the company and credible behaviour towards business partners. Additionally, the sub-theme of delivering according to what has been agreed in a relationship positively contributes to trust creation, as suggested by Cases A, B, D and E.

Table 5.2 Theme: Trust building

Theme	Sub-theme	Cases	Selected Quotes
Trust building	- ***Getting to know people***	C,D,E	CEO, Case C builds relationships slowly; he hosts dinners and his own mini-conferences. (Consultant, Case C)
	- ***Relationship development***	A,B,C,D,E	You have to put time into building trust, trust with both employees and partners is important. (CEO, Case B)
	- ***Establishing credibility and delivery***	A,B,C,D,E	This business has a common language worldwide. If the product is right and the quality is right and the supply is right and the continuity of supply is right the relationship usually works well. (CEO, Case A) I would call each customer back within 20 min, which also creates credibility and strengthens the existing relationships with clients." (CEO, Case E)

5.3 Learning

The data suggests that learning influenced the internationalisation process in the case firms. Learning "how to" is important in an uncertain international environment. The case data suggests that the internationalisation process was characterised by (i) different types of learning, (ii) learning at different levels and (iii) the management of the acquisition and use of knowledge.

Demonstrating the importance of learning, interviewees stated:

> "You need to learn things, you need to understand how to manage a company, how to put a structure on it." (CEO, Case C)

> "It was a great learning experience, as I was moving between disciplines, different countries." (CEO, Case D)

> "It is constant learning, scanning the environment and trying to find answers." (CEO, Case E)

What types of learning matter to internationalisation? The CEOs discussed different types of learning that occurred during the process of internationalisation. These included learning based on prior background and experiences (congenital learning), learning from international and domestic experience (experiential learning), and learning by observing others (vicarious learning).

Congenital learning.

All respondents emphasised how their background and personal history shaped their learning process, quite often observing entrepreneurial behaviour in their family or learning to be entrepreneurial as a child or a teenager, or learning in education, from mentors or learning on the job. As children of entrepreneurs some learned about business:

> "I come from family with entrepreneurial traditions; father and grandfather were running small companies." (CEO, Case B)

> "I was always selling and bargaining, even at college or university, it was an easy way of thinking for me." (Manager , Case C)

Experiential learning

Learning from prior experience (experiential learning) was evident in all of the cases. All CEOs worked for large multinational companies, both in Ireland and abroad prior to founding a company. Interestingly, all CEOs also worked for small multinational companies prior to establishing their own firms. Quite often they had worked in a variety of different roles. The data suggests this work experience gave them 'grounding' in building such business from scratch. All suggested that gaining this international business development experience was crucial for them in their efforts at setting up a business. Some suggested that it was difficult to obtain sufficient experience in Ireland, so four out of five worked abroad first to gain experience and knowledge.

CEO in Case B part founded a small international biotechnology company during his PhD. He, learnt about all aspects of running such a business, including how to prepare a small company for listing on the stock exchange, how to fundraise internationally, and how to network internationally. He used this knowledge when setting up his first company in Ireland. The CEO in Case D started off in a finance role and worked in sales, marketing, operations and an R&D role. These combined experiences gave him an overview of all the key areas relevant for new product development. Referring to their experience, interviewees stated:

> "I had worked in pharmaceutical industry before, so I knew what was required." (CEO, Case A)

> "...it was a great learning experience, as I was moving between disciplines, different countries." (CEO, Case D)

The CEO in Case C is a serial entrepreneur and he stressed how much one learns from the experience of creating a company for the first time. He stated:

> "This is why serial entrepreneurs are so useful for the economy. You learn so much by your first company, you make so many mistakes and you learn from them. You learn how to manage lawyers, tax people, all the people who work for you, who charge you a lot of money it takes experience to deal with them." CEO, Case C

Vicarious learning

An important type of learning referred to by the CEOs is vicarious learning. This partially links to experiential and congenital learning, as they were learning not only by working for businesses themselves, but also by observing the people who were running them. The CEO in Case C reminisced how important his mentors were prior to his entrepreneurial career. He stated that they not only taught him how to develop a business, but also how to network and socialise, and even how to dine with very sophisticated clientele and business partners. He stated that he became known in Ireland as a successful serial entrepreneur and as an excellent host and a networker, who even hosts private conferences. The CEO in Case D suggested that observing dysfunctional businesses helped him learn how to avoid mistakes:

> "I have seen a lot of dysfunctional business; I have learned what not to do." (CEO, Case D)

> "I thought it would be a very good idea to have some experience in a small company before I started my own company." (CEO, Case C)

> "He would start in your face pushing, but if he realises that he is lacking skills or knowledge, he starts listening and learning, understanding the problem and looking for a solution." (Consultant, Case C)

> "Yes, you learn a lot from customers and a lot of people, it is something a lot of people forget (…). You learn a lot from competitors by watching what they do and also what they don't do." (CEO, Case A)

At what levels does learning occur? The respondents referred to various levels at which learning occurred: (i) the entrepreneur; (ii) the organisation; and (iii) business partnerships.

The Entrepreneur

All the entrepreneurs stated that they were constantly learning - learning all aspects of running a small business and learning during international travel and face-to-face communication with business partners and customers. For example:

> "The first thing is you have to learn pretty quickly" (CEO, Case A)

"I have learned how to develop products in the lab, and develop a process that will be suitable for manufacturing and then to implement it in part-production and then full production." (CEO, Case E)

"It is an evolution as you go through. It's not that you are sitting in an office with a big plan. The reality is that you have to constantly adjust the plan, follow the evolution. You are funnelling down to the essence of what you need." (CEO, Case D).

"It is key that you learn to communicate with different people at different levels." (CEO, Case B)

The organisation

Respondents in Cases B, C and D suggest that their organisations are adept at learning, which enhances their internationalisation knowledge. The CEO in Case C stressed, however, that in a small organisation resources limit team learning and training. For example:

"The whole team dealing with new product development is involved. The formal process is laid out, but there is always an element of creativity, we are deliberately trying to break the systematic approach, bring new people in and brainstorm (…). It is people's business, they all need to learn." (CEO, Case D)

"Training is very important, but again balance is very important, because if you are a small company with a limited amount of people, you can't have them all training, somebody has to run the company." (CEO, Case C)

Business partnerships

The CEOs suggested that learning also takes place in business partnerships, where partners learn how to relate, but also create joint knowledge in the projects and jointly recognise new opportunities, for example:

"Our partner knows exactly what we are doing; we are also very well informed about their actions." (CEO, Case D)

"I got interested in establishing this company, because I liked the scientists who had the technology, they are friends of mine. I did not have the time, so we put it on the back burner, but then CEO, Case B arrives out of the blue, driving around universities, looking to do some start-ups (…), so I said, I think we have the guy to start the company."(CEO, Case C)

How is learning managed? The data suggests that the learning process is also managed in various ways, such as information processing, grafting of external knowledge, acquisition or spin-out of other firms, information sharing and searching for knowledge. Some CEOs reported that they have managed the learning process through information processing, such as scanning and sense making. For example:

> "You constantly try to simplify problems, funnelling down to the essence of what you need." (CEO, Case D)

> "It is constant scanning of the environment and trying to find answers." (CEO, Case E)

Some CEOs described how they engaged in active search for knowledge, mainly in situations of uncertainty such as an entry into a new market or recognition of their personal limitations. For example:

> "It is immediately clear to me if I do not know enough, then I start learning or ask people with relevant experience, there is always somebody who will help you." (CEO, Case C)

> "I began collecting information on Sweden and about the whole regulatory system in Sweden for drugs for foods, for medical devices, these are the three big areas." (CEO, Case A)

The CEOs suggested that information searching is also supported by information sharing, which seems to occur in networks or business partnerships. CEO, Case C discussed various business plans with his well-established business contacts; he called them "friends". CEO, Case B also stressed that his networks are a source of information sharing: CEO, Case D emphasised how important information sharing and communication in a company is. For example:

> "It is all about communication and learning in a company. It is better not to create demarcation." (CEO, Case D)

> "You just need to send an email to a network partner if I need to find somebody with that experience, 9 out of 10 times you get a response." (CEO, Case B)

Some CEOs suggested that obtaining knowledge can happen via acquisition of a company or technology. For example, company D came to existence as a spin-out of a different biotechnology company. Company C is a spin-out of the company owned previously by CEO, Case C. Company B was created as joint initiative of entrepreneurs, investors and academics. CEO, Case A used acquisition twice, for example:

> "We wanted to get some experience in Ireland, because we wanted to use Ireland as sort of test ground for new products, so we a bought 33.3% interest in another company to learn about this line of business." (CEO, Case A)

All of the CEOs used some form of grafting of external knowledge by hiring the right people, by bringing in consultants and advisory groups to solve problems or by fostering innovation in the company. The need to hire people with expertise is particularly visible in the data for Cases A and D, where the CEOs were not scientists, and lacked technical knowledge, despite an extensive knowledge base in international business development:

> "Sometimes we would bring people from outside, put them together with our group and then brainstorm, trying to find ideas this way." (CEO, Case D)

> "CEO, Case A has the business knowledge, but he is not a scientist, so he always had to hire scientists." (Consultant, Case A)

What role did learning play in the internationalisation process? The case data suggests that in all of the cases prior experience and learning characterised the internationalisation process (Table 5.2). Learning from prior experiences in their background and history (congenital learning), as well as from the international and domestic experience (experiential learning) is evident in all the cases. These experiences and learning enabled the CEOs to integrate previous knowledge into the emerging organisations. Learning occurred at various levels including at the level of the individual, the level of the organisation and in the context of business partnerships.

In particular, Case D was characterised by all the aforementioned learning types and levels. The capability to learn as an organisation, an entrepreneur and in a partnership seems to be a key factor in their success. It appears that a well-managed capability to learn in diverse ways, on all three levels contributes to successful internationalisation. The CEOs in Cases B and C both seemed to have learned a lot individually. CEO, Case

B seemed to be very flexible in using all sorts of resources and opportunities to learn, especially from other people. It was similar in the case of CEO, Case C. CEO, Case C had excellent mentors when he was young and at the time of interview, close to retirement age, became a mentor himself, mentoring young entrepreneurs such as CEO, Case B. They belonged, however, to different generations; CEO, Case B being young and flexible, while CEO, Case C was much older and more conservative. This is reflected in the way he has built his business and the fact that he focused on wealthy Western countries, while ignoring new emerging markets such as China. CEO, Case B was shown to be much more flexible and open to change, and subsequently created a business model that was flexible and progressive. The evidence for vicarious learning by CEO, Case C did not come from him directly, but from an EI consultant in charge of the company, who suggested that CEO, Case C was less likely to openly admit that he needed to learn from others. At the same time CEO, Case C suggested that it is important to ask for help, if one does not understand something. The combination of the two statements seems to validate the opinion of the consultant that CEO, Case C learns from others. Vicarious learning was also strong in Cases A and D, where the entrepreneurs did not have a scientific background. The data suggests that the strong need to learn from others with a technical background is driven by the scientific nature of the industry.

CEO, Case A was characterised by all the forms of learning and encouraged some form of learning for his employees. However, they appear to apply a very limited management of the learning process on all three levels, organisation, individual and partnership. His preferred method of managing knowledge development was through acquisition. It might be that the reason Company A did not manage to sustain itself as an independent entity and finally had to be sold, maybe rooted in the absence of a management mechanism to create a learning organisation, which may have allowed to flexibly adapt to changes required on the market.

An interesting learning capability can also be seen in Case E, who learnt how to run the business and expand internationally in a very limited manner. However, he appeared to avoid learning from others and hiring or engaging knowledgeable people in his business. The learning under these circumstances occurs mainly on a personal, entrepreneurial level and in a very limited manner in a partnership with his US distributor, who helped him to identify new opportunities. Similarly CEO, Case E like CEO, Case A appeared

to be focusing on keeping control of his business. Both companies represented a typical family business, where operations were primarily self-financed. This approach lowers the risk of losing control, as investors will want to take some form of control over the company, but also limits the exposure of the company to diverse influences that could expand the learning capability of the company and potentially improve the internationalisation process. In summary the cases suggest that learning increases the stock of knowledge available to a company, which increases the ability of a company to recognise, assimilate and apply information from the external and internal environment and increases the knowledge relevant in the context of the internationalisation process.

Table 5.3 Theme: Learning

	Sub-theme	Cases	Selected Quotes
Learning	***Types of learning***		I had to learn while going through it.(CEO, Case B)
	- Congenital	A,B,C,D,E	Absolutely learning from problems. (CEO, Case D)
	- Experiential	A,B,C,D,E	I had to do everything from sweeping the floor to the laboratory work, and that was how I was acquiring the experience of running a small business. (CEO, Case E)
	- Vicarious	A,B,C,D	Being thrown in at the deep end is the best (Manager, Case C) They could not do without him (…). They are also buying in the right people with the right contacts and knowledge. (Consultant, Case D)
	Learning levels:		
	- Entrepreneur	A,B,C,D,E	I have always had a passion for learning, especially in the areas that are important for my business.(CEO, Case C)
	- Organisation	C,D	International business was fun, exciting, cutting edge, you either enjoy or you do not, it depends on a person (…),but you have to learn all the aspects of running a business, which is less fun, but everything you do needs to be 100% kosher, good corporate governance. (CEO, Case B)
	- Business partnership	B,D,E	Our partner knows exactly what we are doing; we are also very well informed about their actions. (CEO, Case D)
	Learning management:		
	- Acquisition or spin-out of other firm	A,C,D	We wanted to get some experience in Ireland, because we wanted to use Ireland as a sort of test ground for new products, so we bought 33.3% interest in another company to learn about this line of business. (CEO, Case A)
	- Searching for knowledge	A,B,C,D	We have to share sensitive data with other scientists during joint projects. (CEO, Case B)
	- Information processing	B,C,D	You do not see clear, big points on the way; you constantly test what is working, constantly getting feedback from people (CEO, Case D)
	- Information sharing	B,D	It is constant scanning the environment and trying to find answers. (CEO, Case E)
	- Grafting of external knowledge	A,D	If you lack information, you need to find people with the right expertise. (CEO, Case C)

5.4 Entrepreneurial characteristics

Among the factors influencing international entrepreneurial behaviour the data reveals the importance of the interaction of a number of entrepreneurial characteristics, such as: perseverance, independence, resourcefulness, and enthusiasm. For example:

> "His characteristics are very important for the business development. He is very skilled, very good at fund-raising, knows chemistry well. He loves working for himself, but is constantly thinking the way business goes and trying to get new business." (Board member, Case E)

> "He is a stubborn person, who tries to explore all avenues, but if he was not like that he would not be right for his company. He has entrepreneurial drive and experiences as a serial entrepreneur. He is not only successful in his area; he became very successful and well known in all the forums related to it. (Consultant, Case C)

What types of characteristics matter to internationalisation? The CEOs, consultants dealing with each company, as well as managers or board members gave accounts of characteristics relevant in international business development.

