A Framework for Sustainable, Competitive Advantage for the Irish Pharmaceutical Industry

Thesis by

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Declaration

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Doctor of Philosophy is entirely my own work and has not been taken from the work of others save the extent that such work has been cited and acknowledged within the text of my work.

Signed:_____

Date: :_____

Abstract

This inductive study seeks to construct a practical strategic framework tailored for use by the Irish pharmaceutical industry to improve its competitive advantage in time. Enhancing the effectiveness of sustainable (predictive), competitive advantage requires strategists to chase change rather than simply react to it. Modern business operates in a complex and dynamic environment, human behaviour is irrational. The application of assumptions and cognitive preference for repetition restricts differentiation being achieved, a fundamental aspect of competitive advantage. The framework was devised, firstly, by utilising interdisciplinary academic theories, spanning behavioural science to business management, to identify the factors important to sustaining the competitive advantage of the Irish pharmaceutical industry, then testing the relevance of the same through time, and finally by developing a methodological prototype for use primarily by Irish senior strategists to formulate their management strategy in context and in time.

Acknowledgements

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Finally, to my husband Tom who has fully supported me on this journey and encouraged me every step of the way, not just for this project but for every milestone!

Dedication

To my husband Tom.

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Chapter 1: Introduction

1.1 Research overview

Competitive advantage is concerned with developing differences that will result in consumers/clients positively distinguishing the output from alternatives in the market. Sustainable competitive advantage is where the strategic direction of a company enables it to maintain above-average profitability for a number of years. [Porter, 1998]

The scope and pace of establishing and maintaining competitive advantage has been intensified by globalisation, and increasing uniformity and integration between national, political, economic and market structures. Further, technological advances are radically transforming methods of communication between consumers and businesses, and the spread of information, tangible and intangible, real and perceived, on business organisations and their activities.

Business, academic and popular literature is filled with numerous case studies, management methodologies and theories on the subject. A wealth of methodologies has emerged within a dynamic reformative business environment characterised by chaos, contradiction, complexity and change (Bettis & Hitt 1995). The pace and scope of such radical transformation has led theorists and practitioners to identify the need for a generally accepted framework within which strategic management's choices and objectives might be easily tailored to suit the business, industry, environment and time for public and private businesses (Neely & Bourne 2000) (Saunders 2008).

The purpose of this research is to develop a framework for sustainable strategic formulation to enable senior strategists to structure aspirational and innovative enquiry and thus promote the competitive advantage of their organisations. The focus of the research is on exploring the competitiveness of a regulated environment. It is presented in the context of the pharmaceutical industry in Ireland.

According to the Collins English Dictionary a framework is defined as '*a particular set of `rules, ideas or benefits which are used in order to deal with problems or decide what to do*'. A framework is a system for strategic management and needs to

be objectively designed to facilitate an organisation to achieve its objectives in the short, medium and long term.

1.2 Background to the research topic

There is general consensus among strategists on the need for a framework for sustainable competitive advantage. The absence of such a utility has been attributed to a lack of cohesion between academics and practitioners, as early frameworks evolved organically within specific businesses or industries and were thus largely reported on by practitioners (Voss *et al*. 1994). Much of the academic research in this area has concentrated on *specific* aspects of a strategic management framework; for instance, progressive evaluation or strategy implementation (Kaplan & Norton 2001). Businesses, seeking to 'measure' competitiveness and maintain flexibility in order to manage downturns in the business cycle, tend to focus predominantly on cost-effectiveness (Dixon *et al*. 1990; Banks & Wheelwright 1979; Hayes & Garvin 1982). The need for structured theory has witnessed the common adoption of frameworks that have been constructed and marketed in the professional development, industrial training and further education markets as management tools. Such packages are not easily tailored to suit individual specifics (objectives, organisational culture) and are largely formatted in the financial lag accounting tradition, facilitating easy computation and technological compliance, but restricting evaluation to predominantly historic tangible factors (Armstrong 1968, Spencer 1961).

The pharmaceutical industry was one of the first non-agricultural industries to establish an Irish base and has been acknowledged as one of the most successful. National policies promoting Ireland as a small, open, export-focused economy, and for its geographical location, low levels of industrialisation and industry-targeted economic and support packages have historically promoted Irish pharmaceutical competitiveness. The expansion of a near homogenous global market, however, has increased competition so that Ireland can no longer simply rely on the supply-side factors that previously provided competitiveness through what Porter called "cost focus".

The timing of this study, 2008–2012, provided an opportunity to investigate the process of strategic planning at a time when all businesses were subjected to extreme environmental shocks. The inter-reliance and dynamics of strategic planning at national and organisational level have been dramatically exposed, emphasising the need for an environmentally constructed framework to drive competitive advantage. The pharmaceutical industry has a tradition of diversifying to exploit emerging market needs, migrating to exploit advantages in patenting and legislation favouring R&D, manufacturing, or sales regulations, and has traditionally worked with and between the public, academic and private sectors. Furthermore, the specific elements within the industry have facilitated entrepreneurial businesses, while the larger expanded to new markets or/and encompassed all aspects of the supply chain from concept to end user. The pharmaceutical industry in question is dominated by multinational corporations (MNCs) that were originally attracted by internationally directed industrial development strategies. The duration of industry presence in Ireland (the large players arriving in the 1960s) presented an ideal opportunity for a study on predictive strategic processes and their effectiveness.

1.3 Thesis aims and objectives

The researcher is an ex-pharmaceutical practitioner still informally connected to the industry through association, and currently an academic in Ireland. Thus, this research is largely motivated by experience and the desire to feed into the research, specifically to aid students seeking employment and employers who might facilitate the same. Professional involvement with industry practitioners, regulators and related government organisations, combined with expertise in the theoretical academic sciences concerned, has facilitated first-hand observation of relevant relational dynamics. The author's location, expertise and experience thus appear to be suited to the holistic, inductive approach necessary for the construction of a strategic framework tailored for the Irish pharmaceutical industry.

The aims of the study are as follows:

1. to undertake a comprehensive review of the literature pertinent to the predictive strategy sequences of Ireland as an economy and of the pharmaceutical industry, strategic management frameworks and performance measurement systems within a management science perspective;

2. to investigate the factors that affect competitive advantage as advocated by the literature, and to propose a self-assessment tool and run a sample pilot with Irish industrial strategic practitioners in order to evaluate its utility in practice;

3. to assess the competitiveness of Ireland as a location for pharmaceutical manufacturing activity;

4. to develop a predictive prototype that reflects the need for an informed and directed approach to sustainable strategic planning by a reformative enterprise that seeks differentiation to direct its competitive advantage.

1.4 Defining competitive advantage

Competitive advantage is an economic concept that is adopted by business and political strategists and is thus subject to interpretation. Since, at both national and business levels, competitive advantage is concerned with capturing *difference*, no uniform 'model' for its inducement applies. Porter asserted that competitive advantage is a *process* requiring adjustment to reflect the internal and environmental realities and predicted eventualities (Porter 1980, pp.41-4). At national and organisational level, 'frameworks' are adapted to reflect objectives, and both inherent and external factors. Changes in realigning strategy to reflect the current and anticipated market *and broader environmental* flux are essential. Any framework would thus need to explore situational and environmental dynamics and incorporate their feasible effects into the continuous process of predictive strategy design.

The competitive advantage of a firm equals the difference between the overall value created by the industry when the firm is in the market and the overall value that would be created by the industry when the firm is not in the market. Thus, competitive advantage is the extra value created by the firm. Value creation provides an important linkage between the steps of the strategy process.

Strategists generally favour financial reporting in performance evaluation and in establishing measurable targets (SMART). These facilitate easy comparison, depict progression and, with computer software, provide current quantitative results from extensive data.

Competitive advantage is concerned with pre-empting and inspiring market behaviour aspiring to capture *difference* over competitors. Opportunistic behaviour in the lack of wider preparation for *possible* eventualities is a commonly cited failing in existing frameworks. The *strategic* element necessary for sustainability in the short, medium and long term needs to be an intrinsic component of an effective framework.

In forecasting there is a need to balance the odds against an objective; identification and investigation of probabilities inform such a process. Game Theory is specifically applied to inform the relational dynamics of the strategic planning process. This dissertation will thus seek to build a predictive model for the Irish pharmaceutical industry that incorporates Game Theory.

1.5 Research rationale

The pharmaceutical industry encompasses most of the desired and necessary qualities for sustainable business activity: diversification, creativity, inter-industry co-operation, innovation, mobility and statutory regulatory compliance.

Since this study focuses on the Irish pharmaceutical industry, the findings need to be situated, explored and clarified so that a culturally appropriate and practically effective framework may be proposed. A framework to direct sustainable competitive advantage necessitates the inclusion of investigative and exploratory strategic measures to enable identification of relational dynamics, both internal and external to the firm.

Such a framework directs a continuous process and needs to be easily tailored, to assimulate change, in order to remain relevant and sustainable. As an evolving utility, its construct should be consistent with criteria preferred by strategists in order to be practically applicable. In this context, the principal research question is:

What framework structure is most appropriate for use by an Irish pharmaceutical enterprise to drive and sustain its competitive advantage?

The research utilises both qualitative and quantitative methodologies to reveal a gap in theories between academia and practitioners in their understanding of strategic planning and competitive advantage.

No research to date has focused on developing a framework specifically for the Irish pharmaceutical sector. Any framework developed should address the needs of the practitioner.

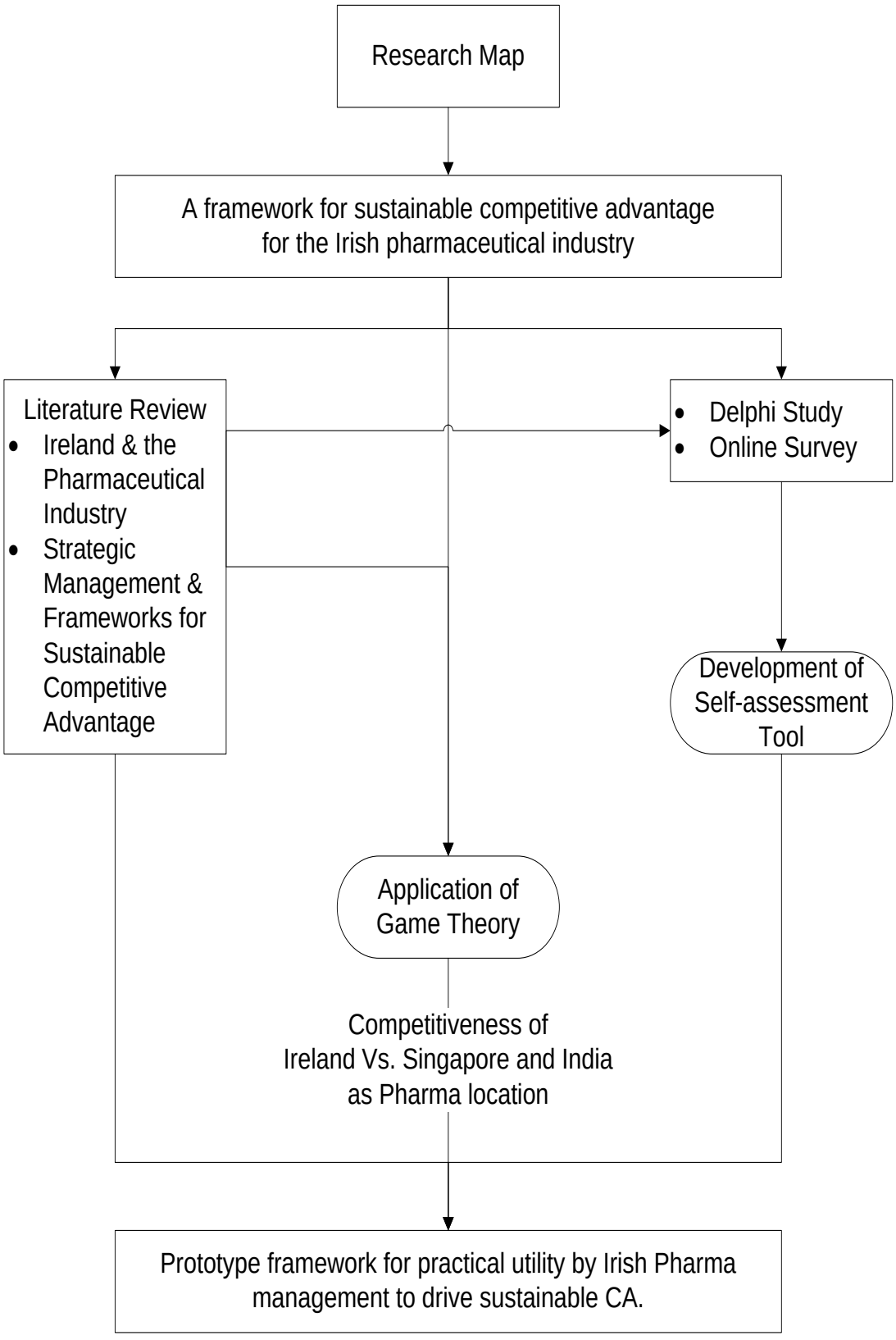
1.6 Thesis outline and structure

After the research proposal was researched and viability in scope and relevance assessed, an objective-driven structured process was constructed.

This investigative research comprises an extensive qualitative analysis of secondary research, followed by staged primary research in context. The size and restricted scope of the study would not provide for quantitative analysis to be transferable, and such statistics are not suited to the investigative, inductive nature of this research. However, the staged exploratory structure of the primary research enabled all qualitative findings to be critically evaluated through being tested for effects in practice. This structure also facilitated the consideration of theoretical and academic literature to the requirements of industrial practitioners.

Figure 1.1 shows a copy of the research map.

Figure 1.1: Research map



1.6.1 Chapter 2 – Research methodology

The intention was always to examine the findings from the secondary research within context. Initially, it was necessary to clarify the findings of the literature review on aspects of competitive advantage in relation to those perceived to be of importance by pharmaceutical practitioners in Ireland.

The initial Delphi survey was formulated to extrapolate features of competitive advantage that the practitioners considered important to the Irish pharmaceutical industry in the past and for the present. The first stage was primarily concerned with clarifying the range of opinion and interpretations relevant to competitive advantage. Findings were collated and qualitatively evaluated, comparable responses grouped and popularity of terminology for further communication noted. The second round required the respondents to prioritise the significance of elements. The results of this allowed differentiations within the industry to be illuminated and evaluated for the implications these would have on the effectiveness of frameworks in practice.

The second round of primary research focused on the desirable structure of a framework and its effectiveness in practice. The importance of practicalities in strategic planning directed the design of the questionnaires, appropriate language and format, all importasnt in the Delphi design. Results were provided to the respondents in a timely manner, enabling strategists' subjective assessment of unambiguous numeric data to be noted. The research was conducted over time to allow for effectiveness to be assessed with the benefit of hindsight.

1.6.2 Chapter 3 – Ireland and the Irish pharmaceutical industry

It was decided that, since the pharmaceutical industry and strategic management framework for sustainability are both examined within an Irish context, the Irish environmental cultural setting would be the first area of research. The resulting findings would then aid focus on the relevant findings from the extensive body of literature concerned with management and strategy formulation.

This chapter is divided into two main, heavily interrelated sections.

Part 1 examines Ireland as a cultural environmental setting. The dynamics between state policy and social norms and aspirations within the economic and cultural

evolution of Ireland are explored. Significant occurrences in the past and historical aspects pertaining to contemporary dynamics are extensively reported. While the order is chronological, the extent to which each era is examined was determined by evidence of the endurance or consequence of events. A wealth of cross-sectional literature covers the recent 'boom and bust' experience, as well as the earlier experience of under-development. With the benefit of hindsight, shortfalls in the research, particularly in the absence of holistic approaches, are apparent. Trends in cultural and environmental behaviours, again with the benefit of hindsight, are noted to inform the predictability element of strategic planning that is particularly of relevance in the application of Game Theory.

The Irish experience was primarily contextualised in the second part of Chapter 2 through a brief exploration of the development of the pharmaceutical industry globally. The relationship and differences between global industrial trends and Irish development was examined in order to depict competitive advantage characteristics and evaluate the significance of dynamics within the national context. Where possible, comparisons between national strategies are outlined in order that alternative possibilities and dynamics might be explored.

1.6.3 *Chapter 4 – Strategic management frameworks and performance evaluation systems*

This chapter is also divided into two parts. The first examines the aspects of and theories on strategic management. Part two evaluates the concept of performance evaluation systems in relation to strategic management. Evidently, the two are interrelated, the latter being designed to feed into the former. Frameworks for management encompass both components, however; systems of measurement are concerned with the implementation and evaluation of strategy.

Part 1

There is a large volume of literature on strategic management techniques, methodologies and structures. Secondary research was carried out, using reputable journals, reports and books. Case studies and targeted studies were selected according to their relevance to Ireland (small open economy, etc) or the pharmaceutical industry (creative, research-driven; technological, chemical). The

year 1970 was used as a starting-point to coincide with the introduction of pharmaceutcial manaufacturing into Ireland. As global trade increasingly adhered to the competitive advantage theory, business grew as a subject of academic study and business literature proliferated.

The concept of management as a profession and the growth of private and public institutions and multinationals further fuelled private-sector involvement in the design and structure of management courses, training, professional qualifications, magazines and courses. As a result, strategic management has increasingly been segmented, identifiable components of competitive advantage being adopted as definitions of organisational structure designs. As stated, a consistent primary focus was placed on the *strategic* aspect within such constructs in keeping with the research quest to establish drivers for sustainability.

Part 2

Initially, a brief look at the evolution of performance evaluation systems was conducted to establish their motivation, utility in context, relationship to strategic management, and construct. Knowledge about the development of these systems in practical application facilitated an examination of strategic management dynamics and implementation, within the evolutionary experience of strategic management as a whole. Technology, not least computerisation, and the spread of academic business specialisms led the research to include human resources (HR) and operational systems in technology; with the latter, the use of dynamic interaction was particularly informative for the research in designing a framework.

Secondary research then involved identifying the range and differentiations between existing models and systems for performance evaluation systems in isolation and as part of broader strategic management constructs such as Total Quality Management (TQM), Six Sigma Professional Project Management, and Balanced Score Card. Additionally, the study of performance measurement illuminated strategies for diversification.

1.6.4 Chapter 5 – Competitiveness and the application of Game Theory

Game Theory, designed as a predictive strategic tool, facilitating the evaluation of probability dynamics, is currently ‘popular’. Technological advances have enhanced

its utility by facilitating access to computer programs that rapidly conduct the complex calculations required. Added to this, its mathematical base is amenable to the financial and accounting bias that dominates strategic planning today. The focus of the qualitative analysis was on its utility in practice. Critical evaluation of the quality and objective of input in practice through an evaluation of case studies and historical analysis of strategic behaviour and results was conducted. Findings were then discussed with a view to the appropriate application of such information within an environment in which the rules of 'the game' are continually being changed.

The chapter concludes with a critique of Game Theory as a research tool and an evaluation of its utility to assess the competitiveness of the Irish economy.

1.6.5 *Chapter 6 – Development of the Framework Prototype*

An evaluation of the findings of all secondary and primary research was carried out. The implications were then taken into account in the design of a framework prototype. An evaluation of the prototype and its contribution to the practical quest for sustainable competitive advantage are theoretically explored.

1.6.6 Chapter 7 – Conclusion

The findings of the study are recounted and situated in the available body of evidence. The appropriateness of methodological approach is also discussed. Shortfalls and restrictions are detailed as are suggestions for further research.

1.7 Contributions and relevance

The research will be of value to academics interested in strategy formulation and competitive advantage within the range of both indigenous and MNC organisations. This inter-disciplinary study may form the basis of new theories and perspectives within Business and Management Science faculties.

No study that the researcher knows of has been conducted into the sustainability of the Irish pharmaceutical sector. The observations presented will provide the basis for more refined research into the future.

Chapter 2: Research Methodology

2.1 Introduction

This chapter is dedicated to the examination of the theoretical factors that influenced the choice of research design used in this thesis. The choice and rationale for the research methods employed in this study are also considered.

The research objective and related hypotheses evolved from the researcher's observation and experience. The recent Irish experience of intense economic growth and rapid decline has increased focus on sustainability as a primary objective at all levels of economic activity, whether global, international, national, industrial or individual.

The quest to contextualise the findings from theoretical studies to Irish pharmaceutical strategists was the primary motivation for the researcher to design an applicable predictive strategic tool for immediate use to measure their competitive advantage.

No previous studies of process management practices in Irish pharmaceutical companies could be located, justifying the focus on the specific location and industry here.

Benchmarking and self-assessment is being used increasingly by industry as a tool to help identify 'best practice' and to identify areas for improvement as a 'one shape fits all' remedy frustrates the attainment of competitive advantage through differentiation. In the quality management area, the impact has been particularly striking. In the US – Malcolm Baldrige National Quality Award – and in Europe – the European Foundation for Quality Management (EFQM) – have been particularly effective. The first section of this primary research will inductively explore the Irish contemporary practitioner's opinion and experience, factors considered to be important in the short and medium term, and desirable features of predictive tools will be purposefully examined.

Ireland has seen very rapid growth over the past 20 years, when the unemployment figure was 17%; the country was a nation of emigrants. In the 1990's Ireland was one of the top three countries in the world for attracting foreign investment, second to Hong Kong. This foreign investment along with tax incentives and cheap labour encouraged multi-national companies into Ireland turning the economy around. The Celtic Tiger was born, the result was well-paid employment, guaranteed income and a transformation of people's lives. Unfortunately the economic climate is changing. The success of our economy has also meant higher wages and higher costs. Management in manufacturing companies is now under pressure to move Irish operations to cheaper destinations, namely Eastern Europe and Asia, in order to maximize their competitiveness.

The pharmaceutical industry is one of Ireland's most successful business sectors. 8 of the world's global ten companies are located in Ireland. They employ 20,000 people. Recent investment (€5 million) from Pfizer, Allergan, Genzyme, Gilead, Merck, Lilly and Centocor has strengthened the presence of the sector in Ireland. Improvements in manufacturing efficiencies and productivity are always paramount in the mind of the senior strategist of an Irish pharma facility.

In 2009 the pharmachem sector exported products worth more than €47bn. Well-defined clusters of pharmaceutical manufacturers have developed in Cork and Dublin due to access to ports and airports, and to the proximity of population bases and universities.