Perseverance

Several respondents referred to perseverance. The CEOs maintained their businesses in spite of difficulties such as recession, lack of finance, customers and skilled labour. Respondents admired how determined the CEOs were at convincing others to share financial and business risks, and how determined they were to solve problems their companies faced. CEO, Case E managed to completely turn the business around after the sales revenue dropped completely as result of changes in the industry. CEO, Case C explored every avenue to find finance for research, finally deciding to sell the majority of his company in order to create finance needed to fund the research project. Consultants also described CEO, Case B as "pushy" in looking for an advantage for the company. Both CEOs, Cases B and D had to work long hours on their own for at least half a year to obtain the initial seed funding needed to develop their companies. For example:

"CEO, Case C is stubborn, but he needs to be like that, this is right for his company." (Consultant, Case C)

"CEO, Case B was kind of quite direct, to the point and pushy, so that could be one of the reasons why he was successful and rich in achieving large investments." (Consultant, Case B)

"CEO, Case E is very sharp, flexible, and good at persuading people in negotiations." (Board-member E)

"CEO, Case B is the life-blood of the company and people listen to him as he is very creative at problem solving. At the same time he is very pleasant to work with. If you come across an issue, while you are still thinking about the issue, he has already thought about a solution." (Manager, Case B)

"CEO, Case C is good at motivating people, selling his ideas and good at influencing people, but is also a supreme technologist." (Consultant, Case C)

Independence

An important attribute of the entrepreneurs is independence. Many CEOs suggested that the desire for independence is a driving force for them. They reported frustration with rigid, bureaucratic large companies they worked for, and a desire to be more in charge of what they do, something they believed was not possible while working in a large organisation. For example:

"During my time at college I did not have to work but I wanted to - independence was important." (CEO, Case B)

"CEO, Case A keeps tight control over the finances of the company, and avoids losing the majority control of the company. He is a closed man." (Consultant, Case A)

"CEO, Case B is driven by finding solutions and has an excellent memory. CEO, Case B can also be described as a serial entrepreneur with one company, as he definitely shows initiative in creating new companies in the future, and has done an excellent job at creating Company B." (Manager, Case B)

The independence of the entrepreneurs shows that they believe in themselves. They did not seem to believe that the success or failure of their venture will be governed by fate, luck or similar forces. They believed that their achievements and setbacks are within their own control and influence. CEO, Case E stressed that he did not like working for

an MNE and was getting "itchy feet". He stated that he had always wanted to run his own business and found it frustrating working for large businesses, because it "it was too slow, too bureaucratic". He was "bored" in multinationals and "it takes a special personality, not somebody who worries easily, to be an entrepreneur, as there is a lot of risk involved". Interestingly, CEO, Case D was described as conservative (CFO, Case D), which is common in the pharmaceutical sector, but he was also described as lacking charisma and not very good at managing relationships and using networks (Consultant, Case D). Despite this lack of flexibility and conservatism, CEO, Case D demonstrated a strong belief in his abilities. The independence and confidence are illustrated below:

> "CEO, Case C, never accepts "no", never accepts problems, he keeps going and believes he can do anything." (Consultant, Case C)

> "I always believe that everything in essence is simple, and if you understand the concepts behind it, you can always understand the problem. I guess the only reason people do not understand something is because they have mental blocks." (CEO, Case D)

Resourcefulness

The attribute of perseverance and independence is consistent with a wish to take responsibility, to be resourceful and to solve problems in a flexible way. The data suggests that resourcefulness allows the entrepreneurs to face an ambiguous international environment, where setbacks and surprises, are commonplace. For example:

> "…you're constantly testing what is working (…). There is a lot of rejection out there." (CEO, Case D)

> "CEO, Case B is a high-energy man, easily generating solutions to problems, thinking outside of the box." (Manager, Case B)

> "CEO, Case E is very flexible." (Board member, Case E)

Enthusiasm

The respondents in the cases also reported enthusiasm and faced the future of their businesses optimistically. Considering that all of them faced major obstacles on the way, their belief in their ability seldom waived. It can be seen in the cases, that during these

down periods they maintained their enthusiasm and let those around them know it; they seemed to help others sustain enthusiasm. For example:

> "CEO, Case C is a man with a great flare and enthusiasm, good at motivating people, selling his ideas, good at influencing people." (Manager, Case C)

The data suggests that the personality characteristics of the entrepreneurs seem to influence internationalisation (Table 5.4). It seems that the most frequent characteristics such as perseverance and independence are precursors to internationalisation behaviour in combination with other factors. Business people, who do think independently, are likely to seek this particular business freedom. The cases suggest that the characteristics of perseverance, independence, resourcefulness, and enthusiasm play an important role in internationalisation.

The only entrepreneur who has all the characteristics discussed is CEO, Case B. He was also perceived by several industry experts (Expert 1, 2, 3, 4, 6, 7, 8) as one of the most successful international entrepreneurs in the Irish biotechnology sector, somebody who is a model example of how to create a successful international Irish company.

Table 5.4 Theme: Entrepreneurial characteristics

Theme	Sub-theme	Cases	Selected Quotes
Entrepreneurial characteristics	***Types of characteristics***		CEO, Case A is a stubborn man. (Consultant, Case A)
	- Perseverance	A,B,C,D,E	The main things that determine the success CEO, Case C is his drive, passion and dog headedness. (Consultant, Case C)
	- Independence	A,B,C,D,E	I found working for large business frustrating (CEO, Case D)
	- Resourcefulness	B,C,D	I was always selling and bargaining, even at college or university, it was an easy way of thinking for me (Manager, Case C)
	- Enthusiasm	B,C,E	CEO, Case C is as a man with a great flare and enthusiasm, good at motivating people, selling his idea, good at influencing people. (Manager, Case C)

5.5 Team interactions and characteristics

The data suggests that team interactions and characteristics influence the internationalisation process, especially teams that are educated and experienced. However, the interactions with a team are also important in determining how teams influence internationalisation. Teams can be characterised by various interactions that can affect the internationalisation process positively or negatively. The interactions provide an indication of whether the team is weak, in need of management or works well together. Some of the cases used advice groups or consultants to improve the performance of the company. The importance of the team is illustrated below:

> "It is important for Company B to operate as a team. (…) I place a lot of trust in my team." (CEO, Case B)

> "Team work is very important in this company; we have no clear divisions between us." (CEO, Case C)

> "We do everything as a team. (…) Human resources is a key, it is a people based business." (CEO, Case D)

The data suggest that there are different types of teams within the case companies, such as teams in charge of day-to-day operations, virtual teams, problem-solving teams, R&D teams or groups, and advisory groups consisting of advisors or consultants advising either on a regular or ad hoc basis. Considering the low numbers of employees, there were typically no clear divisions, with the same employees formed parts of different teams. The approach across the cases is to create teams when they are needed and to avoid divisions and clear structure in day-to-day operations. For example:

> "We are always looking to people who like working as a team, quite often highly educated people, like PhDs, but also those that have a broad expertise, who are able to contribute in a number of areas. As the business is small, you can't have people who will just focus on a very narrow area and not think outside of this box. You must also be able to work with external teams, as we are always working with other companies. We value cultural and personal flexibility." (CEO, Case D)

What type of team characteristics matter to internationalisation? The teams in the case companies had different characteristics, such as good education and experience.

CEO, Case D talked about the sub-theme of education and experience of the team. This approach is possible as they have:

> "A great team of people, with very good education, and very good experiences." (CEO, Case D)

Consultant, Case D confirmed that they hired very well and the company was driven by many people, like CFO, Case D:

> "...they could not do without him (…) they are also buying in the right people with the right contacts." (Consultant, Case D)

In Case B the sub-theme of an educated and experienced team is again visible in the interviews. CEO, Case B also stressed the team approach in the company and how he places a lot of trust in his team. He invested a lot of resources in the team and team training, but also hired "some excellent people" like Manager, Case B. This shows that the Company B team was both well-educated and experienced. CEO, Case B found that working closely with the board was also very important because it ensured that they all wanted to achieve the same goals. He argued that it was vital for an industry to have the right people who have prior experience in setting-up and running smaller R&D companies - there were "very few people like that here in Ireland". Evidence of good education and experience of the team can also be found in the other cases. For example:

> "A great team of people, with very good education and experiences." (CEO, Case D)

> "My son is taking this international selling program, and I as a sponsor have to participate in four, two-day lectures. It is an absolutely fantastic program, best I have ever come across." (CEO, Case A)

> "Sean has a PhD in biochemistry; I have another guy who has a PhD in food science (…). In our business you need quite a lot of good technical people, as well as marketing people who understand technology." (CEO, Case A)

The data suggests that the attribute of team experience relates to experience acquired prior to employment, as well as experience of working together.

> "I invest a lot of resources into the team, training them, but have also hired some excellent people like Manager, Case B." (CEO, Case B)

The cases suggest that gaining relevant business development experience in Ireland is challenging. CEO, Case E complained that finding the right person with international business development experience in the generics sector was very difficult, and that at the time of interview his recruitment had not been very successful. Company E did not invest much in training people as it focussed less on R&D and more on manufacturing. Expert 12 argued that Company E was very much a team operation, but that this only related to how the manufacturing was organised and not to the way the business was run. CEO, Case E suggested that finding the right people was the biggest advantage, and Company E "was not that lucky" in this area, so the company mainly relied on experience coming from the board.

What team interaction can be observed in cases? The data suggests that teams were different in how they interacted. They were examples of weak teams, teams needing to be managed, and teams working well together.

Weak teams

In Cases A and E, the teams were quite weakly developed, which seems to correspond with the findings related to entrepreneurial characteristics confirming that CEOs, Case A and E tended to keep control over the company, more in the style of a family business. In companies A and E, the style of running the business relied more on the control accumulated by the owner, who was reluctant to share the control of the company. CEO, Case A did not talk about the team concept a great deal, as he mainly worked on his own, contracted a few sales reps and contracted out all the manufacturing. For example:

> "I tend to work on my own, contract few sales reps and contract out all the manufacturing. My son is working with me and I would like to leave the business to my son and daughter." (CEO, Case A)

> "You might spot someone, find someone in your travels, but it is difficult to trust people, it is a known fact that about 60% of all people who apply for sales positions tell lies on their application forms." (CEO, Case A)

Company A had reached the point that it was important to sell the majority of the business as a result of the retirement of the owner. The team was also weakly developed in Case E, which was confirmed by the opinion of the consultant:

> "CEO, Case E is doing a lot of the fund raising himself. He has a person, who keeps the logistics going, but he works on his own." (Consultant, Case E)

> "The weakness of the company is that we don't have a second person like CEO, Case E." (Board member, Case E)

Company E was developing well, but the absence of a team supporting CEO, Case E was seen as a weakness of the company both by a Board member, Case E and the Consultant, Case E. The main advisor facilitating internationalisation was Company E's US distributor and partially the board members:

> "The board members are very helpful, like our US partner. He sits on our board of directors and they made on investment in our company as well. I think that has been a key to our success; finding that partner." (CEO, Case E).

The sub-theme of a weak team appears to be linked to the previous themes of entrepreneurial characteristics. For example, both CEOs, Case A and E showed signs of wanting to stay in control of their company, both were running a family type of a company, where family members would become co-owners of the company.

Teams in need of management

The management team in Company B was also well-educated and experienced, but the very strong position of the board appears to have limited the importance of the team, as the majority of decisions were made by the board. Manager, Case B also suggested that the board was an important human resource, as they all brought different expertise and knowledge, but they were mainly managing their investment, making sure that it was well spent. This is an example of an advice group enhancing the knowledge available to the company team. CEO, Case B suggested that the advisory group also needed to be managed. Manager, Case B suggested even that CEO, Case B spent too much time managing the board. It seems that the strong influence of the board limited the freedom of the management team. Considering that the investors own over 50% of the company, they tended to interfere a lot in the running of the company. This allowed them to protect their investment. For example:

> "The board is a great source of human resource, as they all bring different expertise and knowledge, but they are mainly managing their investment, making sure it is well spent. They can also have quite strong opinions, so it is necessary to manage them." (CEO, Case B)

The need to manage the team can be also seen in Cases A and E where the team was very weakly developed. The CEOs therefore tended to bring external advisory groups or consultants to help with the management of the company. For example:

> We use consultants in UK, in the North of Ireland and also in the South, a lot of these would be university based. A lot of intricate problems associated with products are sorted out through consultation with experts." (CEO, Case A)

Teams working well together

The team interactions in Cases B, C and D seem to be quite different, as all three companies had well developed teams, in particular Company D, and were built on the diverse backgrounds of team members. The CEO in Case D seems to have built a particular team from the foundation of the company. The strongest and most diverse team seems to be represented in Case D. In Case D the sub-theme of team work is strongly visible. CEO, Case D repeatedly stresses that team work is a key success factor in the company and how important it is:

> "I have tried to build a culture that creates a good place to work, encouraging people to work as part of the team, which is good for developing business (…) .Human resources, are the key, it is a people based business (…). Our employees have to be able to work together. We also pick people based on whether they can communicate well and present themselves well. If a partner comes in, I am hoping that anyone in the facility can talk to him, so each person needs to know the business." (CEO, Case D)

The creation of the ideas in Company D also displays very much a team approach. They brainstormed as a team and sometimes they brought people from outside to brainstorm. This approach helped CEO, Case D to scan the idea and reach a point where the idea was right.