Bristol-Myers Squibb and Pfizer were two of the early entrants to the Irish economy in the 1960s. They were followed, among others by Eli Lily, Schering-Plough, Merck, Sharpe & Dohme, Smithkline Beecham and Jannsen Pharmaceuticals . Companies within the pharmaceutical sector manufacture products to extremely high quality standards, making the industry a highly regulated one, the manufacturing processes are licensed and are subject to compliance inspections by the regulatory authorities, the Irish Medicines Board (IMB) and the Food and Drugs Administration

(FDA). The sector is an important employer of third level graduates and is strongly committed to the training and development of its employees at all levels.

The pharmaceutical enterprise in the context of this research study is a Development & Manufacturing (D&M) facility producing finished product medicinal products. The nature of this highly regulated environment is reflected in the style of management which can be defined as hierarchial, bureaucratic and conservative. Many pharma companies introduced some form of continuous improvement programmes in the mid-late 1990s.A noticeable trend was for companies to adopt an 'espoused theory' of Quality Management, and used project solving terms to improve work practices. This is not surprising to discover given that pharmaceutical companies are required by law to have more clearly defined systems and responsibilities to allow them to manufacture medicinal products.

The timing of the study was interesting in that when tax revenues were dropping and the economy collapsing with the fall-out from the building 'boom', the pharma sector was relatively buoyant, some contraction of facilities, some expansions, but the sector was seen as a solid industry, one that would 'help' the economy to recover.

2.2 Action Research

Action research is a generic term which covers many forms of action-oriented research, and indicates diversity in theory and practice among action researchers. A large proportion of empirical research in Operations Management (OM) has been done through the use of surveys, case studies, field studies or laboratory experiments. It has been suggested by Pannirselvam *et al*. (1999) that integrative research in the OM area and other business disciplines will require researchers to be more innovative in their selection of methodologies, considering action research for the following reasons:

- Action research (AR) is 'research in action', participative, concurrent with actions and a sequence of events, and is an approach to problem-solving.
- Research in action: the central idea is that AR uses a scientific approach to study the resolution of important social or organisational issues together with those who experience these issues directly.

- AR is participative; members of the system being studied participate actively in the cyclical process, developed by Coughlan and Coughlan (2002) of data gathering, data feedback, data analysis, action planning, implementation and evaluation.
- AR is research concurrent with action; the goal is to make that action more effective while simultaneously building up a body of scientific knowledge.
- AR is both a consequence of events and an approach to problem-solving. It comprises iterative cycles of gathering data, feeding the data back to those concerned, analysing the data, planning action, taking action and evaluating, leading to further data collection, and so the cycle continues. The outcomes of the AR approach are not just solutions to the immediate problems but important learning from the outcomes (intended and unintended) and a contribution to scientific knowledge and theory.

Coughlan and Coughlan recommend the use of action research "when the research question relates to describing an unfolding series of action over time in a given group, community or organisation; understanding as a member of a group how and why their action can change or improve the working of some aspects of a system; and understanding the process of change or improvement in order to learn from it".

Gummesson (2000) lays out 10 major characteristics of action research:

1. Action researchers take action.

2. AR involves two goals: to solve a problem and contribute to science.

3. AR is interactive, requires co-operation between the researchers and client personnel. The members of the client system are co-researchers as the action researcher is working with them on their issue so that the issue may be resolved or improved for their system.

4. AR aims at developing holistic understanding during a project and recognising complexity. As organisations are dynamic socio-technical systems, action researchers need to have a broad view of how the system works and be able to move between the formal and informal subsystems of the organisation.

5. AR is fundamentally about change. AR is applicable to the understanding, planning and implementation of change in the business firm.

6. AR requires an understanding of the ethical framework, values and norms within which it is used in a particular context, specifically how the action researcher works with members of the client organisation.

7. AR can include all types of data-gathering methods; qualitative and quantitative tools, such as surveys and interviews are commonly used. It is important that the research method used be thought through and clearly integrated into the AR process.

8. AR requires a breadth of pre-understanding of the corporate environment, the conditions of business, the structure and dynamics of operating systems.

9. AR should be conducted in real time; AR is a 'live' case study performing the function of a 'learning history' and is used as an intervention to promote reflection and learning in the organisation.

10. The AR paradigm requires its own quality criteria, judged within the criteria of its own terms.

2.3 Rationale for using the Delphi method

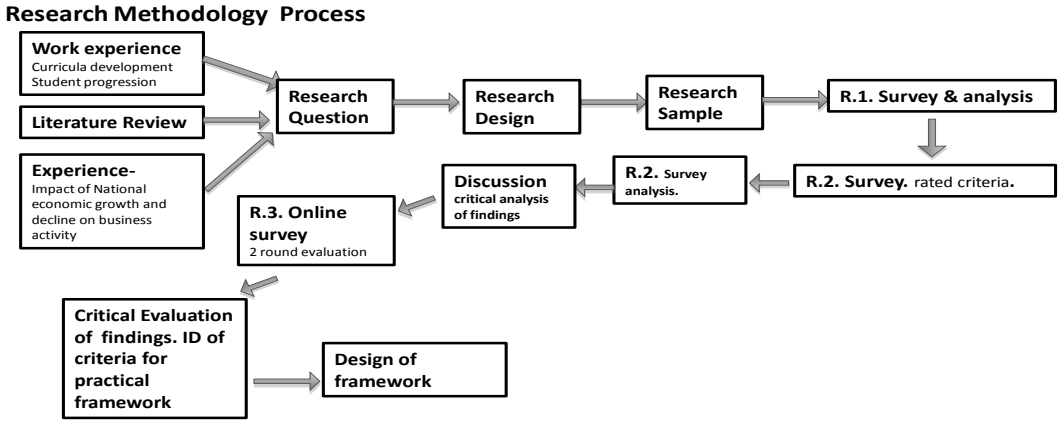
The Delphi method is an iterative process to collect and distill the anonymous judgements of experts using a series of data collection and analysis techniques interspersed with feedback. The Delphi method is a well suited research instrument when there is incomplete knowledge about a problem or phenomenon and it works very well when the goal is to improve and understanding of problems, opportunities or to develop descriptive frameworks of knowledge manipulation activities.
This very adaptable research method can be applied to problems that could benefit from the subjective judgement of individuals on a collective basis.

The use of Delphi for identification of variables and forecasting was deemed suitable for the initial research aspect of this study because it facilitated contextual validation of literature review findings through opinion and 'hindsight' evaluations by experts within the various relevant tiers of decision-making (Rowe and Wright 1999).

The Delphi process, in accommodating refinement and strategic manipulation through time and flexibility in the format of directed/responsive feedback, facilitated

the exploration of anticipated and emerging dynamics. Other possible constraints to the ultimate objective, such as change of personnel, especially in the business and political/governmental sectors, and the pace of evolution in strategic management and computerised measurement applications, could also adequately be factored in to the iterative and flexible traditional Delphi construct. The research design format initially was designed as follows:

Figure 2.1: Applied Delphi design



Developed in the 1950s by the RAND Corporation, the Delphi technique is used to obtain the most reliable consensus of opinion through a series of questionnaires with controlled feedback, intended for use in judgement or forecasting situations. The input needs to be used as efficiently as possible and feedback after each round is presented as a simple statistical summary of the group response, using mean or median. There is follow-up with panellists whose assessment falls outside of the upper or lower quartile for the reasons why they believe their selection is correct.

The literature review indicated the necessity for a forecasting framework to be adaptable to the relevant organisation's objectives and conditions while simultaneously anticipating possible market conditions. Hence, an effective framework for the measurement of competitive advantage that would facilitate the *identification* as well as the weighting of variables might better cater for market innovation. Furthermore, the significance of the wider cultural/environmental situated experience, as nations 'equalise' in line with comparative advantage, has intensified the emphasis on inherent factors in the evaluation of competitive advantage at all levels. The local micro-business competes within a domestic market

that includes competitors whose competitive advantage is based on *imported* elements as well as those tailored to cater for localised conditions. This is adequately catered for by the flexibility in the construct and application of the typical Delphi model which facilitates group decision-making by targeted participants who are actively involved in the research issue and have substantial experience and thus understanding in the area.

Limitation in time and location could then be seen as an enhancement to the validity of the research in providing a contemporary evaluation of applied theory and facilitating assessment of the significance of environmental influence on the strategic processes and their short-term consequences. That said, had finances permitted, a similar study running concurrently – based on another nation state's experience – would have strengthened the findings through providing comparisons. The first section of the Research Methodology chapter, after Rounds 1 and 2, will thus conclude with a critical evaluation of the findings from the primary and secondary research as to the practical and desirable requirements of a framework for the measurement of competitive advantage. The application of Round 3 is then specifically tailored to enquiries arising from this analysis; it will assess findings in practice. The chapter then concludes with an assessment of all findings and their implications for this study's objectives.

This chapter is thus divided into the separate actions identified in Figure 2.1.

2.4 Development of the research question

The research question evolved as a result of the combined findings of the literature review and the primary Delphi research. Initially, the motivation for the research resulted in a broader question, which defined multinational corporation (MNC) activity and separated research and development (R&D) from manufacturing business activity. As the inductive qualitative literature review progressed and the global business environment continued to be redefined, the viability of distinguishing between Irish-based MNCs' outsourcing activities abroad and MNCs originating abroad and operating in Ireland arose as an issue in categorising the Delphi respondents and examining the literature. Similarly, the increased focus on innovation, projectised activity and knowledge-based organisational cultures in strategic management techniques has blurred historical divisions between R&D and

other business activity. Innovation and development of routine business activities and processes are increasingly sought in the quest for competitive advantage. Thus the research question was refined as:

What framework structure is most appropriate for use by an Irish pharmaceutical enterprise to drive and sustain its competitive advantage?

There are two unique features to this research:

- While there has been a pharma presence in Ireland since 1968, there still seems to be a question about the sustainability of the industry which has enjoyed continued government support for almost 50 years. No globally recognised cluster exists in the country nor is there a recognised 'Irish pharmaceutical' brand.
- Three varied research methodologies were utilised to design a practical strategic framework specifically for an Irish application, taking account of national and organizational dynamics in its development.

Although it would have been preferable to have the research question defined before the primary research began, it was necessary to clarify the findings from the literature review in context in line with the inductive, exploratory nature of the study. After the clarification of significance that was situated in locale and time, the research question was amended to reflect the contemporary business environment.

2.5 Research design

From the outset, the study was influenced by a paper by Politis, Litos, Grigoroudis and Moustakis (2009), their objective being to create a business excellence model that was industry- and location-specific: top end Greek Hotels. Initially, this research similarly conducted two rounds of objectively targeted surveys to identify the criteria and, after a critical evaluation of the findings and process involved, to conduct a follow-up survey to test the definitive criteria. While the original construct for identifying variables and weighting the same was deemed suitable here, the researcher's observance of the immediate and intensive impact of financial and business market factors on Irish pharmaceutical activity initially indicated that a

framework for Irish pharmaceutical *sustainability* would necessitate inclusion of changing environmental factors in order to be effective. Furthermore, findings of the literature review on the validity of self-evaluation models – most notably the Lam and Kolic (2008) study noting the effects of semantic incompatibility on rating responses – exposed weaknesses in the Greek Hotel benchmark model. Thus, the design of an appropriate framework that might prove effective in practical application for emerging and future eventualities emerged as a result of the initial Delphi primary research and the literature review. The findings from both are used to direct the design of an appropriate framework for practical application, reported in Chapter Six.