In contrast, the team in Case C was much smaller, but worked very well together. This successful team interaction shown in this case might have resulted from the fact that the majority of the team came to the company from a company previously owned by CEO, Case C. For example:

> "Team work is very important in our company; there should be no clear divisions between team members in such a small organisation." (Manager, Case C)

All the sub-themes identified appeared in Case D. CEO, Case D, despite lacking a scientific background, has created a successful international company. To a large extent the skilful use of human resources contributed to this success. He was able to hire the best people in each area that the company required; well-educated, experienced people, but most of all people who were well connected in the business environment. CEO, Case D put a lot of effort into managing the culture in the company, to enhance team work and manage difficult aspects of the team. The result was that his team was effective at working together, presentable to the external world and contributed significantly to the international success of the company.

In Case C the team was much smaller, and the members of the team were required to multi-task. The data shows no clear division of roles, which requires good team work. CEO, Case C was also committed to hiring experienced and well-educated staff. Company C did not manage to attract any significant funding, therefore there was not much advice coming from investors.

Company A and E again appear similar, both of them representing weak teams. Both of the companies relied on advisory groups. In the case of Company E this was advice coming from the board, while in Company E advice comes from consultants that were constantly being hired on an ad hoc basis to help run the company. Additional differences are that company A had experienced scientists on board, which was necessary considering the lack of a scientific background of CEO, Case A.

Company B on the other hand hired highly educated and experienced people who tended to work well together. The company was fully controlled by the board and investors, which on one hand created a strong advisory group, but on the other hand created a limitation and a need for CEO, Case B to invest a lot of time and energy into managing the relationships with the board. The interplay between the team and the board seems to have worked well, as demonstrated by how successful the company was in attracting large amounts of funding over many years.

The role teams play in the internationalisation process?

All of the firms used some form of team in their internationalisation (Table 5.5). The respondents in some cases suggested that internationalisation would not be possible without the right team in place. Some companies (Case B, C, and D) were characterised by teams that work well together, that were experienced in international business development, and were characterised by high levels of education. In Case B the CEO had to manage the board, which created an obstacle, but was overcome by management.

The teams in Cases A and E are shown to be weak by the interview data. In Case A this was addressed through the use of external consultants, but in Case E the internationalisation was quite limited. It could be argued that the weakness of the team was a limiting factor to internationalisation.

The data suggests that the characteristics of the team, such as experience and education, combined with working well together as a team, can contribute positively to the internationalisation process of companies.

Table 5.5 Theme: Team interactions and characteristics

Theme	Sub-theme	Cases	Selected Quotes
Team interactions and characteristics	***Types of characteristics***		CEO, Case C invests in training people. (Manager, Case C)
	- Educated	A,B,C,D	
	- Experienced	B,C,D	I invest a lot of resources into the team, training them, but have also hired some excellent people like Manager, Case B. (CEO, Case B)
	Team interactions:		Culture that creates a good place to work, encouraging people to work as part of the team, which is good for developing business. (CEO, Case D)
	- Weak team	A,E	
	- Teams in need of management	B,D	CEO, Case E is doing a lot of the fund rising himself, he has a person, who keeps the logistics going, but he works on his own. (Consultant, Case E)
	- Teams working well together	B,C,D	They need to put quite a lot of effort into management and integration of different company cultures after buying a new facility with its staff. (Consultant, Case D)
			They need to put quite a lot of effort into management and integration of different company cultures after buying a new facility with its staff. (Consultant, Case D)

5.6 Chapter Summary

This section explains, how the themes emerging from the data explain how SMEs internationalise in the Life Sciences industry in Ireland. The internationalisation process observed in the five case companies appears to be influenced by: networks, trust building, learning, entrepreneurial characteristics and team interactions and characteristics. The constellation of influences of various factors and dynamics differ in each case.

Company A

Company A is engaged in manufacturing and some limited research. It is the oldest company among the cases investigated in this study. Looking at its internationalisation process one can see a company that was acquired over 30 years ago with a wide network of international distributors. The company was a typical family business, self-financing and CEO, Case A kept a tight control over both corporate governance and finances. CEO, Case A focused on self-learning himself, and educating his two children to take over the business. However, ultimately the company suffered as a result of insufficient team building, combined with a lack of resourcefulness and enthusiasm by the CEO. He also undertook quite limited network activates with limited evidence of business and academic networking. CEO, Case A attempted to sustain his company by acquiring a new, less research intensive product line. Although he continued searching for new knowledge to expand his company, the international position of the main product became outdated. After the data collection for this study was completed, the majority of company A was sold. Interestingly this was predicted by Consultant, Case A, who suspected that the company would fold.

In summary, in Case A, the entrepreneur did not have the entrepreneurial characteristics (lack of enthusiasm and resourcefulness), and the firm did not have a sufficient team. CEO, Case A covered the limitations of his own characteristics by the use of advisors, but this does not seem to have been sufficient to foster the internationalisation process and the company declined. CEO, Case A acquired an existing international company, which subsequently declined internationally. CEO, Case A was engaged in various forms of learning, he also invested in the training of his employees and two children. He also engaged in a limited form of networking, and trust building was based on

establishing credibility and delivering according to agreements. For over 30 years, Company A used the distribution channels that were acquired with the main drug. Fundamentally, therefore, they did not expanded internationally, but were sustained by these sales. The company did not manage to innovate or modify the drug. CEO, Case A managed to create a new, simpler line of products, based on food supplements and basic medical devices. He managed to expand sales of these products to several European countries.

Company B

Company B was perceived as a success story in Ireland, where diverse investment, academic and business actors came together to form this venture. This was a research-led company that undertakes clinical trials outside of Ireland, and contracted out some of the research abroad, but also worked as a contracted researcher for large pharma. Their main internationalisation activities were also international fund raising and developing international academic collaborations. The mechanism that underpinned those activities was a process of networking internationally and building trust with business partners. CEO, Case B represented all characteristics such as perseverance, independence, resourcefulness and enthusiasm, combined with extremely diverse network activities (business, social, academic, and Irish Diaspora networking). He also worked together with a team of highly educated and experienced people in day-to-day management of the company and worked closely with an actively involved board of investors. He found the management of the relationship with the board very time consuming. The strong position of the board limited his entrepreneurial drive and independence to perform international activities. CEO, Case B and his team constantly managed the existing relationships and attempted to multiply the existing networks by tapping into new circles or new business/academic partners. This effort was strengthened by building trust in all relationships, which resulted from careful development of relationships, strengthening the credibility of the company, but also delivering on the existing relationships according to expectations of a particular relationship. This process of internationalisation was underpinned by an internal owner and team process of learning. Considering that the company had a team of highly qualified staff, the main method of learning was from prior background and experiences in order to master all types of internationalisation activities they pursued. The success of learning was embedded in both the traits of the entrepreneur and his team. CEO, Case

B also actively used all the expertise and contacts available to him via the board of investors.

To sum up the internationalisation process in Company B based on the sub-process of the learning, networking and trust building was mainly driven by factors such as the entrepreneur and the team. Due to their prior experiences, relationships and evaluation of opportunities, they decided to form certain relationships with other researchers and venture capital organisations. Once the relationships has been established the company/the entrepreneur continued to learn, network and build trust in each relationship. This resulted in the establishment that company growth was credible, and as it became increasingly well known in the international bio-technology network that this company had the capacity to grow.

Company C

Company C was a spin-out from a company that was previously owned and sold by CEO, Case C. They had a very effective team that was experienced and well educated. CEO, Case C invested in learning by his team, but also actively learnt by himself (experiential, congenital and vicarious learning). Company C had an active network management policy, with social networking and networking via Irish Diaspora managed by CEO, Case C; and business and conference networking managed by his team. As a serial and portfolio entrepreneur he was well known in Ireland and his company benefited from a network multiplication effect. CEO, Case C mainly built on relationships with "friends", which is how he referred to his long standing network contacts. CEO, Case C undertook a lot of social networking to manage his investment portfolio. This related mainly to the entrepreneur, who networked quite a lot to widen the portfolio of his investments in various companies, and not only to solely support Company C. CEO, Case C placed a lot of emphasis on trust building in each new relationship and appeared more conservative in his vision of the future of international expansion, focusing on wealthy, Western countries and ignoring the emerging markets in China or India.

The internationalisation process observed in Case C is similar to Case B being dominated by the entrepreneur. CEO, Case C represented all the characteristics (persuasiveness, independence, resourcefulness, and enthusiasm.). CEO, Case C was a serial and portfolio entrepreneur. He was not as successful in expanding Company C as

he had been with a formerly owned company. He was engaged in various forms of networking and network management. He also engaged in all forms of learning (congenital, experiential and vicarious), to ensure that his organisation was learning. He also placed a strong emphasis on trust building. The processes observed were also supported by a team, which worked well together. CEO, Case C stressed that at this stage in his career (close to retirement, he was not getting involved in a company unless he had a manager in place. The internationalisation process in Company C was therefore driven jointly by the entrepreneur and the team, and relied on an interplay between networking, learning and trust building. The firm's environment influenced the process mainly by difficulty in obtaining funding for continuation of research; it resulted in a friendly acquisition of company C by a foreign company.

Company D

Company D was born out of the fusion of different investment groups. It was a spin-out of a previously very well-known Irish, indigenous, bio-tech company. CEO, Case D built the company based upon his experience. The company had a strong team and operated as an organisation that learns at variety of levels (entrepreneur, organisation and partnerships). CEO, Case D was independent, resourceful and persistent in developing his company. There seems to be weakness, however, in relation to networking, which was noted by external partners (Consultant, Case D and CEO, Case B). He was also perceived in the Irish business community as someone who was difficult to connect to or like as a person. CEO, Case D was, however, extremely dedicated to enhancing his company development, building relationships carefully. He focused on trust building, which he found extremely important considering that Company D was listed on the Irish Stock Exchange and all information available to the public needed to be carefully managed. CEO, Case D had a strong team supporting his work, but he admitted that he made the effort to manage it every day.

In sum the internationalisation processes observed in a Company D depicts the factors of entrepreneurial characteristics and a team's interactions and characteristics as dominant factors influencing the internationalisation process. Having the right people on board was an important prerequisite in this context. The team was carefully selected and managed by CEO, Case D. The processes of learning, networking and trust building took place on both the level of the entrepreneur and the team. CEO, Case D

emphasised that his business as all about people. The weakness of the company lay in limited networking, which resulted in a weak portfolio of business relationships that threatened the sustainability of the company. The interplay of networking, learning and trust building driven by the joint effort of the entrepreneur and the team created the particular internationalisation process observed in this case.

Company E

Company E, was a typical family business focusing on high value added manufacturing for the Life Sciences industry. The internationalisation activities were mainly linked to international direct sales and the establishment of foreign distributors. The element of international fund raising was negligible and did not reach levels anywhere near that of research companies. CEO, Case E was very enthusiastic, independent and driven. The company was mainly based on his expertise, which created a weakness noted by others (Board member, Case E and Consultant, Case E). CEO, Case E had a capable team to manage day to day manufacturing, but virtually no team working with him on business development. He networked himself on all possible levels, but he was the only person who was engaged in networking or learning in the company. The networking was quite diverse, including business and social networking, as well as networking with academics. This was understandable considering that CEO, Case E showed the need to learn from network partners. He also emphasised the importance of trust building, which reflected quite a controlling approach to team building. Any existing international expansion seems to have resulted from one strong relationship. The benefit of learning to internationalise only occurred at an entrepreneurial level and in the partnership with the main US distributor. Company E had a weak team, which seems to have been balanced by the use of an advisory group and a strongly learning-oriented resourceful, flexible and independent entrepreneur. This model, a manufacturing company driven mainly by a single entrepreneur, appears to have worked quite well considering that the company required low numbers of customers (10-20) and the entrepreneur had a strong scientific background.

The internationalisation process observed in Company E was driven only by CEO, Case E. He was engaged in several forms of networking and managed the process of networking. He was also learning (congenital and experiential learning) and stressed the importance of trust building in his existing business relationships. Trust played a very

important role to him and he emphasised the importance of the credibility of his company and always delivering according to expectations. The company were mainly manufacturers, which also limited the need for networking. Company E did have a weak team and CEO E tended to work on his own. Advice on operations came from the company board and there was also a lot of reliance on a strong relationship with the US distributor. The influence of the company's external environment is particularly visible in this case, as CEO, Case E stressed the shortage of possible employees with applied science and international business development skills. The interplay of networking, learning and trust building is also confirmed in this case, with the weakest factor being the almost non-existent team.

Chapter Remarks

This chapter has examined the case data from the perspective of understanding SME internationalisation in the context of the Irish life science industry. The themes emerging from the analysis are:

Companies internationalise across a range of business, social, academic networks that may be linked together and managed accordingly. These include the Irish Diaspora, academic and business conferences, EI and social occasions.

Companies build trust during their internationalisation through simply getting to know people and developing relationships with people and business. Establishing credibility and delivering on promises is also essential for building mutual trust during the internationalisation process.

Learning facilitates internationalisation, and it happens through various mechanisms (i.e. congenital, experiential and vicarious) and on a range of levels (e.g. entrepreneur, organisation and business partnership). Learning is also managed through the acquisition or spin-out of other firms, searching for knowledge, information processing and the sharing and grafting on external knowledge.

Entrepreneurial characteristics such as perseverance, independence, resourcefulness and enthusiasm influence the firms' internationalisation.

Team interactions (e.g. weak team, team in the need of management, team working well together) and team characteristics (education and experience) influence companies' internationalisation.