2.6 Research sample

In response to the pace of transformation and the increasing importance of 'externalities', as noted previously, a representative range of 'experts' was sought in order to encompass expertise from industry, businesses (ranging in size, style and objective), political and economic policy and the academic and theoretical fields. It was initially noted that the changing face of business facilitated a single expert to qualify in more than one area of expertise.

While international and national experience was deemed necessary in the holistic analysis, the extent of global market integration did not influence individual expertise qualification. Therefore, international experience/knowledge and influence was noted but the study was not analysed or conducted specifically to depict factors exclusive to MNCs or domestic entrepreneurs. Large organisations evaluate intrapreneurial features and entrepreneurs may outsource without national boundary constraints.

- A spreadsheet was generated to help categorise potential experts. The experts were divided into four categories: Government, Practitioners, Regulators and Academics. Such a broad field facilitated a range of expertise to reflect the influence of strategic planning decisions made on the performance of the pharmaceutical industry in Ireland. A variance of management roles was sought to accommodate variance in priorities and short-term objectives. Thus, 10-18 people encompassing the diversity of organisations, businesses

and roles therein were selected. The inclusion of academics who had worked with the industry and/or had published on issues concerning the research were included, providing an impetus from academic/theoretical research.

- Given the limitations on time and lack of administration support, selection of candidates was restricted to high-level management. This was justified as strategic management decisions that are predictive are designed and evaluated at the higher levels of management. An examination of varying levels of management and their interpretation of strategic management policies and procedures would be better suited to a case study. Responses from this group would be critically evaluated for predispositions and measured against statistics and 'outside' opinion.
- Basic professional biographical information for each potential participant was researched in order to ensure qualification as 'experts' for the study and facilitate selecting a cross-sectional representative group. The criteria for selection was:

  a) Minimum of 10 years' expertise

  b) Academics require a PhD

  c) Senior decision-maker with international experience

  d) Respected contributor to the enhancement of competitive advantage in relation to the research topic

  e) Number of publications/conferences

- In July 2008, telephone contact was made with each panellist. The purpose of the study, its time constraint and the commitment required from each participant was explained. It was anticipated that, for the initial Delphi, panellists would be asked to commit to completing 3 x 15 minute questionnaires and return them within 5 working days of receipt.
- All of the experts approached agreed to participate in the research study. The main proviso was 'as long as it does not take too much time'.

Table 1.1: List of the panellists

Panellist	***Description***
A	Managing Director of a Training Consultancy
B	Director of a Quality Training Organisation
C	Manufacturing Director at US Finished Product MNC (East)
D	President of a Third-Level Institution
E	Government expert on Competitive Advantage
F	Chief Economist in Financial Institution
G	Senior Inspector with a Pharmaceutical Regulatory Authority
H	Manufacturing Director at US Finished Product MNC (East)
I	General Manager of US Finished Product MNC (North-West)
J	General Manager of US API Facility (East)
K	Lean Expert in Pharmaceutical Manufacturer (South-East)
L	Director with Employers Federation
M	Pharmaceutical Manager with Industrial Development Authority
N	R&D Manager of Finished Product Manufacturer (South)
O	Regulatory Affairs Consultant (South-East)
P	General Manager of a Generic Manufacturer (South-East)
Q	President of a Third-Level Institution
R	Function Head of Government Agency for Partnership & Performance
S	Managing Director of a Regulatory Consultancy Company
T	Technical Director at Research & Manufacturing Facility (South-East)

2.7 Round 1 Survey and Analysis

The objective was to establish the factors that the participants viewed as being important to competitive advantage in the past and those they considered relevant for the future.

For the first questionnaire (see Appendix A), the questions were left open and simple language was used to avoid ambiguity. Each panellist was asked to list six factors that they considered to have been influential on 'Competitive Advantage within the Irish Pharmaceutical Industry', using their experience to date. The panellists were then similarly asked to list six factors they felt would aid competitive advantage of the Irish pharmaceutical industry if implemented within the next 5-10 years. The questionnaire was validated by academic research specialists and emailed along with an introductory letter to each panellist in July 2008 (Appendix B).

The summarised results are provided in Appendix C.

Such open questioning allowed the extensive range of diverse experiences to be fully exploited as participants were unrestricted. Using the first round of questions to identify factors to be addressed in the later rounds is in keeping with the inductive Delphi method (Rowe 1994). The qualitative analysis in this case involved grouping responses that were interpreted to imply similar factors.

For Question 1, identifying factors seen to be relevant to the Irish pharmaceutical industry in the past 12 years, the following factors were dominant in the responses:

- Ireland as an English-speaking nation
- Ireland's favourable tax rate
- Availability of a well-educated workforce
- Workforce adaptable to change
- Role of the IDA in attracting business to Ireland

For Q2, the factors the respondents considered to be of importance in achieving competitive advantage in the future were:

- The nature and supply of an educated workforce – particularly with industry-based skills, and specifically technological, engineering and science

- R&D focus, stronger university-led R&D, government incentives and a focus on R&D to fuel innovative activity in product design, manufacture and business processes
- Pharmaceutical strategic management responsiveness to changing market, awareness and proactive management of market threats, adaptability and responsiveness, adoption of best practice for performance benchmarks from within and outside the industry, creative adoption of new technologies and encouragement of an entrepreneurial spirit
- A lowering of the regulatory burden and enhanced collaboration between the industry and regulators, improved transport and communication infrastructure, cost-effective renewable energy supplies, and maintaining a compliant culture that also denotes efficiency
- Extension of industry activities, particularly in integrating upstream activities, such as clinical and fundamental chemical research, into existing manufacturing operations; migration into value-added activities such as product, process and service development; developing expertise in support/specialist consultancy such as sterile manufacturing and freeze drying

2.8 Round 2 Survey-rated criteria

The Round 2 Questionnaire

After a qualitative analysis of the findings from Round 1, it was evident there was a need to reduce the number of variables to a viable number in order to avoid gaps in the raw data. To this end, a common theme or denominator with regard to the meaning of a group of factors was used to collate raw data. Since the raw data was open-ended, the existence of ambiguity and possible repetition through misinterpretation of the subject matter by the respondents and between the groups was evident. Socially constructed concepts such as ‘growth’ are subject to assumptions, myths and interpretation that are evidenced between and within groups (Gibb 2000, Henrekson & Johansson 2008).

It was also evident that, to a large extent, the future requirements stated in Round 2 (Appendix E) relied heavily on past experience and thus many of the responses reflected a need to enhance factors they had evidenced as being influential in the past. However, since the objective of this section of the research was to expose such behaviour and interpretation, further exploration of such factors was deferred to the analysis of both Rounds 1 and 2. The grouping of the broad scope of responses in order to arrive at a manageable and constructive number of questions in Round 2 thus involved the amalgamation of related elements into factors, as is explained below.

The questionnaire (Appendix D) was comprised of two sections:

SECTION 1: The historical data was grouped into a combined list of 31 statements derived from the factors and elements gathered during the Round 1 questionnaire. Each panellist was asked to validate the historical data (31 statements) and also to rate each statement for future applicability, using a 1-5 rating system.

SECTION 2: The future data was structured into nine key themes – affinities called 'factors'. Given the responses from Question 2 in Round 1, each factor collated 3-5 associated elements. Panellists were asked to validate the nine factors and rate each key factor and associated elements for significance, using a 1-5 rating system. To further explore these factors it was suggested that they identify any 'additional' elements that were not listed and that they held to be of importance, in the assigned rating for each factor. It was hoped this leading suggestion might extrapolate further expert opinion and illuminate the respondents' interpretation of the factors listed.

The author recognised that the success of this round of the study was pivotal in gaining a greater understanding of CA. It was anticipated that a greater time commitment would be required from each panellist in order to elicit valuable insights. The retention of panellists was also uppermost in the author's mind – a significant problem with Delphi surveys, but the problem was alleviated by the timing of the questionnaires, a period of national economic downturn while the global business cycle went into regression. The Round 2 questionnaire was emailed to panellists in October 2008.

A summary of the Round 2 findings is presented in Figure 2.2**,** which depicts the historical contribution, the future contribution and the shift in importance of these

elements. An overview of the raw data is presented in Appendices E and F.

In Round 2, 42 elements were identified by the expert group as having a contribution to competitive advantage. An identification number was assigned to each of these elements (1-42) and is represented on the vertical axis.

For example:

***Element Identification Number**: 33*

***Element:** An enhanced physical & IT infrastructure & 'first world' public services, efficient, cost-effective transport and communication infrastructure.*

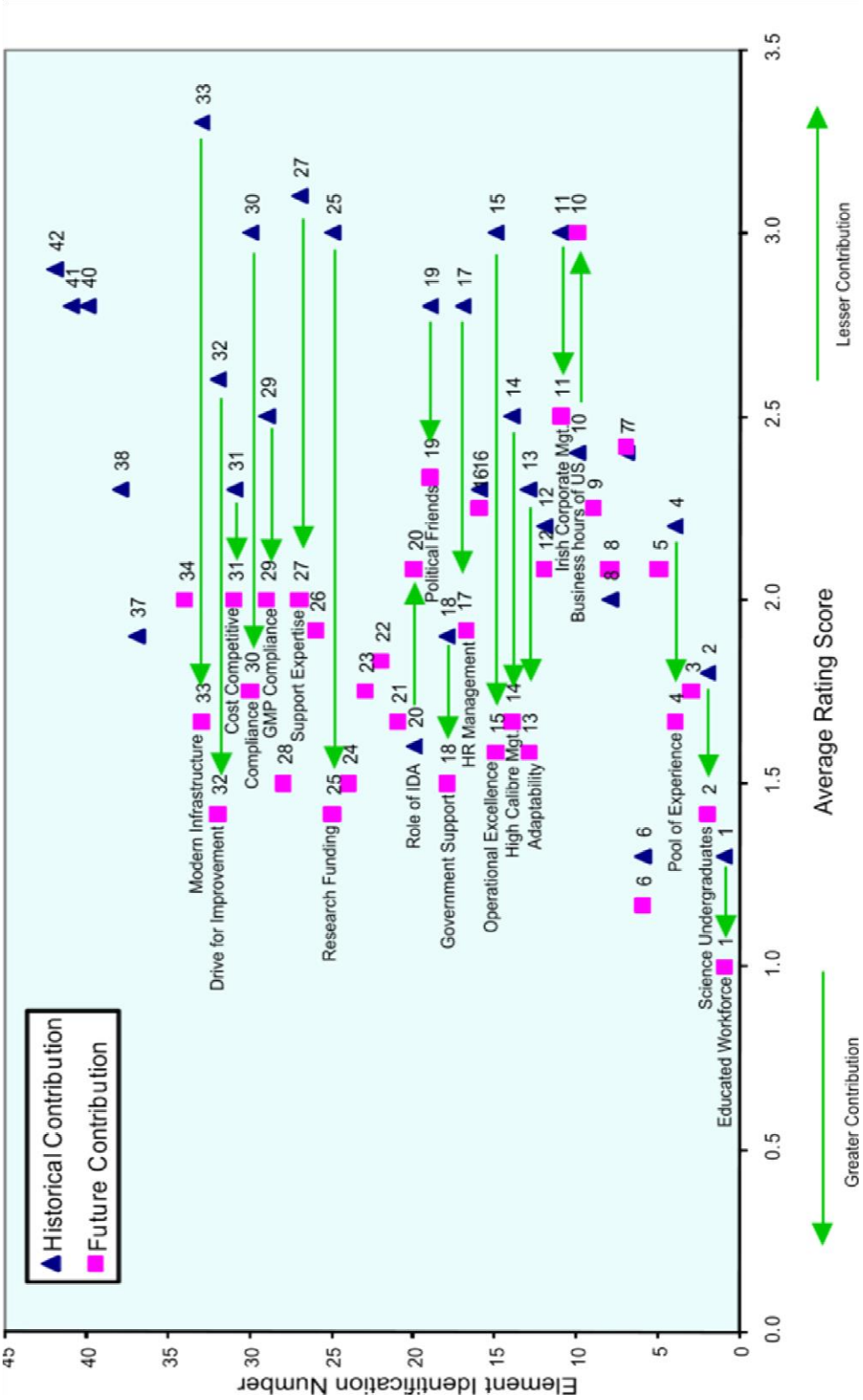
***Average Historical Rating:** 3.3 – Significant*

***Average Future Rating:** 1.7 – High Significance*

The shift from right to left on the graph indicates that this element has now become more significant. The greater the shift, the greater the significance.

Based on the individual ratings (1 to 5) by the expert panellists, an average score was calculated for each element, represented on the horizontal axis. This is shown in Figure 2.2.

Figure 2.2: Historical Contribution and Future Contribution to Competitive Advantage



2.9 Round 2 Survey analysis

As already mentioned, the survey exposed an overriding tendency for the respondents to rely on past experience in evaluating factors of significance in the future. There also appeared on first evaluation to be a predisposition to cite factors pertaining to supply-side issues.

The following factors were evidenced as being of significant importance to the competitive advantage of the pharmaceutical industry in the past and into the future.

The numeral in brackets indicates the element number on the graph.

Workforce

A well-educated workforce (1)

The adaptability of Irish workforce to change (13)

The availability of science undergraduates and postgraduates (2)

Maintaining good industrial relations. Focus on Human Resource Management within industry to make pharmaceuticals 'the Industry of Choice' (17)

High-calibre Irish management in the pharmaceutical industry (14)

Irish-based organisations having sufficient influence to guide corporate decisions (9)

Corporation Tax Rate

A low rate of Corporation Tax (6)

Drive for Improvement

The ability to manufacture at low cost (31)

A programme to drive continuous improvement (32)

To benchmark and adopt best practice, such as Lean manufacturing, Six Sigma and Supply Chain Management (15)

Encouragement of entrepreneurial spirit (9)

Governmental Support

Continued support from the Irish government for the pharmaceutical industry (18)

Good Regulatory Record

Good Manufacturing Practice (GMP) Regulatory Compliance (29)

Non-GMP Regulatory Compliance (30)

The following factors were less important to the competitive advantage of the pharmaceutical industry in the past and considered to be more important to competitive advantage in the future.

Infrastructure

An enhanced physical and IT infrastructure and 'first world' public services; efficient, cost-effective transport and communication infrastructure (33)

Research and Development (R&D)

Focus on R&D to fuel innovation and improvement in products, processes and manufacturing, enabling cost reductions (25)

The following factors were not listed on the Round 1 historical factor but are new entrants from the Round 2 questionnaire. They are deemed very important to sustaining the competitive advantage of the pharmaceutical industry into the future.

Funding Incentives for R&D

An ability to integrate upstream activities such as clinical trials and fundamental chemical research into existing manufacturing operations (21)

Establishment of further Process Development Facilities in Ireland (22)

Irish sites becoming centres of excellence for launch of new products to market (23)

Tax incentives for R&D (24)

Development of Irish-owned research-based organisation able to compete on the world stage (26)

Universities with strong R&D capabilities with which to form partnerships with industry (5)

Promotion of Related Academic Subjects

Promotion of Science & Engineering (3)

Greater Collaboration between the Pharmaceutical Regulators and Industry

Greater collaboration between pharmaceutical regulators and the pharmaceutical industry (28)

Inherent Demographics

Ireland an English-speaking nation (8)

Strong link between USA and Europe, within business hours of USA and Europe (7)

The following factor was very important to competitive advantage in the past but considered to be of less import to competitive advantage into the future.

Enhancement of the role of the IDA and other such organisations (20)

2.10 Critical analysis of the Delphi findings

Innovation and productivity are supported by a highly educated workforce. Ireland has benefited from strategic government education policies since the 1970s and has historically been seen to produce students with qualifications that matched industry demand, specifically in electronics, pharmaceuticals and more recently the computer software industry. The emphasis in Round 2 on enhanced cooperation between academia and industries in the construct and skills encompassed by syllabi is an issue that has been similarly identified in the UK and the US. In itself, this reflects the extent of Irish development in exhibiting competitive advantage structures to compete alongside 'first world' nations.

The emergence of a knowledge-based market has emphasised the necessity for continuous training and development noted in the referral to HR in element (17) and with the emphasis on innovative and proactive management skills (14 and 15). The focus on education in the study reflects the shift from an industrial compliant and productive workforce to a knowledge-based, creative and entrepreneurial base, mimicking the traditional boundaries between industries and public and private strategy. Voss (1992) identified the benefits that quality management frameworks and awards might gain from academic input being meshed with practitioners'

experience. This illuminates an opportunity for cohesive strategic management, between business and public strategists, to stimulate the development of a culture exhibiting elements of competitive advantage in the new era. Structures of management, business and industry have evolved; hence education necessitates being radically reconstructed to reflect the increasing need for problem-solving ability, creativity, team work, adaptability and management of risk in today's labour market.

The belief that low corporation tax continues to be necessary for future competitive advantage as an outright benefit to the Irish pharmaceutical industry conflicts with the reasons such tax was beneficial in the past. Ireland's lower level of domestic industrial development meant FDI could be offered with little resistance and the spill-over benefits would encourage domestic industry. However, given the pace of Ireland's development in the recent past, the spill-over effects and indigenous entrepreneurial development were not achieved, complying with Keller's diffusion hypothesis due to the time scale, and recorded by Ireland's significant reliance on MNC exports in the variance between GNP and GDP (discussed in the literature section). The pursuance of this policy necessitates further exploration. A similar export-driven drive in the 1980s was seen to be detrimental to Irish indigenous development. Furthermore, Ireland cannot continue to heavily rely on the availability of low-cost supply-side factors (tax incentives, workforce, utilities) not only due to the 'boom' inspiring a rise in the cost of living, but to the global environment in which emerging nations offer sustainably lower supply-side costs (OECD 2009a). Ireland is now competing with developed European states and the newly emerging eastern European nations, South America, Asia and the rest of the world for FDI that is rapidly transferable. While there was panel unanimity in identifying low corporate tax as a continuing element of competitive advantage, the other factors identified – such as encouragement of entrepreneurial spirit (9), the development of an Irish-owned research organisation (26) and the integration of upstream activities (21) appear to conflict in practice with economic policies underpinning such a tax incentive.

The identification of a national record for regulatory compliance (30) clearly illustrates that the respondents were aware of the relational dynamics between 'external and 'internal' strategists. This was reinforced by the identification of

greater cooperation between industry and regulators (28) as an element of competitive advantage not noted historically but required for the future.

The findings of the two rounds clearly depict the tendency of respondents to see as predictive those factors considered in the past to be influential on competitive advantage. This feature, when further explored, further indicates a shift in responsibility, in a belief that the responsibility for competitiveness and sustainability lies elsewhere. The factors held responsible in the past are more likely to be supply-side factors that are external to the firm, environmental features arising from directly targeted politico-economic policies, such as tax rates (6) and government support and promotion of the pharmaceutical industry (9 and 18), to the consequences of broader policies in the compliance and high level of education of the workforce, particularly science graduates (1 and 2), encouragement of an entrepreneurial spirit (9), and a high calibre of Irish pharmaceutical management (14). The influence of directly targeted government policy is reduced in occurrence and weighting in the future, most notably with the IDA being identified as waning in significance. This fits in with the theory of transformational development and the need for Ireland to 'catch up' in the past, as discussed in the literature review. And, as Rodick (2009) pointed out, broad policies not specifically focused on a particular sector that directly enhance and culturally embed desirable features are evidenced in the future. The evidence for this is very clear, with the influence of a 'highly educated and adaptable workforce' in the past and future (elements 15, 13, 9 and 2), to be supplemented by elements identified as being significant in the future, such as R&D to fuel innovation (25), 'first world' public services (33), university and industry R&D partnerships (50), the promotion of science and engineering (3) and greater collaboration between industry and regulators (28).

The elements noted as continuing to be relevant to future competitive advantage and those cited as new additions comply with a holistic perspective (internal and external to the firm) on vertical integration, being *directed* facilitating incremental, radical, product, technical, process and administrative innovation (Damanpour 1991). The citing of cooperation and integration between industry and policymakers and emphasis on directed R&D (21-24, 26 and 5) complies with Amit's (2000) theory that management focuses on the environmental context in which a firm would seek to exploit competitive advantage. The introduction of entrepreneurial orientation in

the organisation in the form of intrapreneurial activities requires competitive advantage to be achieved in process, product, and market innovations. Strategic thinking is applied to facilitate the creative concept of an entrepreneur developing into a reality (Mintzberg 1994).

It could thus be surmised that the researcher demonstrated an understanding of the necessity of and theories on the appropriate styles of strategic management and elements vital for competitive advantage that emerged from the literature review. Further, the extent of recent historic development has led to a shift in focus on the necessary elements for competitive advantage in the future. A 2010 OECD report showed that, as well as competitive advantage, comparative advantage determinants continue to be of relevance to contemporary international trade, particularly emphasising the importance of secondary and tertiary education elements that were found to be significant in this research for competitive advantage. However, it should be noted that, as global competition has increased, it is particular attributes and efficiencies in the details of education that should dominate Ireland's strategic development, as this study indicates.

2.11 Round 3 rationale

The Delphi study suggested the need to improve the identification and clarification of elements concerned with strategic management directed for *sustainable* competitive advantage. The results also exposed an 'insular' bias in a delay of organisational response to changes in the culture of the organisation and wider immediate environment. Issues that might be traditionally associated with risk management are compatible with processes of strategic management when operating within environments of intense change and when assessing conditions that *may* occur in the future. Evidence from the responses suggests that there is a lack of consideration of the dynamic effect that beneficial factors in the present or past might stimulate through time. For instance, the quest for 'first world' services, infrastructure, academic institutions and bureaucracy to improve competitive advantage might very well affect the cost of labour and taxation and diversify social expectations and legislative/statutory requirements to reflect a higher standard of living.

As Porter (1980) notes, "The essence of formulating competitive strategy is relating

a company to its environment."