The relationships between the themes have been discussed in relation to each separate company All themes are relevant to the internationalisation process of the companies. Each individual case differs slightly in the way that these themes relate to each other. Some of the themes are more pronounced in some of the cases. The observation of this research is that the internationalisation process of SMEs emerged from simultaneously occurring processes such as learning, networking and trust building. The multilevel view on show that these processes can be only properly understood, if looked at from three levels. These are the firm's environment, the entrepreneur and the company (in particular team interactions and characteristics). Each of these levels can alter the three processes and the internationalisation process in general. It is possible that the dominant entrepreneur will drive internationalisation, but the most effective internationalisation process observed took place if all the levels influenced the sub-processes of the internationalisation process.

Chapter VI Discussion

The literature on SME internationalisation offers a range of explanations in regard to how firms internationalise. These theories have assisted the researcher in understanding elements of the five companies' international behaviour. A combination of data from the five case companies and data from the industry case has enabled the identification of drivers and inhibitors to internationalisation that are rooted in the company environment - mainly the status of industry internationally, but also the industry situation locally in Ireland. The case analysis has also suggested drivers and inhibitors to internationalisation at the firm and entrepreneurial level, and analysis of these proposed elements has been deepened by the cross-case thematic analysis. Analysis of the secondary and primary data from the case companies has enabled the development of five themes that address the initial research objectives. These themes are networks, trust building, learning, entrepreneurial characteristics and team interactions and characteristics.

Based on the findings of this research the internationalisation process of an indigenous SME in Irish life sciences industry differs from that suggested by the existing models in the literature. None of the models affirm the combination of factors that have emerged from the data presented in this thesis. Several of the academics have argued that internationalisation of SMEs is unique, complex, and no theory can fit all cases. This investigation supports this assertion. Andersson has emphasised for example that the problem with current theories and models is that their focus on generalisations that suit all firms (Andersson, 2000, p.79). Similarly, Bell (1995) argued that SME internationalisation is a complex, dynamic, interactive and frequently non-linear behaviour. The uniqueness of SME internationalisation has been also stressed by Hutchinson et al. (2007) and Jones and Coviello (2005), who both stressed that models of international entrepreneurial characteristics in SMEs need to be flexible to accommodate different factors that might shape firms' behaviour.

The literature also suggests that internationalisation is a process created by the globalisation of economics. The globalisation process, which has strengthened the position of SMEs in relation to large companies, also applies to Irish companies, but the specific factors influencing such companies differ. The discussion in this chapter addresses how the empirical findings of this research relate to the literature.

This chapter presents a discussion of the analysis from Chapter 4 and 5. The discussion is structured as follows:

A discussion of how internationalisation relates to the following: firm's environment; networks; trust building; learning; entrepreneurial characteristics; and team interactions and characteristics.

Development and discussion of an integrated framework.

6.1 How a firm's environment relates to the internationalisation process

In many studies, the economic environment, especially that of the industry, is a factor that influences the internationalisation process. In fact, the importance of the environment can be seen in IB theories dating back as early as the classical trade theories (Smith, 1776; Ricardo, 1817; Vernon, 1966), and also in later theory of competitive advantage of nations (Porter, 1980,. Support for the argument that environment context influences internationalisation is also found in IE theories, such as those proposed by Dana (2006) and Etamad (2004), who both argue that a firm's internationalisation is strongly affected by its environment. A similar view that SME internationalization decisions depend on the environment in which they are taken is represented by Hutchinson et al. (2007).

Acs and Yeung (1999) suggested that the international environment creates opportunities for SMEs. Andersson (2004) suggested that firms in different industries have different international patterns, because the environment affects their strategies. The majority of studies also emphasise the importance of the industry context. For example, the study of alliances and physical clusters in biotechnology in the US confirms that physical clusters do not matter in international alliance formation, although they are seen as relevant in other industries (Delerue & Lejeune, 2012). Similar studies have also been reported for Canadian biotechnology companies (Schiffauerova & Beaudry, 2012), and Indian biotechnology companies (Reid & Ramani, 2012). Indeed, all of the studies show evidence that patterns do differ in different contexts and environments.

This research argues that internationalisation of SMEs is influenced by the firm's environment. This study supports other studies that found that the economic environment, in particular the industry, influences internationalisation, mainly the internationalisation patterns (Andersson, 2004), governmental policy and networks (Ratten, 2008). The importance of the environment can be seen in IB theories dating back as early as the classical trade theories (Smith, 1776; Ricardo, 1817; Vernon, 1966), and to the later theory of competitive advantage of nations (Porter, 2000). Support is also found in IE theories. For example, Dana (2006) found that some economic environments supports internationalisation. Etamad (2004) argues that a firm's internationalisation is affected by its environment. Andersson (2004) suggested that firms in different industries have different international patterns, because the environment affects their strategies. This study reports data from a single industry. For this reason, the life cycle of the industry could not be assessed, and the industry data remains only descriptive.

In terms of research on the environment context relevant to internationalisation, there have been a number of Irish-based studies that have focussed on other economic sectors in Ireland. For example, research on the Irish seafood sector confirms the importance of government-funded export promotion organisations in facilitating internationalisation (O'Gorman & Evers, 2011). Evers and O'Gorman (2011) also observed extensive improvisation in internationalisation in the Shellfish industry in Ireland, and emphasised the importance of idiosyncratic prior knowledge and prior social and business ties in this type of internationalisation. Outside of Ireland, the literature related to internationalisation in the Life Sciences sector is more developed. For example, there is a study of alliances and physical clusters in biotechnology in the US, confirming that physical clusters do not matter in international alliance formation (Delerue & Lejeune, 2012). This study confirms that physical clustering in Ireland seemed irrelevant or almost impossible considering that companies operated in small international niches and the Irish market is extremely small and isolated.. This study also confirms importance of the governmental policy in stimulating internationalisation. There are also studies of Canadian biotechnology companies (Schiffauerova & Beaudry, 2012), Indian biotechnology companies (Reid & Ramani, 2012), among others. All of the studies show evidence that patterns do differ in different contexts. This study suggests that the context for internationalisation in the Irish Life Sciences is unique, due

to factors such as the differences in the industry's evolution, and differences in government policy. A consequence of this the patterns of internationalisation may be unique

With regards to the international trade theories, the Life Sciences industry case indicates that Ireland has an advantage over other countries (classical trade theory). This has been the case since the 1960s and 1970s, when large pharma arrived in Ireland. Ireland created an export platform for Europe with companies taking advantage of the relatively cheap and English speaking labour force. An additional advantage for foreign companies came from the fact that the corporation tax was relatively low. This created an opportunity for MNC transfer pricing of pharmaceuticals to Ireland. The Irish business environment is complex, as the Irish Life Sciences industry has two very different and independent elements, namely multinationals and indigenous SMEs. All the case companies in this investigation belonged to the indigenous Irish SMEs.

In relation to the indigenous Life Sciences, a technological advantage (Product Life Cycle Theory by Vernon, 1966) appeared once government started investing in research in the early 2000s. The pool of scientists and technologies created by this investment formed a base of growth for indigenous SMEs in bio-technology. Case B, for example, confirmed that the reason he came to Ireland to set up an international R&D company was government policy and the availability of funding at the time. This finding concludes with the argument put forward by Ratten et al. (2008), who have suggested that a dominant factor in stimulating internationalisation is government policy and the state of the economy. Toole (2003) also suggest that industry-specific policy, public research funding and IP law regulations all support the emergence of industry. This study can confirm that government policies, research funding and IP regulations facilitate internationalisation. Expanding on the existing literature, the findings suggest that internationalisation and growth of Irish indigenous SMEs is hindered by insufficient availability of scientists with applied science and international business experience. As a result, the two main processes (trust building and learning) identified as relevant to internationalisation are weakly supported by a firm's environment, in cases where firms have difficulty accessing appropriate human resources.

Theories related to a firm's environment are more relevant in the later stages of firm's internationalisation (Andersson, 2004). In this research, case companies did not have

the time to build their position and were strongly affected by the influence of the environment, especially the lack of human resources, which contradicts the argument by Andersson (2004) The Irish market is too small to become self-sufficient, so both multinationals and indigenous companies are oriented towards international customers. The weakness of the Irish industry also relates to R&D companies, which are not created very frequently in Ireland as the pool of existing companies is too small to create a base whereby young scientist could gain relevant applied science and international business development experience.

6.2 How internationalisation relates to networks

The importance of networks has been highlighted in all the case companies, and is supported by a number of publications in the literature. Contrary to the findings by Jones (1999) suggesting that there was no sequence of events in international network creation, the findings of this research suggest that case companies had applied not only various types of networking, focused clearly on network development, but also managed the existing networks. The suggestion by Welch et al. (2004) seems to partially confirms those research findings(2004), describing how the skilled use and management of networks has allowed a case company to continue international expansion for seventy five years.

A network is understood as an institutional and social web that supports the firm in terms of access to information, human capital, finance and so forth (Vatne, 1995). Entrepreneurs use their personal contact networks to gain knowledge, and seek out and mobilize new partnerships that help the firm to grow and expand into foreign markets (Johanson & Mattson, 1988). There are networks created between small and large companies, as the larger ones increasingly use SMEs as subcontractors for research or suppliers of components (Lorenzoni & Baden-Fuller, 1995). Networks include academics, industry experts sharing knowledge with SMEs, but also investors/venture capitalists allowing SMEs to access finance (Casson, 1994). Networks also embrace customers, suppliers, and governmental authorities relating to SMEs (Johansson & Vahle, 2003). The use of networks gives SMEs an opportunity to initiate "mode-stretching" activities which facilitate internationalisation (Dana, 2001). Globalisation brought a growing use of non-internal technology development (outsourcing, strategic

alliances) and products became increasingly multi-technological, which led to the growing use of networks by all firms, large and small (Economist, 1994; Narula, 2004).

All network related activities do not follow a pre-planned blueprint, but tend to emerge in various ways. Jones (1999) confirms in her findings that there was little evidence of a "typical" starting point or sequence of events in international network creation that could be said to reflect the conventional internationalisation models. Similarly, Luostarinen (1989, 1994) suggests that the internationalisation process is unique to each individual firm, considering that various cases represent a different number of variables and heterogeneity of firm characteristics. Subsequently it seems that if internationalisation of SMEs can be explained via the network approach, it will emerge in various individual ways.

Johanson and Vahlne (2009) argue that both trust/commitment building and learning and opportunity development take place within the network context. A firm's success requires that it should be well established in one or more networks. Anything that happens within the context of a relationship, and a firm that is well established in a relevant network or networks is an "insider". They argue that it is mainly via relationships that firms learn, build trust and commitment, and develop opportunities. The internationalisation knowledge seems to be the key factor in the internationalisation process. It is characterised by several kinds of experiences, including foreign market entry, specific, core business, alliance/acquisition, management's prior relationships and other types of experience (Johanson and Vahlne, 1977, 2009, p.1416). Johanson and Vahlne talk about experience in a very open ended manner, and conclude that experimental learning is indeed a "central factor in firm's internationalisation" (1977, 2009, p.1416). The Uppsala internationalisation process model (Johanson & Vahlne, 1977, 2009) focuses on the learning of the company as an organisation and disregards the experience of the entrepreneur, which partly results from the fact that the model was designed to explain both small and large companies' behaviour. It suggests that developing knowledge is fundamental to a firm's internationalisation.

Several authors, including Fernhaber (2013) and Johanson and Vahlne (1977, 2009), argue that networks are a key catalyst leading to internationalisation. Johanson and Vahlne (1977, 2009) go as far as replacing the importance of a market with the importance of the network. All of the case companies in this investigation reported the

use of various types of networks in their internationalisation (e.g. business, social, academic, and the Irish Diaspora). They also indicated the development of their networks through EI, the attendance of conferences, socialising and/or taking advantage of network interconnection, whereby new networks may be accessed through existing links. All of the case companies apply different forms of network management. Despite the fact that all of the case companies confirm the importance of various types of networking in internationalisation, the research points out that the importance of networks alone cannot explain a firm's internationalisation. None of the studies suggested that network management or development takes place on all three levels: firm's environment, the entrepreneur and the company. Some evidence recognising the importance of entrepreneurs, and not only a firm as a unit of analysis in studying networking, are Loane and Bell (2006), pointing out that entrepreneurs may build cross-national networks independently of the firm. Some of the studies link networks to the firm's environment (Ratten et al., 2008), not linking the process to the firm or the entrepreneur and focusing more on the macro implications of networking. The multilevel view on networking as a sub-process of internationalisation process adds to the discussion related to networking and internationalisation.

This study argues also that the interaction of the networking process with processes of learning and trust building is relevant in order for the internationalisation process to occur. Learning and knowledge acquisition have been emphasised by Johanson and Vahlne (1977, 2009) and Casillas et al. (2009). Casillas et al. (2009) argues that established networks contribute to a firm's knowledge base and assist in the recognition of new international opportunities. Johanson and Vahlne (1977, 2009) emphasise the importance of learning, networking and trust building and commitment as has been done in this research, but omit to look at the multilevel perspective of the internationalisation process, focusing mainly on the firm. This research argues that the multilevel view on networking as a sub-process of SME internationalisation adds to the existing literature. The processes of networking are taking place on the level of the firm, the entrepreneur and the firm's environment.

6.3 How internationalisation relates to trust building

Johanson and Vahlne (2009) suggest that the model from 1977 needs to be extended to add emotive and emotional dimensions as they are critical in understanding

relationships that are central in the business network model. They use the definition of trust from Morgan and Hunt (1994, p.29): "trust means integrity, reliability, and that the word of another can be relied upon". If trust does lead to commitment, it implies that there is a desire to continue the relationship, a willingness to invest in it, or even recognition of the necessity of making short-term sacrifices that benefit another for reasons of long term interest for oneself (Johanson and Vahlne, 2009, p.1418).

Johanson and Vahlne conclude that trust is another ingredient supporting successful learning and development of knowledge, as it persuades people to share information. Commitment usually follows from trust and is based on a common history between parties (1977, 2009). Madhok argues that trust persuades people to share information, promotes the building of joint expectations, and is especially important in situations of uncertainty (2006). Johanson and Vahlne gave up on the belief from 1977 that firms follow an incremental chain of entry modes internationally; they suggest that contextual factors often play a more important role (1977, 2009, p.1422).