The role of quality data collection and analysis as the basis for managerial decisions is paramount. There is no genetic code that directs organisational development, but organisations can direct, anticipate and influence their dynamic existence within and as an influence on the wider environment (Levie & Lichtenstein 2010). Furthermore, quality efforts should not simply concentrate on the elimination of defects but also encompass creative activities that will influence customer satisfaction. Self-assessment and benchmarking tools, like the Malcolm Baldrige National Quality Award, have proved useful in improving performance and quality practices. However, the factors referred to belonging to the 'fifth quality era' (Kaye & Dyason 1995b), in the need for entire organisations to apply continuous vertical and *horizontal* improvement, integrate external stimuli and focus on customer needs, are paramount in any effective forecasting tool. Frameworks that evaluate an organisation's progress against historic goals and attributes are not sufficient to direct *sustainable* competitive advantage. Self-regulation for stability and sustainability has recently seen an increase in the emphasis on the application and portrayal of ethical practices (Smith & Langford 2009) while , concurrently, consumers are demanding simplicity, business transparency , extensive information on business practices and economic value in light of the recession (Flatters & Willmott 2009).

Lean accounting and management tools designed to increase efficiency (Maskell & Baggaley 2007) appear to be more popular among pharmaceutical companies than Six Sigma or Supply Chain Management. The author suspects that this trend in Ireland may be due to the fairly closed circle of consultants who have been engaged by pharmaceutical companies. Such methodologies compartmentalise processes, comply with traditional vertical 'one-way' management structures and do not in themselves inspire innovation. Taiichi Ohno (1988) aptly describes the practice of Lean management as:

> *All we are doing is looking at the timeline … from the moment the customer gives us an order to the point when we collect the cash. We are reducing that timeline by removing the non-value added wastes.*

Six Sigma is a continuous assessment management system which focuses on customers, time efficiency and quality in the reduction of defective products or services (George 2005). The associated mantra, Define, Measure, Analyse, Improve and Control (DMAIC), implies it is reliant on how it is defined, managed, communicated and applied by strategic management (McAdam, Rodney & Donegan 2003).

The objective of this study is to suggest a format for a quantifiable framework that will *drive sustainable competitive advantage;* it would thus necessarily incorporate innovativeness in the continuous process. Bettis and Hitt (1995) describe the competitive business environment in the 21st century as exhibiting four powerful forces: contradiction, chaos, complexity and change. Business survival relies on how well the business deals with increased risk, market unpredictability and dissolution of industry boundaries, necessitating innovative management and structural formats. A 'one-off' activity conducted as a snapshot of time, or a framework that solely measures historic progress to date, however efficient, would not necessarily incorporate the need for creativity and foresight that are critical when planning for the unknown. Voss (1992) described benchmarking as:

> *A continuous, systematic process for evaluating the products, services and work processes for organizations that are recognized as representing best practices for the purpose of organizational improvement.*

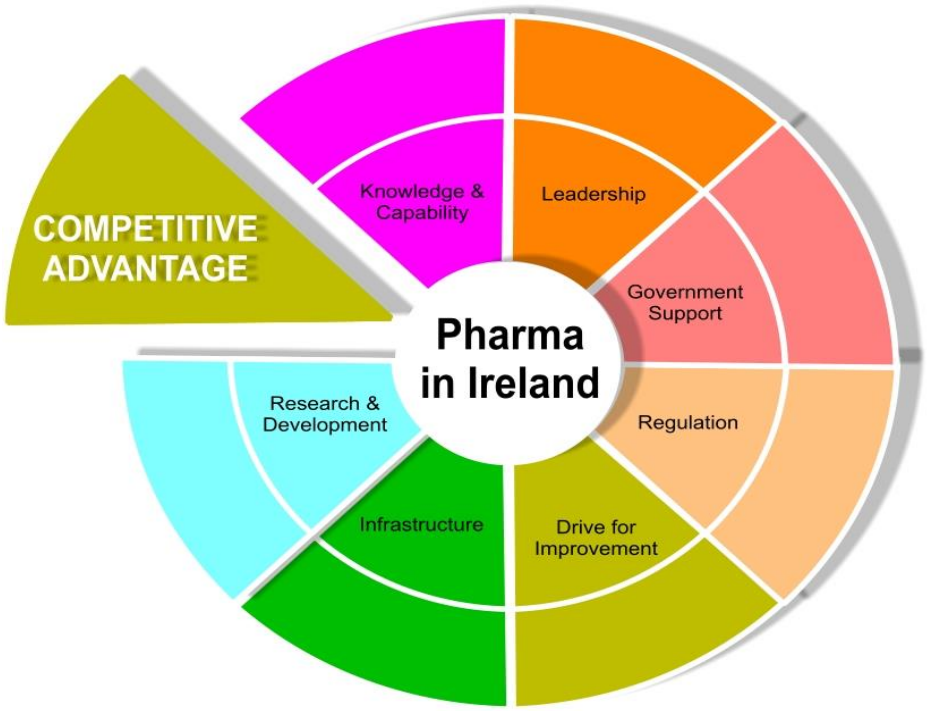
Benchmarking for *sustainability* additionally would enhance the strategic management process by identifying the steps needed to modify, improve and introduce practice in order to meet the requirements of a better-performing organisation. The design of the Round 3 framework and its application through time will facilitate an analysis of where and when innovative progressive stimuli are needed, as well as illuminating good practice.

2.12 Design construct Round 3

To assess Irish pharmaceutical strategic management processes through time and critically evaluate the same in line with market, environmental and organisational stimuli, *a self-assessment framework* was designed, to be completed by pharmaceutical managers based in Ireland over a period of two years. The

framework for competitive advantage comprises seven broad criteria in no particular order, shown in Figure 2.3 and outlined below.

Figure 2.3: Competitive Advantage – elements for strategy directed at sustainability



The framework interpretation was provided to facilitate coordinated interpretation and operate as a clarification when necessary. The initial format of the framework was that of a spreadsheet, comprising a description or interpretation of the criteria. The detail in the spreadsheet continued with a list of statements which related to various aspects of the individual criterion, designed to probe and encourage critical evaluation. Each criterion was broken down into sub-criteria (as shown in Table 2.2) and the respondents were required to rate each in a given column, with the options of 'not applicable' (N/A) and 'non-existent' as alternatives.

Leadership

Preparation for future eventualities is sourced and directed by leaders. The importance of styles of leadership in the formulation and implementation was

extensively explored in the literature review, from Miles and Snow's (1978) Competitive Orientation typologies to the importance of structures for construct and efficient omission of strategies (Simmons 1987, Raymond, Julian & Ramangalahy 2001). Importantly, it was found that Irish enterprises favoured formal strategic planning based on Porter's five influences (Gibbons & O'Connor 2005). However, the basis of the analysis of these influences, particularly on lag accounting, and their ambiguity in transmission of strategies are both paramount to their appropriateness and hence effectiveness (Levie & Lichtenstein 2010, Bourne *et al*. 2000, Kaplan & Norton 1992, Banks & Wheelwright 1979, Hayes & Garvin 1982, Druker, 1993).

The primary research, in evaluating important factors of competitive advantage in context, showed a considerable shift from the dominance of externalities in the past to the importance of proactive strategic direction in the future:

(20) The role of the IDA Ireland

(15) To benchmark and adopt best practice, such as Lean manufacturing, Six Sigma and Supply Chain Management

(25) Focus on R&D to fuel innovation and improvement in products, processes and manufacturing, enabling cost reductions

(9) Encouragement of entrepreneurial spirit

Knowledge and Capability

Knowledge and capability are difficult attributes to quantify, encompassing learning, awareness, skills, attitudes and approaches. Mintzberg identified the emergence of strategies as a process of adaptive learning, ideally encompassed in a proactive flexible construct, stimulating learning as a continuum (Mintzberg 1974, 1978, 1991 and 1994). The tendency to proactively seek new and enhancing practices is referred to as an exploratory strategic stance by March (1991). The concept of a learning organisation (Senge 1990) is adopted in numerous constructs and cultures aimed at complying with competitive advantage sustainability in the current era (Atkinson, Waterhouse & Wells 1997, Ittner & Larcker 1998). Furthermore, the popularity of performance measurement systems specifically designed to facilitate such behaviour and include intangible, non-financially recordable assets, enforces the argument for its inclusion here (Fitzgerald *et al*. 1991, Chenhall 2005, Kaplan & Norton 1992, 1996, Simons 1999, 2000).

The primary research identified the value of these for competitive advantage in the past, and increasingly in the future:

(1) A well-educated workforce, (13) the adaptability of Irish workforce to change

(2) The availability of science undergraduates and postgraduates

(21) An ability to integrate upstream activities such as clinical trials and fundamental chemical research into existing manufacturing operations

(22) Establishment of further process development facilities in Ireland

(23) Irish sites becoming centres of excellence for launch of new products to market

(26) The development of Irish-owned research-based organisation able to compete on the world stage

(5) Universities with strong R&D capabilities forming partnerships with industry

(3) Promotion of Science and Engineering

Drive for Improvement

This is intrinsically linked with leadership, and involves progressive evaluation techniques, benchmarking, diversification, training, learning and a culture of innovation. Fundamentally, it is involved with the formulation and direction of strategies designed for competitive advantage sustainability rather than relying on internal cultures to adopt in an organic manner. As Levie and Lichtenstein (2010) pointed out, an organisation is not genetic and hence does not inherently adopt behaviours for survival. The emphasis on objective direction of the intangible as well as the traditional cost-effective focus has increasingly been adopted by frameworks for measuring the effectiveness of strategies that promote change rather than reacting to it (Wong-on-Wing *et al*. 2007, p.364), Kaplan & Norton 2001). The primary research notes the importance of such a structured approach in the external as well as internal environment.

(29) Good Manufacturing Practice (GMP) Regulatory Compliance

(30) Non-GMP Regulatory Compliance

(32) A programme to drive continuous improvement

(15) To benchmark and adopt best practice, such as Lean manufacturing, Six Sigma and Supply Chain Management

(9) Encouragement of entrepreneurial spirit

Government Support

In a context of global, political and economic cohesion, characterised by an increasing ease of relocation and intense competition between nations for FDI, the importance of supportive strategic planning at a government level is as vital as ever. In the recent past Ireland exploited inherent factors (location, language, US association) and the benefits of EU market and monetary integration to attain competitive advantage. However, in a transformational period of intense national competition and as a result of the consequences of national economic growth, such advantages have proved unsustainable (Bettis & Hitt 1995, Porter 1980). Baker's diagram of a firm's interaction with its environment and inter-reliance on the same clearly depicts situational and community influence (Baker 2010). The importance of national competitive strategies that provide economic stability, political accountability, infrastructural amenities and work with industry to provide for changing needs (educational, living standards, industrial relations, ethical issues, etc) is evidenced in the importance of such factors in the selection of locations for investment.

The Delphi study indicates a reduction in importance of direct financial benefits and an increase in cooperative and communal policies. National and firm strategies increasingly require a coordinated approach of inter-reliance in the quest for competitive advantage.

(9) Irish-based organisations having sufficient influence to guide corporate decisions

(22) Establishment of further process development facilities in Ireland

(23) Irish sites becoming centres of excellence for launch of new products to market

(24) Tax incentives for R&D

(26) The development of Irish-owned research-based organisation able to compete on the world stage

(5) Universities with strong R&D capabilities forming partnerships with industry

(30) Non-GMP Regulatory Compliance and the reduction of IDA importance in its previous format

(20) Enhancement of the role of the IDA and other such organisations

Research and Development

The impetus of research and development in the pharmaceutical industry has always been high; however, it is essential to extend this culture out of the laboratory and encompass diversification and differing ways of doing business. Objective research alliances to eradicate duplication, enhance cost-effectiveness, enhance supply-chain allegiance and benefit from broader bases of knowledge and capability, specifically within the pharmaceutical industry, have been promoted as conducive to sustainable advantage in aiding a firm's preparation for unforeseeable market shocks (Katz & Ordover 1990, Petit & Tolwinski 1999). Noticeably, the primary research identified the need for R&D increasing in the area of government, regulatory and academic cooperation as well as to enhance intra-industry integration and spill-over effects from the establishment of tangible and intangible assets.

(33) An enhanced physical and IT infrastructure and 'first world' public services; efficient, cost-effective transport and communication infrastructure

(25) Focus on R&D to fuel innovation and improvement in products, processes and manufacturing, enabling cost reductions

(21) An ability to integrate upstream activities such as clinical trials and fundamental chemical research into existing manufacturing operations

(22) Establishment of further process development facilities in Ireland

(23) Irish sites becoming centres of excellence for launch of new products to market

(24) Tax incentives for R&D

(26) The development of Irish-owned research-based organisation able to compete on the world stage

(5) Universities with strong R&D capabilities forming partnerships with industry

(3) Promotion of Science and Engineering

(28) Greater collaboration between pharmaceutical regulators and the pharmaceutical industry

Infrastructure

Given Ireland's starting position, there was an emphasis in the past on developing amenities and facilities necessary for business generally, transport network, IT, etc. However, as Ireland has developed, its infrastructure has become comparable to that of developed states. Infrastructure encompasses facilities, procedures and processes that a business and its employees are reliant on. Integration of sustainable industry in a locale is intrinsically connected with the ability of the firm to influence externalities and collaborate with strategists in the wider environment (academic, policy, regulatory, etc). Irish governmental support has provided amenities targeted at the pharmaceutical industry's needs in the past (e.g. the establishment of industrial parks with specific provisions for water and waste disposal). However, the primary research clearly points to a more proactive approach from industry *in situ*.

(26) The development of Irish-owned research-based organisation able to compete on the world stage

(5) Universities with strong R&D capabilities forming partnerships with industry

(3) Promotion of Science and Engineering

(28) Greater collaboration of between pharmaceutical regulators and the pharmaceutical industry

(22) Establishment of further process development facilities in Ireland

(23) Irish sites becoming centres of excellence for launch of new products to market

2.13 Development of the on-line survey

The researcher sourced participants for the online survey through the professional networking website LinkedIn (www.LinkedIn.com). The author was keen that the framework would not develop into 'another' questionnaire, with participants simply ticking boxes. The idea was for pharma managers to think critically about the performance of their organisation under each criterion. The author did not believe that approaching individual companies with a pilot assessment tool would be a

valuable activity. With cold-calling, commitment by a chosen company to use the tool in a strategic way could not be guaranteed.

The author joined the LinkedIn website and developed a number of connections from her prior experience of working in the pharmaceutical industry for 13 years. The draft framework (Appendix F) was validated by members of the Delphi panel in June 2010. Their feedback and comments were used to refine the final framework.

An 'expression of interest' email was sent to 14 connections/contacts through LinkedIn in June 2010. This email included details on the origin of the research and the subsequent framework, seeking to determine their interest in participating, in using the framework, while assurance was given that all information provided would be treated with confidentiality (see Appendix G).

A formal email was sent to six middle/senior managers of pharmaceutical companies who had responded to the author's email on LinkedIn. The purpose of this email was to acknowledge their commitment to participate in the study, develop the contact and provide the link to the online survey. The original idea was that each representative would complete the survey 1-3 times over a six-month period, to assess and evaluate their progress in managing their performance and competitiveness. Each company will have similar strategies in terms of regulations and operations, but the factor that differentiates them from each other is the level of leadership commitment to develop the strategies to optimum performance.

2.13.1 Profile of participating companies and managers

- **Pharma L** was founded in 2004 and is involved in the development, registration and manufacture of high-potency solid-dose products; it currently employs 40 personnel.

- **Pharma M** – Generic pharmaceutical company (finished product) in South-East). Director of Manufacturing, Manager M has been employed with the company since its inception.

- **Pharma N** is a highly automated API manufacturing facility located in southern Ireland, employing approx. 400 people; it was established in Ireland in 1975. Manager N has been employed with the company since September 2009 as Director of Innovation.

- **Pharma O** is a US MNC based in the North-West of Ireland – Quality Director

- **Pharma P** is a biopharmaceutical manufacturing facility located in the South-East of Ireland. It was established in 2001 and employs 450 personnel. Manager P is a Manufacturing Cell Leader with the company since Jan 2010.

- **Pharma Q** – US MNC in Leinster – Continuous Improvement Director.

- **Pharma T** is an established US MNC pharmaceutical company (finished product). Located in Munster; 30 years in Ireland, employing 700 people. Manager T is part of the Technical Services department.

- **Pharma R** is an API facility based in southern Ireland. The participant is a former employee who subsequently gained employment with Pharma P, 10 months after leaving this organisation.

2.13.2 Development of the self-assessment framework

The construct of the survey is shown in Table 2.1 below and, along with the rating system, was fully explained to all the participants in a 1:1 interview prior to completion of the survey.

Table 2.1: Criteria and sub-criteria

Criteria	Interpretation	Sub-criteria
Workforce/ Leadership	What/how the site leadership manage, develop and release the knowledge and full potential of employees at an individual, team and organisational level, and plan these activities in order to support the firm's learning and development strategy. The company's efforts to develop an appropriate working environment to support its employees to develop their skills and competencies and to improve the site to achieve competitive advantage Leadership, development of management style, CEO activity.	Performance appraisal, % staff with third-level qualifications, availability of educational assistance programmes, recognition of the value of the pool of experienced staff within the pharma clusters
Government Support	What/how the site leadership engage with local and national governmental agencies (IDA, EI, others) to develop the structures and relationships with its peers for the achievement of competitive advantage	The Government has developed an economic policy to attract and retain pharmaceutical companies in Ireland. The Government provides streamlined, effective support, advice, to each business. Ease of doing business (correct business environment). Regional development, Europe. The government offers an attractive Corporation Tax regime for pharma companies in Ireland.
Regulatory Record (GMP)	How the site leadership manages performance with regulatory inspections and legislation with regard to its Sustainable Compliance Strategy.	
Drive for Improvement	How the site leadership plans, manages and improves its processes in order to support its Continuous Improvement strategy, using indicators which are indicative of the site's operating efficiency, and benchmarks the results with other pharmaceutical organisations operating in Ireland.	The business is actively involved in networking opportunities with similar pharma businesses.
Infrastructure	How) the site leadership plans and develops the resources, structures and systems necessary for transport, communication and energy in order to support its competitive advantage.	A suitable infrastructure exists to support the workings of the pharma industry in Ireland
Research and Development	How the site leadership develops and collaborates with academic institutions to participate in course development and Research & Development initiatives.	The Government is providing incentives/grants to attract Research & Development business into Ireland. Participation in the Programme for Research in Third-Level Institutions (PRTLI). Science Foundation of Ireland and other associated bodies. Patent Protection; Intellectual Property and how it applies or

		contributes to CA. A national skills facility exists to support the generation of valuable intellectual property, e.g. NIBERT.
Government Support	How the site leadership engages with local and national governmental agencies (IDA, EI, others) to develop the structures and relationships with its peers for the achievement of competitive advantage.	The Government has developed an economic policy to attract and retain pharmaceutical companies in Ireland. The Government provides streamlined, effective support, advice, to each business. Ease of doing business (correct business environment). Regional development, Europe. The Government offers an attractive Corporation Tax regime for pharma companies in Ireland.

The scoring system is listed in Table 2.2 below.

Table 2.2: Criteria for self-assessment framework

Not Applicable	N/A	Concept does not apply to the particular business in question due to the nature of product or service.
Non-Existent	0	Activities are considered important for this business but are non-existent or not in place. Employees are unaware of the concept in question and of its benefit.
Very Poor	1	Some of the practices identified do exist but are sporadic or do not make any contribution either locally or to the overall business performance.
Poor	2	Some practices exist in isolated pockets and have delivered benefits. These practices have not been integrated into the overall business processes and would not be considered sustainable.
Good	3	Some practices exist and have delivered significant benefits in some areas. The techniques and concepts are becoming more widespread across the business. Business performance is improving as a result.
Very Good	4	Practices are widespread and an integral part of the culture of the business. All performance metrics are improving consistently and many are exceeding their target levels. A formal process for improvement is adhered to for all improvement activities and all are aligned to the overall business strategy.
Excellence	5	Practices are excellent, with the business considered as best-practice. All performance metrics are constantly above target. A culture of improvement is fully integrated in every aspect of the business, with all employees automatically identifying and implementing improvements.

Table 2.3: On-line survey - User completion information

User	Date of Completion	Code	Status
2278877	01 August 2010	L	First attempt
2386855	15 August 2010	P	First attempt
2445141	19 August 2010	N	First attempt, no subsequent data
2882153	14 October 2010	P	Second, retrospective
3183690	06 November 2010	O	2008
3183778	06 November 2010	O	2009
3183852	06 November 2010	O	2010
3185237	07 November 2010	L	Second attempt
4130515	27 January 2011	R	Previous employer
4785746	14 March 2011	T	First attempt
5807754	09 May 2011	P_2	R move to P, different dept. in the company

2.13.3 Online survey conclusions

The findings of this study were disappointing in the participating companies' take-up, yet the extreme environmental conditions – including Ireland's debt crisis and the Western banking crisis, which triggered extreme shifts in global business – necessarily affected the results. It could be argued that the extremities of the crisis could not have been foreseen. However, the study illuminated several factors.

The strict adherence to quality performance criteria and respondents relying on this to provide sustainability demonstrated weaknesses also identified from the results of previous studies by Samson and Terziovski (1999), where their hypothesis was that the soft elements of TQM (leadership, continuous improvement, planning) were an accurate predictor of company performance. During the study, the realignment of the pharmaceutical industry in responding to external shocks involved mergers and acquisitions, resorting to competitive criteria resembling that of economies of scale. Furthermore, the increased need for cost efficiency together with the mobility of investment saw rapid transference of investment to locations that provided cheaper supply-side factors.

McAdam *et al.* (2008) suggested that organisational sustainability and success depends in part on the measurement and benchmarking of predictive upstream dimensions, indicators and measures within organisations. 'Upstream' refers to the

development of organisational areas that are at the conception stage of an organisation, activities such as new product development, employee development or technology development, in contrast to more 'downstream' or output-oriented activities such as manufacturing or service delivery. This view is supported by Kaplan and Norton (2001) and Hayes *et al.* (2005). Zairi and Anmed (1999) refer to this re-conceptualisation of performance measurement and benchmarking as "building a knowledge capability" and having "futuristic potential" rather than solely tackling current problems. The application of such theory in the Irish case proved to be insufficient to promote sustainability.

Mergers and acquisitions were motivated as a method for sustainability by those firms that had accumulated wealth from patented drugs, whose patent was running out, such expenditure in acquiring the benefits of competitors' R&D investment, limited investment in R&D in the industry as a whole. European austerity measures limited markets for the emerging'individualised drugs' that enhanced existing treatments and saw markets for existing drugs shrink. Further, the movement of drugs within the free market saw drug companies lose out on price differentials therein, with retailers targeting consumers beyond national boundaries.