Commitment is not always calculative, it can be affective, meaning it is based on a sense of positive regard for, and attachment to, the other party (Goundaris, 2005). Affective commitment may then replace cognitive analysis. Johanson and Vahlne (2009) agree with Madhok (2006, p.7) that "trust building is a costly and time-consuming process", with commitment developing later in this process.

The concept of trust can be conceptualized as coming into existence when a party has confidence in his exchange partner's reliability and integrity (Morgan & Hunt, 1994). Trust is something that slowly accumulates between parties as a relationship gradually develops and matures. Quite often trust is discussed with commitment, as trust is usually followed by commitment.

The results suggest that trust building, which strongly links to the themes of networks and learning, is one of the factors influencing SME internationalisation. Dhanaraj et al. (2004) support the link with learning, arguing that an established trust facilitates knowledge transfer between companies. Similarly, Johanson and Vahlne (1977, 2009) argue that trust building is one of the main factors influencing internationalisation. More specific arguments can be found by Blomquist et al. (2008) who suggests that developing trust is particularly important to SMEs as they lack the resources and expertise to draw elaborate contracts and enforce them. They also confirm that trust is a

pertinent issue to the internationalisation of technology-intensive SMEs, as they are disclosing critical technical knowledge and have to work often in partnerships on complex technical processes. All the case companies stressed that developing trust was extremely important in conducting international business, but all of them had to protect various technologies they worked on and therefore it was key to build relationships of trust with business partners. The case industry findings also suggest that establishing trust facilitates collaboration in joint international research projects as reported by Feams et al. (2008), who discuss how trust triggers extensive information sharing and helps mutual adjustment if the need arises. The only study, which also suggests networking and learning as part of the internationalisation process is Johanson and Vahlne (1977, 2009) model, but equally like in the theme of networks previously discussed, it lacks the multilevel perspective applied in this study.

The data confirms that building trust was relevant in the case companies prior to establishing a relationship, but was also an on-going process that took place during relationship development. All companies stated that trust was founded on the consistent delivery and credibility of a company. This is consistent with the finding of Morgan and Hunt (1994) who stressed that trust comes into existence when a party has confidence in his exchange partner's reliability and integrity. Morgan and Hunt (1994) also confirmed the importance of the sub-theme relationship development, stressing that trust accumulates between parties as a relationship gradually develops and matures. This finding strongly suggests that building a relationship history is relevant in building trust and is consistent with that of Poppo (2008), who reviewed literature on origins of trust and found that both the prior history and the expectation of continuity of relationship affect trust development. All CEOs stressed how important trust was and that it helped reduce their costs in the long term.

None of the literature reviewed in this thesis considered trust from a multilevel perspective. The data suggests that the process of getting to know people, developing relationships and establishing credibility and delivery takes place not only on a firm level, but very much on the entrepreneur level and is relevant in the firm's environment, especially as the industry is very conservative.

6.4 How internationalisation relates to learning

Existing research argues that knowledge and learning have influenced the internationalisation of SMEs. Johanson and Vahlne (2009) suggest that learning is much more complex than they assumed in 1977. They building on the argument from Axelsson and Johanson (1992) that foreign market entry should not be studied as a decision about modes of entry, but should instead be studied as a position-building process in a foreign market network. They also argue that position-building is associated with a complex process of learning. Subsequently the study by Eriksson, Johanson, Majkgard and Sharma (1997) suggested that a lack of institutional market knowledge (knowledge of language, laws, rules) and a lack of business knowledge (knowing the business environment) require different amounts of time to overcome. There are other types of knowledge that they mention as relevant to internationalisation, such as business specific, mode, alliance, acquisition, relationship-specific knowledge. In addition, a management team's prior experience may have strong effect on internationalisation (Reuber & Fischer, 1997). From a business network point of view it is important to emphasise a management team's prior relationships provide important knowledge. Forsgren (2002) reviewed the Uppsala model from 1977 and suggested that types of non-experiential knowledge matter, such as the acquisition of the other firms, imitation and search. Johanson and Vahlne (2009) recognise the learning styles mentioned above and argue that indeed they may be relevant to the internationalisation, but they argue as in 1977 that experiential learning plays a central role in the process of internationalisation. The theme of learning is quite complex and in IE includes both organisational learning and entrepreneurial learning (De Clercq, Sapienza, Yavuz, & Zhou, 2012). Learning is defined as a process that brings together cognitive, emotional, and environmental influences and experiences for acquiring, enhancing, or making changes in one's knowledge, skills, values, and world views (Illeris, 2004). De Clercq et al. (2012) have provided a comprehensive, evaluative literature review documenting findings with respect to the roles of learning and knowledge in the antecedents, processes, and outcomes of early internationalization. They suggested that early internationalization is not random, nor does it occur only because ventures are pulled in by customers; rather a variety of sources of learning and knowledge acquisition styles contribute to the phenomenon and outcomes of early internationalization. They also suggest various types of learning occurs, including experiential learning (learning from

international and domestic experience), vicarious learning (learning by observing others), searching for knowledge (companies that are more active in searching for knowledge are more successful), congenital learning (prior background and experiences), and grafting of external knowledge (hiring new managers brings new knowledge). Learning also occurs via information processing, scanning the environment or sense-making, which allow both opportunity construction and recognition (Vaghely & Julien, 2010). Bruneel et al. (2010) developed an integrative framework that looks at the joint and interactive effects of experiential learning by the firm, the management team's pre-start-up international experience (i.e. congenital learning), and inter-organizational learning from key exchange partners. They conclude that learning advantages facilitate the internationalization of young firms by explicating substitutive interrelationships among different learning mechanisms.Shane (2000) looked at prior knowledge and concluded that prior knowledge has a stronger impact than the personal characteristics of individuals on the discovery process . Prior knowledge makes individuals better at discovering some opportunities. The term "experience" overlaps quite a lot with the term experiential learning and as such will be subsumed under experiential learning. The term "experience" has been used by entrepreneurship scholars in many ways, including the outcome of involvement in previous entrepreneurial activities (Baron & Ensley, 2006); the experientially acquired knowledge and skills that result in entrepreneurial know-how and practical wisdom (Corbett, 2007); and the sum total of things that have happened to a founder over his or her career (Shane & Khurana, 2003). In general "experience" can be defined as a lived-through event where the individual is "in the moment"(Cantor et al., 1991, p.425). In the context of internationalisation of SMEs, experiences which will appear relevant to entrepreneur's international expansion are likely to be particularly important.

The data in this study did not provide explicit confirmation of various types of knowledge, which agrees with the work of Thorpe et al. (2005) that knowledge has an embedded nature and should not be conceptualized as some form of separable, material asset. Knowledge is subsequently treated as embedded in the processes of learning and results from a diverse range of learning processes. The results of this study indicate a range of learning models (congenital, experiential, vicarious) as suggested by De Clercq et al. (2012). De Clercq et al. (2012) provided a comprehensive review of types and processes of learning relevant to internationalisation. They have suggested

both organisational and entrepreneurial learning arguing that early internationalisation is learning process occurring prior to establishment. There are several researchers, who argue the need for entrepreneurial learning such as Baron and Ensley (2006), Corbett (2007), and Shane and Khurana (2003). All of these studies tend to focus only on one level of analysis. There are also limited studies related to the need of learning in the small firm's environment, stressing that external influences should be altered to facilitate the process of SME development (Kelliher, 2006). The importance of learning, which emphasises learning in a company and in a business partnership can be found in Johanson and Vahlne, (1977, 2009).

None of the literature suggested a multilevel view on the process of learning. In the small and isolated economy like Ireland, it becomes relevant that the firm's environment is also learning how to increase the growth in SME internationalisation. The industry study identified several problems in the firm's environment resulting from the weakness of learning on the level of a firm's environment. The researcher observed that the various types of learning took place at different levels such as entrepreneurial, organisational and business partnership level. The researcher observed that in all cases learning took place on the entrepreneurial level. All of the entrepreneurs learned about international business development and running a business, but only in Cases C and D were the organisations actively involved in the learning process.

The process of learning in a business partnership was visible in Cases B, D and E. The case evidence shows that the learning process was managed in all the cases in various ways including: through acquisitions or spin-outs from other firms, through the process of searching for knowledge; via information processing, information sharing and/or the grafting of external knowledge. The researcher observed that learning strongly shaped the internationalisation process of the case companies. Contrary to Johanson and Vahlne (1977, 2009), however, it cannot be conformed that learning from experience (experiential learning) was the fundamental type of learning. In terms of learning at different levels, the results of this investigation partially agree with the literature, confirming that learning takes place in partnerships and networks (Etemad and Lee, 2003). The findings partially confirm the conclusion of Casillas et al. (2010) and Blomstermo et al.(2004) that internationalisation of SMEs can be seen as a process of learning. The main argument enhancing the discussion about learning as a relevant sub-process of internationalisation of SMEs in the Life Sciences in Ireland relates to the

need to undertake the process of learning on all three levels: the firm, the entrepreneur and the firm's environment.

6.5 How internationalisation relates to entrepreneurial characteristics

Entrepreneurial characteristics seem to emerge from prior research as one of the key elements determining SME internationalisation. The concepts of personality and personality traits both in psychological research and in common sense understanding are rather fuzzy. In a broad sense, personality traits include abilities (e.g., general intelligence as well as numerical, verbal, spatial, or emotional intelligence), motives (e.g., need for achievement, power, or affiliation), attitudes (including values), and characteristics of temperament as overarching style of a person's experiences and actions (Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism, called the Big Five with the acronym OCEAN (Hermann, 2011)). Entrepreneurs in particular have many traits that are perceived as relevant: initiative, persuasiveness, resourcefulness, enthusiasm, integrity, motivation to achieve, being independent (in control of his/her life)(Sanchez, Carballo, & Gutierrez, 2011). Littunen (2000) found empirical links between entrepreneurial characteristics and the learning process. According to the empirical findings, becoming an entrepreneur and acting as an entrepreneur are both aspects of the entrepreneurial learning process, which in turn have an effect on the personality characteristics of the entrepreneur. The empirical findings suggest that entrepreneurs whose personal relations had increased also showed a clear increase in mastery of running a business. Welter & Smallbone (2011) suggest that institutional context influences the way entrepreneurs behave. This is particularly apparent in challenging environments such as emerging markets or international business. They call for an investigation of how trust influences entrepreneurial behaviour. Despite the importance of traits in the existing literature, relatively few studies have empirically explored the relationship between CEO characteristics and firm's internationalisation (Westhead, Wright, & Ucbasaran, 2001).

The role of entrepreneurs and their characteristics was originally put forward by McDougall (1994) and Madsen and Servais (1997). Vatne (1995) stresses the importance of the entrepreneur for internationalisation, as the person who mobilises his knowledge and networks to help the firm to grow and expand into foreign markets. Nielsen and Nielsen (2011) argue that CEO characteristics greatly influence their international

development and that greater experience may result in an increased awareness of complex managerial environments.

Similarly, characteristics are shaped by experience. For example, Ruzzier et al. (2007) suggest that an entrepreneur exposed to foreign cultures through travel or residence is likely to accumulate experiential knowledge and characteristics that benefit them while internationalising. The importance of entrepreneurial characteristics was also confirmed by Felicio et al. (2012). Felicio et al. (2012) argues that characteristics of the entrepreneur and the firm explain the global mind-set and confirm their impact on internationalisation behaviour. The characteristics they mention are: the entrepreneur's level of education, their satisfaction with company performance in the domestic market and the potential for growth in the domestic market all affect global market.

The characteristics of entrepreneurs in relation to internationalisation are largely ignored in many studies, despite calls for greater inclusion of entrepreneurial characteristics, which is perceived as not an easy task (Westhead et al., 2001), but necessary to fully understand SME internationalisation (Jones and Coviello, 2005).

Liu et al. (2008) suggest that entrepreneurial characteristics definitely influence internationalisation. The study is conducted on indigenous Chinese, private entrepreneurs and reports that they are bounded by their low education and experiences, by unfavourable institutional arrangements and by limited cognition of international business opportunities. The authors suggest that working on characteristics, especially knowledge and capabilities, will allow entrepreneurs to become better at internationalisation. It should be noted, however, that entrepreneurs in emerging economies like China or India will be limited by their historical and economic situation.

The results of this study suggest that entrepreneurial characteristics are relevant to SMEs internationalisation. The multilevel view on the internationalisation could suggest that Ireland faced historical limitations, and developing entrepreneurial characteristics was facilitated by positive changes in the firm's environment similarly (see Liu et al., 2008 for similar perspectives). The research characteristics that featured strongly in the data were perseverance, independence, resourcefulness and enthusiasm. Some of the CEOs were more successful internationally than others partially because of these characteristics. CEOs, Case B and C represented all four characteristics and appeared to

be successful in their international business development. CEO, Case A, who was not characterised by resourcefulness and enthusiasm, did not perform well internationally and even started to decline. These finding partially agree with argument of Andersson (2000), who takes an entrepreneurial perspective on internationalisation, stressing that finding the right people has more significance than entry mode per se (Andersson, 2000, p.83). He also suggests that different types of entrepreneurs act differently when it comes to choosing strategy. The findings cannot confirm Andersson's argument that different types of entrepreneurs appear at different stages of an industry's life cycle. This may be because Irish entrepreneurs operated in an almost non-existent local, indigenous industry (that effectively started emerging in Ireland after 2000), while at the same time they had to find ways to operate internationally in a very mature pharma or bio-technology industry. The characteristics of resourcefulness and independence are partially reflected in the fact that CEOs engaged in various types of learning.

Both experience and education of managers has been confirmed in the literature as relevant to internationalisation (Hsu, Chen, & Cheng, 2013). Contrary to the findings in the literature, the study found a direct link between internationalisation and entrepreneurial characteristics such as resourcefulness, perseverance, independence and enthusiasm. The contrary argument in the study by Liu et al. (2008) that a lack of characteristics may hinder internationalisation may support findings in this research. Additionally, the suggestion by Andersson (2000) that having the right people is key in internationalisation is partially supported by the results of this study. The main difference in looking at entrepreneurial characteristics is the multilevel view, which suggests that internationalisation process is affected by three levels: the entrepreneur, the company (team's interactions and characteristics in particular) and the firm's environment. If one of the levels underperforms in influencing internationalisation, the remaining factors can step in to enhance the process of internationalisation. The results suggest that in cases where the characteristics of the entrepreneur were weaker, they were balanced by the interactions and characteristics of the company's team.

6.6 How internationalisation relates to a firm's teams

One of the first studies to confirm the importance of managerial team knowledge and experience in export development process of small companies was Reuber and Fisher (1997, 1999, 2002). Teams have been defined as small groups of interdependent

individuals who share responsibility for outcomes. Team-based structures play an increasingly important role in organizations (Ilgen, 1999). Companies tend to have various types of teams, such as management teams, ad hoc teams, advise/involvement groups, production/service teams, action/negotiation teams, project development teams, project teams, etc. (Hollenbeck, Beersma, & Schouten, 2012). Hollenbeck et al (2012) suggest that these taxonomies are not as important in small organisations, where the divisions between the types of teams will be less relevant. What appears to be more relevant are the characteristics of the SME team.

Fernandez-Ortiz and Lombardo (2009) found empirical evidence that SME team characteristics influence the company's international performance. They looked at such characteristics as age, education, professional experience and language knowledge in top management teams. They argued that managers that have experience of working in different cultural settings will be more aggressive in venturing abroad and likely to share the learning experience with the rest of the company. Nielsen and Nielsen (2011) argued that in order to effectively manage international complexity and ambiguity, managers should possess characteristics that enable them to process the information effectively. The literature also stresses that a lack of qualified personnel is a major barrier to export development (e.g. Pinho & Martins, 2010). Loane et al. (2007) confirm that firms formed and managed by teams demonstrate superior performance in terms of pace of internationalisation, broader market reach/spread and higher export ratios. Team-based capabilities are crucial in leveraging external resources, such as venture capital or business angel funding. Combined networks of team members are also more diverse and extensive than those of lone founders. The findings of Hill and Lineback (2012) suggest that great leaders manage teams well. They suggest that teams work well together not only if the management helps to foster social and emotional bonds. However, the Hill and Lineback (2012) study does not consider the internationalisation aspect.

The conclusion that team interactions and characteristics can be used to understand internationalisation is useful. The theories discussed seem to confirm the importance of an educated and experienced team. Comparing the literature with empirical findings it can be seen that companies did not have clearly defined teams, they had limited amount of employees, who participated in management teams, project management teams, ad hoc teams, advice groups (Hollenbeck, Beersma, & Schouten, 2012). In all of the cases

there was evidence of positive education and experience of internationalisation. The sub-theme that suggests that teams are more effective if managed, is partially confirmed in the literature (e.g. Hill & Lineback, 2012). The results that teams working well together or weak teams can influence the internationalisation has not been found in the literature. The data suggests that the characteristics of education and experience were the most relevant. Companies, Cases B, C and D had not only well educated and experienced teams, but teams that worked together, and these companies seemed more successful internationally as a consequence. CEO, Case D managed his team to optimise its effectiveness. Similarly, CEO, Case B had to manage the board as it was strongly impacting on the firm's growth. CEO, Case D stressed that each of his employees should be able to represent the company.

Indeed, the data suggests that firms Company B and D, that reported higher technical complexity and greater up-front investment in R&D, as well as pre-commercialisation activities, had teams that were more relevant to the success. More traditional companies, such as Companies C, A and E had a lower need for team development. The teams in Cases A and E were weakly developed, which was recognised by respondents outside of the company as a weakness that was affecting the internationalisation in these companies. The weakness of the team meant that apart from the CEO there was virtually nobody, who could share the tasks related to international business development, and who would have the commitment and emotional bond to the company. The critical opinions related to the assessment came from external respondents who were included in this study to validate the data coming from the company respondents. The multilevel view of the problem of internationalisation also facilitated the understanding that the sub-theme of team characteristics and interactions is a relevant factor. The industry study indicated that one of the main problems faced by the companies was the lack of scientists with applied science and international business development experience. In fact CEO, Case E complained that it was extremely difficult to find experienced people here in Ireland. It can be seen that the factor, team characteristics and interactions, influences the observed internationalisation process.

6.7 Internationalisation of SMEs in Irish Life Sciences sector: an integrated framework

The internationalisation process of SMEs observed in this study is presented as a conceptual framework in Figure 6.1.

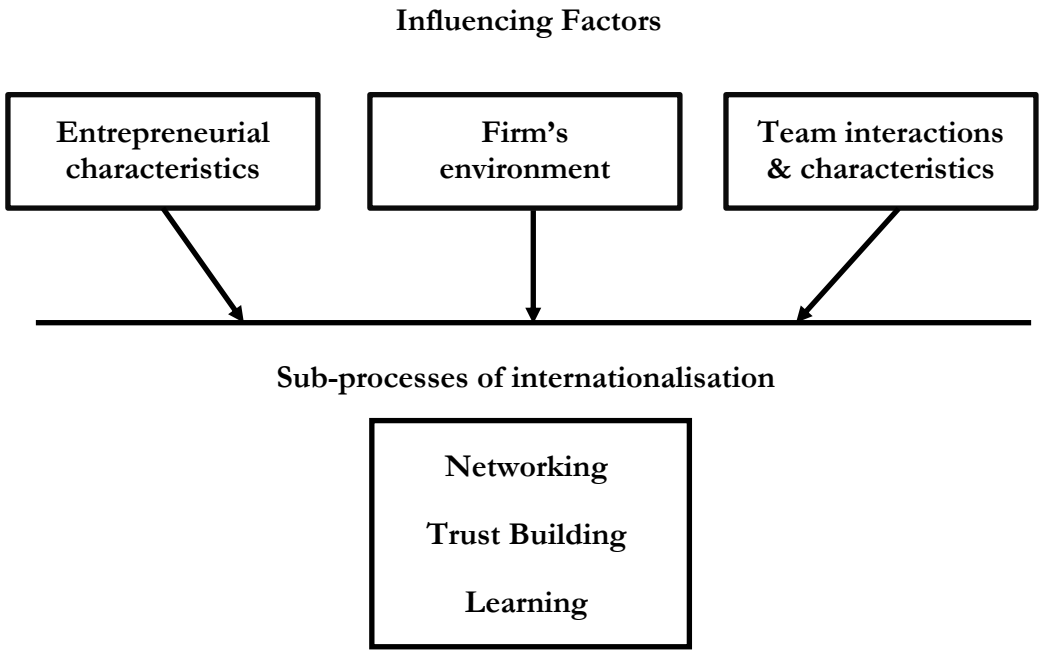

Figure 6.1 Framework showing the sub-processes and influencing factors in the internationalisation process of SMEs in the Irish Life Sciences sector

The sub-processes that are shown to jointly create internationalisation process are: networking, trust building, and learning. The interplay of the three sub-processes creates an internationalisation process. It has been observed in the case companies that they undertake different steps, such as establishing a distributor or looking for a research partner. Those international actions are extremely diverse and usually company-specific. It is possible to create categories or types of companies that undertake a similar set of actions.

The focus of this research was not on categorising the case companies, but on understanding the underlying processes of internationalisation. The approach followed in this research was to look for processes underpinning the internationalisation process across all cases, but also to look at the cases from a multilevel perspective (the

entrepreneur, the firm and the firm's environment). It is argued that companies that are constantly learning on various levels (the entrepreneur, the organisation and in business partnerships), through various types (congenital, experiential, vicarious) and manage the process of learning (acquisition or spin-out of other firm, searching for knowledge, information processing, grafting of external knowledge) are internationalising. It is also argued that alongside learning, internationalisation requires that the companies engage in various types of networking (business, social, academic, the Irish Diaspora), manage their networks, and develop their networks in various ways, through: EI, conferences, social gatherings or other means of effective network multiplication. The last sub-process of internationalisation strongly emphasised in the data and linked to networking and learning is trust building, which takes place via getting to know people, relationship development, and establishing credibility and delivery.

The multilevel analysis, which looked at the entrepreneur, the firm and the firm's environment allowed for the identification of three factors that affect and modify the internationalisation process observed. Five themes appeared relevant during the data analysis, despite a pool of potential themes and sub-themes was much wider, and related to many issues. For example on the firm level factors such as culture, legal form, resources, technology etc. were mentioned. The three factors identified on the three levels analysed appeared consistently across the cases. The factors identified are: entrepreneurial characteristics, team's interactions and characteristics and the firm's environment. The entrepreneurs in this study were engaged in a process of internationalisation by simultaneously networking, learning and trust building. These processes were driven by entrepreneurs, their teams or influences of firm's environment.

The entrepreneurial characteristics relevant to the internationalisation process are perseverance, independence, resourcefulness and enthusiasm. Entrepreneurs with these characteristics seemed more proactive and successful in the internationalisation process, engaging proactively in the sub-processes of networking, learning and trust building.

The factor of team interactions and characteristics emerged as the strongest theme relevant to internationalisation on the firm level. It relates to various teams created in companies, top management teams or ad hoc project management teams. The characteristics that mattered most were the experience and education of the team

members. Team interactions supporting successful internationalisation and its sub-processes were connected to how well they worked together and how well they were managed, if such need arose. In contrast, the sub-theme, a weak team, meaning a weak or almost non-existent team supporting the entrepreneur in a company, was likely to influence the internationalisation process negatively. Considering that all three sub-processes of internationalisation (learning, networking, trust building) relate to human interaction it does not seem to be surprising that the human factor of the firm such as teams and their interactions and characteristics play a role in SME internationalisation.

The last factor relates to the firm's environment and cannot be easily described, as it requires an understanding of a very complex environment. Ireland is a very small country with currently a weakly developed indigenous industry, with a lack of overlap or cooperation between mainly foreign MNEs producing pharmaceuticals.

Historically, the indigenous sector started developing late when compared to other countries. Due to the low numbers of R&D SMEs there is a shortage of PhDs with applied science and international business development experience. This missing pool of human resources hinders the internationalisation of SMEs. On the other hand the governmental support for SMEs fosters internationalisation by providing funding and facilitating networking internationally. The VC funding is insufficient and pushes SMEs abroad. The influence of the firm's environment seems to affect the ability to internationalise companies more in some cases that others. The industry entry barriers faced in some cases were very high considering that an SME requires very high funding to finance R&D and some were unable to access staff with applied science and international business experience as suggested by the firm's environment factor. The SMEs were competing using size-related advantages of flexibility, like in Case E, or an advantage based on advanced technical knowledge, like in Cases B, C or D. Furthermore, the target markets for these firms were beyond Ireland and, in many cases, geographically distant. This consideration, combined with the limited resource base of the entrepreneurial high-tech firm at the early stages of the lifecycle (as the indigenous industry is still very young), would indicate that even if low transaction costs were experienced, direct investment off-shore will be limited. In one of the cases (Case C), the company had to be acquired to continue research as they had faced difficulty in accessing funding. In terms of management attitude and behaviour, the process of SME internationalisation in the Life Sciences industry differs from that suggested in the

literature. This can be attributed to the absence of an Irish domestic market forcing SMEs operations with foreign market intentions within the first years of existence. It seems that companies that are proactively engaged in the sub-processes of networking, learning and trust building, and that have a stronger influence of the entrepreneur and the teams, perform more effectively internationally. Additionally, research companies do not focus on the entry mode, as companies are knowledge based and become international not via entry, but through the establishment of international research collaborations, international fund raising, international conference attendance and presentations. Some of the case companies did not even have exports in a classical sense; for example one was a pure research company. The internationalisation process relied on the interplay of sub-processes such as networking, learning, and trust building. Those processes were affected by entrepreneurial characteristics, firm's environment and the importance of team interactions and characteristics. All of the companies were affected by the influence of the factors such as firm's external environment, the entrepreneurial characteristics and team's interactions and characteristics. The framework suggested in Figure 6.1 appears to hold for the five case companies (A, B, C, D, E).

The internationalisation process identified in this research is presented in the form of a conceptual framework (see Figure 6.1). This framework is specific to the entrepreneurial high-technology, knowledge-intensive firm, indigenous SME in the Irish Life Sciences industry, and incorporates the sub-process of on-going networking, trust building and learning that is driven by factors such as the entrepreneur's characteristics, the firm's environment and firm's team interactions and characteristics. Such a process is not characterised by clear, identifiable stages or entry modes, because of the fact that, with knowledge intensive companies, physical entry into a country does not play an important role. More relevant is the establishment of international relationships with other companies and business people.

6.8 Chapter summary

This chapter presents the discussion of the research findings presented in Chapters 4 and 5. The internationalisation process emerging from the results is contrasted with the existing literature. The discrepancy between the existing literature and the findings of this research has allowed for the proposal of a new framework (Figure 6.1). Following

from Chapters 4, 5 and 6, a final set of conclusions and implications can be drawn, and are presented in the following chapter.

Chapter VII Conclusions

This chapter concludes the research and is based on the results discussed in Chapters 4, 5 and 6. It begins with the review of the research purpose and objectives, which were used to guide the within case and thematic analysis of this research. Summary conclusions are then presented. The chapter and thesis is concluded with a section outlining implications for future research, practitioners and policy.

7.1 Research purpose

The general purpose of this research was to explore the area of SME internationalisation. This was to be accompanied by the development of an empirically-based conceptual framework of the internationalization process of entrepreneurial high-technology, knowledge based firms. The context for the study was SMEs in the Irish Life Sciences industry. While the existing literature offers an understanding of the ways that firms grow internationally, the models of internationalisation have both empirical and conceptual shortcomings. There is also a lack of empirical work and theoretical models that focus on the internationalisation of indigenous Irish SMEs in the Life Sciences industry

The overall objectives of this study were stated as:

Research Objective 1: To explain the internationalisation process in SMEs in the Irish Life Sciences sector.

Research Objective 2: To apply a multilevel approach, incorporating the entrepreneur, the firm, and the firm's environment, to the study of SME internationalisation.

Research Objective 3: To identify factors influencing the internationalisation process in SMEs and explore how these factors affects the processes.

7.2 Findings

The research examines whether there is an identifiable internationalisation process in high-tech, knowledge-intensive, indigenous Irish SMEs. The research concludes that there is an identifiable internationalisation process in high-tech, knowledge-intensive, indigenous Irish SMEs (Figure 6.1).

Conclusions relating to each issue are presented in the sections that follow. These conclusions integrate and summarise the findings presented in Chapters 4 and 5.

Research Objective 1: To explain the internationalisation process in SMEs in the Irish Life Sciences sector.

SMEs internationalisation in the Irish Life Sciences is shown in Figure 6.1. The process observed in the Irish Life Sciences sector is also influenced by the drivers and inhibitors to internationalisation discussed below the framework. The internationalisation process identified in this research is presented in the form of a conceptual framework (see Figure 6.1).

This framework is specific to the entrepreneurial, high-technology, knowledge-intensive firm in the Irish Life Sciences industry. The case studies provide confirmation of the sub-processes of networking, learning, and trust building. The multilevel research design which looks at the industry, the entrepreneur and the company, has allowed the identification of factors, which affect the internationalisation process of SMEs. These are the entrepreneurial characteristics, the firm's environment and team interactions and characteristics. The sub-processes, which create the internationalisation process, are the process of networking, learning and trust building.

The process identified in this study does not have any identifiable stages or entry modes. Instead, the results show a more dynamic process of changes during the internationalisation of a company. These companies engaged in various types of networks, actively developing and managing their networks. All of the case companies, engaged in diverse types of learning, on different levels (e.g. entrepreneur, organisation and business partnership level), but also managed the process of learning. The process of learning and networking operates simultaneously with building trust. Trust building

takes place through the process of getting to know people, through relationship development, but also through establishing credibility by meeting agreed deliverables.

The initial condition necessary to initiate this process is the existence of an entrepreneur, who can also be complemented by a team. Both entrepreneur and team have to have certain characteristics that predispose them to create such a process for a company. The entrepreneur is characterised by perseverance, independence, resourcefulness and enthusiasm. The team needs to be experienced in international business development and well educated. The team must work well together and in some cases this needs to be managed by the entrepreneur. The last factor influencing the internationalisation process emerging from the multilevel analysis of the data is the firm's environment. Irish companies are affected by a specific industrial environment, with a very weak indigenous and a need to constantly engage with the international Life Sciences industry. At the same time companies are limited in their internationalisation by a lack of human resources with applied science and international business experience, limited access to local funding and an almost non-existed market for their products in Ireland.

In fact, the proposed framework and the findings highlight:

- The interactive nature of the internationalisation process. The process is based on the on-going process of networking, learning and trust building that occur simultaneously.
- The importance of the how a firm's context can both drive and inhibit the internationalisation process.
- The importance of entrepreneur's characteristics and of team interactions and characteristics as drivers or inhibitors to the internationalisation process observed in case companies.

The framework proposed by this study challenges the existing models, such as FDI, Stage Models or models suggested in IE. The companies do not engage in FDI, rather they follow the externalisation of activities through on-going networking, learning and trust building. Regarding the use of Stage Models, the results of this study show that there is no clear incremental following of the stages of international development. Instead, the globalisation of economies has created opportunities for SMEs, with very

little evidence of a "typical" starting point or sequence of events in internationalisation (Jones,1999). This conclusion confirms Luostarinen's (1989, 1994) opinion that the internationalisation process is unique to an individual firm considering that various cases represent a different number of variables and heterogeneity of firm characteristics.

The framework that is discussed resulted not only from the thematic analysis of the case companies, but also from the industry case study and within case analysis. This suggests that the firm's environment is an important factor in SME internationalisation. The factor "firm's environment" is very complex and suggests several drivers and inhibitors to internationalisation, which are discussed below:

Research Objective 2: To apply a multilevel approach, incorporating the entrepreneur, the firm, and the firm's environment, to the study of SME internationalisation.

The multilevel view on internationalisation revealed that although the internationalisation process identified appears similar in all cases, the factors emerging from the three levels discussed, namely the entrepreneur, the firm and the firm's environment may introduce unique modifications in each case. The case research suggested the following:

Industry drivers and inhibitors to internationalisation:

Ireland represents a specific environment for SMEs and these factors are relevant to understanding how SMEs develop and internationalise. These factors are as follows:

- Life Sciences industry in Ireland is defined differently than in other markets. It includes bio-tech pharma, diagnostics and medical devices. This wide definition reflects the fact that Ireland is a very small country with weakly developed indigenous industry. This underdeveloped market pushes the companies from the start to look for contacts abroad and expand internationally.
- The Irish life sciences industry has two very different segments, namely multinationals and indigenous SMEs that are almost independent of each other.

The Irish market is too small for firms to become self-sufficient, so both multinationals and indigenous companies are oriented towards international customers.

Historically the Irish industry did not develop in parallel with the international industry development. It started much later and was based on a very weak indigenous pharmaceutical industry and strong multinational pharma industry, which arrived in Ireland in the 1960s and grew rapidly in the 1970s. The bio-technology industry arrived in Ireland in the late-1990s and early 2000s, which mirrored a change in international industry. The historical development of the firm's environment was preventing Irish SMEs from developing prior to late 1990s and 2000s.

The arrival of biotechnology stimulated the emergence of indigenous research and SMEs in bio-technology, considerably boosting the base of indigenous SMEs in the Irish Life Sciences industry. The Irish Life Sciences industry remains not typical of those in other countries; there is no petrochemical industry and virtually no bulk chemicals production, which hinders development of SME spinouts traditionally attached to such sub-sector.

The low number of indigenous companies in R&D is linked to the fact that graduate scientists are typically unable to gain applied research and business development skills in Ireland. They are forced to emigrate to gain such experience.

Company drivers and inhibitors to internationalisation:

The SMEs in this study were characterised by the following:

The firms all operated in pharma niches.

The firms all sold their products/research internationally. Company A and E had some small sales in Ireland, which was linked to the fact that their products were not as research intensive, were simpler and there was a limited market for their products in Ireland.

The internationalisation process was characterised by the use of diverse sales channels, research relationships and international fund raising.

The firms typically became internationally oriented early on, because they were forced to look for customers, venture capital and/or research partnerships internationally.

The internationalisation process in all firms was rapid.

Four of the five firm required external funding. Only company A was funded with own funds. There was a low amount of Irish seed or vc funding present in the companies. The more expensive the research required in the company the higher the involvement of international venture capital and/or seed funding.

Entrepreneurial drivers and inhibitors to internationalisation:

The industry and the entrepreneurs in the study were characterised by the following:

All entrepreneurs seemed to have prior international experience acquired in international companies. This background possibly contributed to the later establishment of their own companies.

Those that are scientists had to emigrate to gain business development experience in bio-technology SMEs.

The framework of the internationalisation process has been developed through empirical multilevel examination and analysis of data related to how the environments of the entrepreneur, organisation and firm impact on the internationalisation of the company. It adds to the extant literature on internationalisation by providing a more complete explanation of internationalisation by:

Applying a multilevel approach to understanding the internationalisation process, looking at the entrepreneur, the firm and the firm's environment.

Assimilating the internationalisation sub-processes as an on-going process of learning, networking and trust building, driven by the factors such as the entrepreneur, the team interactions and characteristics, and the firm's environment. These factors emerged from the multilevel analysis, which looked at the entrepreneur, the firm and the firm's environment.

Presenting an empirical context (indigenous SME in the Irish Life Sciences industry) that is different from that found in the existing IB and IE literature.

The multilevel view on internationalisation process suggests that the understanding of the internationalization process of entrepreneurial firms is enriched when we expand the analysis beyond the individual firm's actions, and address the influence of a firm's environment as well as the role of the entrepreneur's characteristics and the role of a team interactions and characteristics.

This research shows that the expansion of a firm's presence into foreign markets does not have to follow the traditional concept of modes of entry or stages of international development, but arises from learning on all levels of the company, as well as learning in business partnerships formed, from opportunities created through external relationships of a company and building trust in those relationships.

All these sub-processes of internationalisation are influenced by the specific firm's environment, characteristics of an entrepreneur and team interactions and characteristics, which drive or hinder the internationalisation process. The internationalisation process is also affected by the firm's environment, which includes the drivers and inhibitors from Irish indigenous industry but also affected by the international Life Sciences industry. It shows that the internationalisation process cannot be divorced from human attributes, and human interaction, which builds relationships. It can also not be divorced from the influence of the firm's environment. It shows that the pre-existing knowledge, personality and background of an entrepreneur co-shape the organisational process of internationalisation. The social, emotional dimensions such as entrepreneurial enthusiasm also affect internationalisation. It also shows that the characteristics and interactions in firm's teams also may alter the internationalisation process.

Research Objective 3: To identify factors influencing the internationalisation process in SMEs and explore how these factors affects the processes.

The exploratory research confirms that the factors of networks, learning, and trust building create sub-processes of SME internationalisation. The factor of experience did not emerge as a separate factor, but it has been considered as part of the process of learning, as experiential learning. Experience has also been considered as one of the relevant characteristics in the factor of team interactions and characteristics. The data

also did not confirm the factor of commitment as relevant to explaining the internationalisation process observed. The results confirm the importance of entrepreneurial characteristics as relevant to the internationalisation process. The combination of influencing factors and processes explains the internationalisation process discussed above.

7.3 Contributions

Academics and practitioners alike note the need for detailed research into the process of entrepreneurial internationalisation (Anderson, 2000, 2004; Etemad, 2004b; Fletcher, 2004; Johanson & Vahlne, 2009; Jones, Coviello, & Tang, 2011). While there is an abundance of anecdotal evidence on internationalisation and there is an interest in the topic area from researchers (De Clercq et al., 2012; Jones & Coviello, 2005), more theoretical and empirical work is required (Jones & Coviello, 2005; Johanson & Vahlne, 2009). The literature relates to the theory of internationalisation in general and to all the themes that are presented in this research: firm's environment, networking, trust building, learning, entrepreneurial characteristics and team interactions and characteristics, as can be seen in Chapter I, II and VI. Theory related to each of the themes is discussed in Chapter VI. The literature on SME internationalisation offers a diversity of explanations on how such firms internationalise. These theories helped the researcher to understand parts of the five companies' international behaviour. The data from five companies and the industry case study allowed for an identification of five themes relevant to internationalisation and firm's environment as a relevant factor in internationalisation. A multilevel look at the internationalisation process required information, which could be obtained from companies, from entrepreneurs but also from the Irish and international industry. As a result of analysis the themes identified as sub-processes of internationalisation process are: networks, trust building, and learning. The factors which affect the internationalisation process from the three researched levels are: entrepreneurial characteristics, team interactions and characteristics, and firm's environment. None of the former research reviewed in this study offered an integrated look at internationalisation employing three levels, which would explain internationalisation as a process of on-going networking, learning and trust building driven by the entrepreneur, team interactions and characteristics, and the firm's environment.

This research makes a number of contributions. First, the research contributes to the development of a more complete explanation of internationalisation by explaining internationalisation in terms of (i) the three simultaneous processes of networking, trust building and learning; and (ii) the factors that influence these processes as the entrepreneur, the team interactions and characteristics, and the firm's environment. Given the exploratory nature of the research, the extant literature base is used, together with empirical evidence, to develop a conceptual framework of the internationalisation process, specific to high technology, knowledge-intensive firms in the Irish Life Sciences industry. These factors are summarised in a framework, Figure 6.1 (p. 191).

Second, more specifically the empirical research provides an explanation of the internationalisation process that extends prior research by describing the process in terms of three simultaneous processes of networking, trust building and learning. The companies in this research engage in various types of networks in their internationalisation including business, social, academic, and the Irish Diaspora internationally. They develop their networks at conferences, via EI, at social occasions, and through network multiplication. They also manage their networks. Closely linked to networking is the theme of trust building that occurs during internationalisation. This happens through getting to know people and the development of relationships, but also through establishing credibility and delivering accordingly. The theme of trust building was strongly emphasised in all cases. The third process influencing internationalisation is the process of learning. Various types of learning (e,g, congenital, experiential and vicarious) facilitate internationalisation and occur at various levels (e,g, entrepreneur, organisation and business partnership). The process of learning is also managed in various ways by companies, such as the acquisition of spin-out of other firms, searching for knowledge, information processing and sharing or grafting on external knowledge. The processes described are driven to various degrees by entrepreneurs displaying certain characteristics (perseverance, independence, resourcefulness and enthusiasm). In some cases it is a joint effort of entrepreneurs and their teams. Teams are characterised by certain interactions (weak team, team in the need of management, and team working well together) and characteristics (education and experience).

Third, from a methodological perspective, this study takes a holistic approach to the study of firm internationalisation. The research provides an industry level and context specific study, as called for by Thoams et al. (2003) and Andersson (2004). By focussing

on multiple levels, and by combining data on the industry and firms, this approach differs from much of the previous empirical work in the area which has either emphasised cross-industry survey data, with a limited amount of case research, or focused mainly on individual business cases. Thus, breadth and depth are provided in the data, both of which are necessary for the examination of the entrepreneurial process (Coviello & Jones, 2004).

Fourth, from a context perspective, this study extends existing research on the internationalisation of SMEs by exploring the context of the Irish Life Sciences sector. Currently there is no empirical research that has specifically studied the internationalisation of firms in the Irish Life Sciences industry.

7.4 Limitations and generalizability

The research was primarily exploratory in nature, with the intent to explore the internationalisation process specific to the entrepreneurial high-tech, knowledge-intensive SME in the Irish Life Sciences industry. The study has identified relevant in SME internationalisation processes and factors. Thus, the purpose and scope of the research is clear, in that the conceptual framework is developed, specific to a certain type of firm, knowledge-intensive, high-tech, Irish indigenous Life Sciences SME.

The first limitation relates to the Stage I data collection phase during which the industry case research was conducted. The industry analysis looked at economic, political and market factors influencing the way the Irish industry developed, but the major facts considered were analysed through the lens of indigenous SMEs. As a result, the study is not a complete picture of all industry issues appearing in Ireland.

The second limitation relates to the Stage II data collection phase. Here the case research was conducted from a single-firm focus, and only some networks partners were consulted (consultants external to each company and a few companies). Not all network partners, such as supplies, distributors, investors, research contacts among others were asked to participate in the study. The approach was followed as the case firms, the individuals running them and the industry they operated in, were the defined units of analysis, with the research interest focusing on their decisions and actions.

The limitations also relate to the sample size, given that five case companies, an industry case and 35 interviews create the database. The database is not large enough for meaningful statistical analysis to be conducted, which would for instance measure the impact of some contextual factors and provide a tangible tool to shape internationalisation processing habits of the participating SMEs. In view of these limitations, the results are not sufficiently robust for statistical generalization.

The themes and factors are based on mainly interview data, some secondary research and limited statistical data. The limitation relates also to measuring of the data. The limitation of the data coming from unstructured interviews relates to the fact that data collected in unstructured interviews is also prone to digression and much of the data collected could be worthless.

Finally, since both stages of data collection focused on "successful" firms, and only one company (Company A) was qualified as unsuccessful internationally, there is potential for some degree of bias to occur. However, each of the case companies had clearly identifiable histories of internationalisation and growth failures, thus minimising the potential for successful firm bias.

The scope of this research is both the firm and industry specific, and the results are initially analytically generalizable to a defined set of organisations; i.e. the Irish Life Sciences companies. In principal, these set of conditions may be found outside of the Ireland (i.e. other entrepreneurial knowledge-intensive firms operating in international markets), but it should be stressed that context is very important in understanding this study. For this reason, it is suggested that the framework may not be generalizable to larger firms or those competing from large domestic market bases or purely manufacturing firms without a need for specialist technical knowledge during manufacturing process. This provides significant research opportunities, as discussed in the following section.

7.5 Direction for future research

Based on the current findings, future research opportunities can be identified in at least four areas as follows:

framework refinement and testing

further within-industry studies

cross-cultural and cross-industry studies

entrepreneurship issues

These opportunities will now be discussed.

7.5.1 Within-Industry Studies

The framework of internationalisation and related issues proposed in this research are currently specific to a research company three manufacturing/research companies and high value added manufacturing company in the Irish Life Sciences industry. Given the value of longitudinal research in the area of internationalisation (Jones & Coviello, 2005), it would be useful to continue examining such companies over time, to further understand their internationalisation patterns and processes.

Additionally, the internationalisation and entrepreneurial characteristics, as well as team interactions and characteristics in the Life Sciences companies should be of interest to future researchers. As the Irish Life Sciences industry matures the importance of human characteristics may change. For example, the Irish Life Sciences industry may be able to offer a stronger pool of human capital locally and the ability to acquire necessary business development skills in Ireland may become more feasible than currently.

The industry study also indicates some drivers and inhibitors to internationalisation. A joint study combining industry trends in Ireland and those occurring internationally would therefore be of interest. One of them is a need to network internationally as the market is too small to become self-sufficient, so companies will continue to internationalise. Another study area could look at how network relationships will be affected by increased competition for such partners internationally. Considering that the industry is very complex and requires sophisticated knowledge, it is likely that the entrepreneurial orientation of the firm will become increasingly team-oriented. It would be interesting to observe whether entrepreneurs will continue to be key architects of the internationalisation process.

Another potential area of enquiry relates to the nature of learning associated with different network relationships. Of potential interest would be research into the behaviour and cognition associated with internationalising small firms. How are these

firms able to leverage network relationships to simultaneously achieve exploration and exploitation?

Each of those propositions warrants further examination in the context of the Irish Life Sciences industry. At the same time, they provide a basis for research outside of Ireland.

7.5.2 Cross-cultural and cross-industry studies

The current research looked at firms within the Life Sciences industry, which by its very nature lends itself to networking, with relationships occurring between researchers and pharmaceutical companies looking for new discoveries. However, it would be useful to examine findings across countries, using a cross-section of representative firms to validate the results. This could be accomplished using firms from other countries such as those with small open economies (e.g. Sweden, Israel and New Zeeland).

Furthermore, it is important to note that the findings of this research are specific to entrepreneurial firms, which are small, high-tech and knowledge-intensive. As a consequence, it is also important to examine the findings in other industrial contexts, e.g. smaller, entrepreneurial firms which are low technology and knowledge-intensive or low-technology and manufacturing-based.

Also, given that the firms studied in this research are relatively small (not exceeding 50 employees), the findings of this research could be compared with the patterns of larger SMEs possessing the above characteristics.

Therefore, in both cross-cultural and cross-industry studies, it would be of interest to test and further refine the frameworks proposed in this study, and examine the "industry evolution" patterns more fully as indicated in the findings.

Furthermore in relation to the development of SMEs, it would be useful to draw upon economic geography to understand better the link between SMEs and the geographical location of industries. This could relate both to a small firm's local milieu, as well as to their sub-national links within international markets. Considering that internationalising small firms increasingly establish a presence in international markets, often via networks, the nature of the local industry context can influence firm performance.

7.5.3 Framework refinement and testing

In addition to the above, the research findings also provide opportunities for additional research on networks, learning, trust building in network relationships, entrepreneurial characteristics, and the interactions and characteristics of the teams.

The analysis of networks could involve relationships involving partners from very different cultural backgrounds. This could be combined with issues such as trust building, learning and opportunity creation in relationships involving culturally different network partners. Additionally, the research could focus on an understanding of how "successful" relationships are created, and key factors influencing these creation processes. In particular, studies could concentrate on how specific relationships influence and are influenced by other relationships as part of the internationalisation process and network evolution.

While useful insights on the development of networks, trust building and learning have emerged from the research, clearly more needs to be done to understand how these factors relate. For instance, little is known about which networking behaviours are most strongly associated with trust building. The cultivation of trust is another potential research area. Future research could explore trust building and internationalisation, especially how trust is affected by factors such team and management characteristics.

Finally, it is suggested that longitudinal studies may provide the most appropriate method for capturing the internationalisation process of SMEs over time. Case research would be useful in this regard, allowing for the collection of rich descriptive data in a chronological manner, following either a macro or micro perspective in analysis; or combined micro and macro perspectives.

7.5.4 Entrepreneurship issues

Considering that entrepreneurial characteristics and team interactions and characteristics are shown to be the key factors driving internationalisation, it would be of interest to study management and other teams (boards, ad hoc teams, etc.) and entrepreneurs further, to examine whether or not the pattern of internationalisation can be explained by psychological profiles. Moreover, given that internationalisation is related to growth, it would be of interest to examine how entrepreneurs or team members in this study

define and perceive "growth", and what implications this has for the internationalisation process of their companies.

7.6 Implications for practitioners, business assisting organisations and policy makers

The implications for managers are manifold. It is important to recognise that the processes of learning, networking and trust building are relevant in SME internationalisation. These processes are more effective, if they are driven by the entrepreneur, and company team characteristics and interactions. These processes are also affected by the firm's environment, so it is important that stakeholders are aware of the environment and how to moderate positive and negative influences on internationalisation. Entrepreneurs should work on their characteristics, in case they are missing attributes such as resourcefulness, enthusiasm, perseverance or independence, which may impact on internationalisation objectives. It is relevant that managers understand that learning needs to happen on all three levels (entrepreneur, organisation and in business partnerships), that they should take advantage of different types of learning (congenital, experiential and vicarious), and that they need to manage the process of learning, choosing from a portfolio of methods: acquisition, spin-out, searching for knowledge, information processing and sharing and grafting of external knowledge if needed.

The findings of this research suggest that entrepreneurs and managers of high-tech, knowledge-intensive SMEs in the current competitive environment need an enhanced understanding of the impact of networking, trust building, learning, but also their own personality characteristics on international development of their companies. Given the inevitable impact on network relationships, but also on their own people in the company, more attention should be paid to skills that allow for effective international network development. Practitioners should also pay more attention to careful recruitment of team members, who have the potential to add value and stimulate the process of internationalisation over time. Related to this topic, owners and managers should understand the benefits and risks associated with the trust building process, and the associated issues of control and dependency. This is important because owners and managers in high-tech, knowledge-intensive SMEs tend to share knowledge related to their company with research partners, investors and/or other network contacts. This

may potentially weaken their network position, particularly in times of escalation of the economic downturn and increases in international completion. The skills needed to balance the pros and cons in each relationship and the sensitivity to build effective, strong international relationships also becomes a key to successful growth internationally. This becomes especially important in relationships with larger network partners, who tend to take more control over the activities of smaller firms. Issues related to managing relationships with partners operating in different cultural settings must also be considered.

It is important that owners and managers continue successful positioning of their companies in international networks such that they have a wide range of relationship options open to them. Their existing relationships as well as their ability to establish new relationships should be managed as a key competitive capability.

The findings of this research are also of practical interest to managers of entrepreneurial high-tech knowledge-intensive, biotechnology firms in Ireland, with related interest groups being public policy makers and organisations supporting international investment and growth activities.

The findings suggest several implications for policy makers and business assisting organisations. One of them is the need to address the shortcomings of scientists with applied science and applied international business development experience. It could be positive to create joint industry-university based PhDs, as well as system of work placements in internationally present small companies for PhD students. This would potentially encourage them to set up companies shortly after their PhDs are completed. There is also the possibility of creating mentoring programs for young entrepreneurs to nurture their characteristics, and to coach them in network management. There is a strong need to increase the level of funding for applied research in Ireland, as currently companies are experiencing a shortage of funding. All case companies were very complementary about the supportive role of EI. There seems to be scope for improvement in the work of EI in relation to mentoring young scientists and facilitating their education on international business development. If EI negotiated such mentoring or shadowing arrangements with industry, this not only an provide an understanding of the factors relevant for successful internationalisation, but also experience of these processes in action.

The research results offer a better understanding of the process of internationalization and the opportunities and risks associated with networking, based on owners/managers personality and previous experience. This is particularly relevant given the importance of a small firm growth to the Irish economy, and the related need of high-tech, knowledge-intensive firms to expand internationally (often through networks). In the knowledge-intensive firms the internationalisation process was quite specific, being based on the interplay of learning, networking and trust building. This could be explained by the how expensive and knowledge-intensive the research in the Life Sciences sector is. The knowledge-intensive sector is also very much people based, and maybe this is why both the entrepreneur and the teams are so important in driving the internationalisation. Considering that the research process into new drugs is very complex an expensive, the firm's environment can also become friendlier to internationalisation by introducing support and policies facilitating it.

7.7 Chapter Summary

This chapter concludes the research, providing a review of the major research findings, as well as identifying research limitations.

The empirical framework suggests that internationalisation of SMEs in the Irish Life Sciences industry can be defined by the interplay of processes of networking, learning and trust building. All these sub-processes of internationalisation are affected by the factors emerged from the multilevel analysis of the internationalisation: the entrepreneur, the company team interactions and characteristics, and the firm's environment.

In companies aspiring towards internationalisation, the research implies that managers and practitioners should focus on creating well-educated and experienced teams to support the role of the entrepreneur. Additionally, entrepreneurs should work on characteristics such as interdependence, resourcefulness, enthusiasm and perseverance, which are shown to greatly enhance success in internationalisation. It is also important that managers understand that learning and networking needs to occur on all levels of an organisation, and that these processes need to be appropriately managed. The research demonstrates that trust building is central to successful and sustainable international development.

Future research opportunities include different industrial contexts, cross-cultural studies, longitudinal studies amongst others.

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Appendix A: List of data collection techniques applied:

1. Interviews in the companies with CEOs, owners and managers.
2. Interviews with experts external to each company working with them on their development.
3. Interviews with industry experts related to industry in Ireland, internationalisation, as well as links between small and large companies.
4. Creation of two databases. Database of 94 MNE foreign companies based in Ireland and database of 84 indigenous SMEs based in Ireland.
5. Publications related to Life Sciences industry in Ireland.
6. Archival records – organisational charts and budgets over time (where available) and personnel data.
7. Direct observation – observations made by the researcher during the visits to the companies.
8. Networking with entrepreneurs, experts and attendance of industry events.
9. Use of internal data on companies and company related news, stock data, promotional materials, organisational minutes and memos.

Appendix B

1. Example of coding from the interviews with CEO, Case B:

"I had exposure to business people, was getting appreciation of how they were doing the business (…). **Code: learning from others, experiential learning**

I could see that I was generating results here, which will be useful for the company (…). I enjoyed the opportunity to travel, to meet people, get more exposure at such a young age group; it was fantastic, it was very important to my confidence. **Code: enthusiasm, growing independence**

(….) International business was everything I hopped it to be, you can either enjoy it or you do not. It depends on a person, some people hate travelling and communicating; I prefer working with people in teams." **Code: enthusiasm, the importance of teams working well together.**

2. Example of coding from interviews with CEO, Case D:

"It depends on whether you have delivery capability and the other party has it too. We put a lot into collaborations and meetings. We meet people face to face and also add a social aspect, so if you build trust and things do not go to plan, it is easy to solve problems.(…) Knowing a person and seeing subsequently that they deliver as agreed helps building trust, but we do make effort, constantly take references **Code: trust building, it suggests also that delivery facilitates trust building.**

"I have tried to build this company on principles that are important, encouraging people to work as part of a team, to develop, to take responsibility for what they do. I was trying to build a culture, that creates a good place to work, but is also good for developing business. **Code: team work, it suggests the importance of teams working well together.**

The researcher has read the text carefully and circled what seem to be key terms or key events or actions. A short note of what these are has been written after "code" above. An initial coding list from the presented transcripts was:

- Learning
- Learning from others
- Experiential learning
- Independence
- Trust building

- Delivery
- Teams working well together

These terms summarise the events and actions noted by the coding in Example 1 and 2, and some are more analytical, i.e. not merely describing something that happened or was said. They form examples of a coding list that has been marked-up in the rest of these transcripts. The researcher placed the code labels and comments on the margins of transcripts, also used brackets in the transcribed text, which allowed coding much larger chunks or passages of text. The researcher has also used a highlighter to identify words that refer to codes or description of codes.