The responses clearly indicated the adoption of TQM and other such quality performance evaluation measures and benchmarking systems with competitive behaviour. In the majority of cases, these had been applied as part of the MNC operational policy. The evidence of movement of personnel between companies who had relocated to new locations, which offered similar competitive advantage factors to those that had attracted them to Ireland initially, demonstrates a lack of assimilation of local cultural factors in the competitive assessment mechanisms applied.

While external stimuli accelerated the extent and speed of negative competitive attributes, the online survey clarifies the lack of assimilation of indigenous cultural factors in the strategic management methodologies applied. The factors that had attracted MNCs to Ireland had been evolving for some time; accelerated economic growth had affected the cost and standards of living in Ireland; the proportion of professionally qualified employees rose, increasing wage expectations and the cost of living, hence amending the competitive advantage features that Ireland offered. The lack of strategic planning to reflect changing circumstances on the ground was

evident both in national and organisational strategic management formulation, while, with benchmarking goals set, the dynamic effects of achieving such factors were significantly overlooked.

2.14 Conclusion

Porter has repeatedly warned that competitive advantage necessarily implies differentiation and therefore requires strategies to be culturally related at an organization and national level. Ireland's pharmaceutical industry displayed a lack of assimilation into the locale, the national strategists sought to compete internationally by replicating competitive advantage measures that had worked in the past, when national and international competitive features were significantly different. Hence emerging nations offering cost efficient supply side factors were identified for industry relocation. Strategists at organisational level had failed to coerce with national and communal strategists to facilitate sustainable competitive advantage through differentiation. Significantly, national development grants and tax exemptions for R&D have not been aligned with indigenous academic, intra and inter-industry collaboration that might facilitate the benefits from such endeavours being sustainable within Ireland in the medium, long term. Further, the government concentration on growth being directly equated to personnel numbers and values in exports is not transferable to strategic management at an organisational level where, differentiation, sustainability and market share equate to competitive advantage

Chapter 3: Ireland and the Irish Pharmaceutical Industry

3.1 Introduction

This chapter seeks to explore the contextual setting for this research. Section 1 will explore Ireland as a geographical location. Human behaviour, on which markets rely, is a consequence of numerous tangible and intangible factors, historically inherited, collectively applied and aspired to. The examination of historical conditioning allows patterns of behaviour to become apparent and thus enhances any realistic forecasting mechanism being applicable to Ireland. Limitations are applied to allow for depth and relevance, given the extensive scope of such an exercise. A summary of the Irish experience pre-World War 2 is provided. The post-war years saw the emergence of the current international system of trade, a period when Ireland politically and economically realigned itself towards its European counterparts. Literature from a range of academic literature pertaining to human behaviour has been included; the historical perspective facilitates the discussion of patterns and influential dynamics. The chapter concludes with details of the development of the pharmaceutical industry in Ireland.

3.2 Part 1: Ireland

3.2.1 Historical economic development

For the last two centuries, the economic examination and justification for trade, specifically *international trade,* has used the theories of absolute, comparative and competitive advantage. All three are relevant now as the intensity of a globalised political and econ**o**mic order transforms and tests theories on the mechanisms and gains from business and trade. The agricultural, rural nature of this peripheral island compensated for the shift in resources from traditional to commercial, as Great Britain industrialised. Stringent focus on production of agricultural produce for British demand established an export-driven economy, concurrently deterring traditional industrial technical practice and hence development, which were sourced from Britain (i.e. imported). Ireland's first Political Economy professor, Mountifort Longfield, reflects the Irish experience, rejecting Ricardo's hypothesis of a product's value being determined by the labour involved in its production. He argued that the

type of produce and terms of trade were subject to *reciprocal demand*, as was Ireland's export-centric externally directed experience (Mountifort Longfield 1934). In any event, Irish production and trade formed part of Britain's; in isolation then, neither *absolute advantage* (the exploitation of an inherent advantage) nor comparative advantage (specialisation of a relative difference) entirely applied (Deardorff 2011). On independence in 1922, Ireland was the agrarian peripheral territory that had benefited little from the welfare and infrastructural benefits of international trade, yet, Ireland's economy was export-focused – apparently contradictory factors, common in the construct of peripheral regions as politically independent nation states, colonial or otherwise (Birnberg & Resnick 1973).

3.2.2 Historical context

As an independent state in 1922, Ireland initially entered a free-trade agreement (FTA) with Britain and maintained parity with sterling, thereby facilitating the continuance of established trade and production patterns. There followed a period of protectionism in the 1930s, an effort to distinguish Irish identity and facilitate domestically led industrial and economic development, legislating against foreign investors using the cheaper labour and repatriating the profits. The FTA was abolished and tariffs on imports were reciprocated. Technologies for development in order that imported consumables might be domestically produced increased in price, while exports were curtailed (O'Malley 1999). With high unemployment and emigration, taxes were raised through repeated reductions in the exemption rate for Irish Corporation Tax (CPT). While including more traders in the tax net, this served to dissuade business investment, and the gap between the standard of living in Ireland and that of its neighbours grew.

Post-WW11, the need to rebuild domestic infrastructure, reduce the likelihood of recurring war and sustain the democratic populaces' demand for increasing levels of welfare saw the international spread of open-market ideology. The belief was that an export-driven economy potentially could achieve *sustainable comparative* advantage through the beneficial spill-over of knowledge and technology from exports and their welfare effect on imports, which cyclically improved the specialised exports (Vernon 1966). Tariffs and barriers to trade were replaced by localised international-trade alliances, customs unions and free-trade areas and ratified international institutions;

in 1944, the World Bank (WB) and International Monetary Fund (IMF), and in 1947 the General Agreement Tariffs Trade (GATT), which evolved in the 1990s into the World Trade Organisation (WTO). Domestically, economies invested in structures and features conditioning the factors of production (i.e. education, power and resource provision, communication and transport networks, etc).

Until 1958, Ireland's politico-economic stance was protectionist. By the mid 1950s Irish politicians were faced with a backward industrial sector despite industrialisation having been a focus for 20 years of protectionist policies. Furthermore, native industries were largely agriculturally dominant: food manufacture, leather, textiles and wood 63.7%; engineering and metals 12.8%, and the chemical industry a mere 4.1%. Primary commodities and manufactured goods were largely imported; Ireland exported livestock and imported manufactured/processed food. Protectionist policies that sought to support Irish agriculture and aid manufacturing were thus reassessed. The early 1950s experience of economic crises due to a balance of payments (BOP) deficit, depleting foreign reserves, compelled economic policy to focus on exports. Hence, in the mid 1950s, tax exemptions were introduced to promote exports and the 1958 report on Economic Development was followed by two stages of government programmes for economic expansion, the first running from 1949-64.

The Industrial Development Authority (IDA), established in the 1950s, played an active role in soliciting foreign investment and provided substantial subsidies for many firms in the form of non-repayable capital grants, ready-made facilities, training, and research and development (R&D) grants. Between 1956 and 1975 progressive tax policies shaped the Irish corporation tax system which, together with lower labour costs, aided the state's comparative advantage vis-à-vis the UK. Lack of infrastructure was further compensated for by higher capital grants and tax exceptions in the less developed regions; for example, in 1959 the Shannon Tax-Free Zone opened (O'Malley 1999, p.225). The rural electrification scheme, which had been delayed by WW11, continued until the early 1970s; and broader policies aiding the quest for comparative advantage were instituted in the public services – significantly, in health and education. The export-targeted industrial growth of the late 1950s and 1960s was extensively reliant on foreign-owned manufacturers. Indigenous firms not benefiting from similar incentives did not fare well, as O'Malley (1999) noted; the investment grants were unfocused and therefore did not

prove to be effective value for money. FDI was increasingly associated with Ireland's 'dependency' and need to catch up with the industrialised West (O'Hearn 1998). The neoclassical Solow model of convergence through comparative advantage did not emerge in Ireland. Export-led FDI, while benefiting the BOP in balancing the increasing importation of technology and consumables afforded by 'openness', saw the gap in standard of living between Ireland and western Europe increase rather than converge. Monetary parity with sterling prevented exchange rate mechanisms being a factor until the late 1970's.

3.2.3 Trade and foreign direct investment

Trade liberalisation meant access to foreign markets and the domestic market being 'open' to imports, inherent differentiations leaving states vulnerable to trade imbalance, specifically due to lower levels of development. FDI was targeted by some governments as a means of plugging the developmental/investment gap while also favouring BOP statistics through increasing exports. Overt financial incentives and deterrence incurred penalties from 'tit for tat' behaviour and the newly established international bodies; thus domestic taxation methods, foreign-exchange policies and subtle statutory administration processes were used to support the government's objective. It is worth noting that a state's international political allegiance *vis-a-vis* Cold War politics and the domestic political environment influenced the nature, source of origin and amount of FDI sought. Hence, the UK and Ireland were favourable locations for US FDI, France administered policies reflecting the electorate's high level of socialist nationalism, non-aligned India attracted FDI from the Soviet Union and US, while Germany's FDI was mirrored to comply with strong indigenous labour sentiments.

Internationally, economic belief trends had altered to curtail resource inefficiencies and over-dependence on domestic market demand, and nations adopted inter-reliant open and outward-looking policies. Further motivation for Ireland was provided by the possibility of a European free-trade area and competition on a level playing field from international producers. The establishment of the Common Market in the EEC in 1957 was viewed as a precursor to a political entity since customs unions had historically progressed in this way. Ireland, seeking integration in a global economy, promoted exports through tax concessions; encouraged manufacturing through

progressive reductions on import tariffs, particularly on plant machinery, and gradually withdrew the Control of Manufacturers Act in order to encourage foreign investment. The second stage of the programme accelerated the process of 'liberalisation'. In 1965 a (largely) Free Trade Agreement was signed with the UK, which facilitated the export of Irish manufactured goods to the larger market and introduced the withdrawal of the system of quotas and guaranteed pricing on agricultural exports. By 1968 the Control of Manufacturers Act was abolished and a schedule for the steady reduction of tariffs on UK manufactured imports was introduced.

The resulting levels of growth in manufacturing are evidenced in Table 3.1. Most significantly, these periods saw a reduction in imports and an escalation in domestic market demand for indigenous manufactured produce. Notable too is the rise in imports *and* exports; for example, drugs (manufactured) and pharmaceuticals within the chemical industry, denoting specialisation through technological and skill competitiveness, facilitating integration into global markets.

Table 3.1: Rate of growth in manufacturing in Ireland

Manufacturing Industry	1950-58	1958-66
Food	21.8	51.3
Drink & Tobacco	3.5	9.3
Textiles	31.1	79.3
Clothing & Footwear	1	40.8
Wood, Cork & Furniture	-20.7	52.4
Paper & Printing	39.4	41.4
Chemicals	33	116.9
Minerals	19.7	153.7
Metals	16.9	111.7

Source: *Ireland, Statistical Abstract*, various issues; *Irish Trade Journal and Statistical Bulletin* (or *Irish Statistical Bulletin)*

While the period from 1955-1970 saw significant growth in industrialisation, Ireland's starting point behind European counterparts and the global economic boom were significant contributing factors to the upsurge. Added to this, the gradual elimination of extreme protectionist and anti-UK trade policies naturally resulted in opportunities for trade previously denied. Towards the late 1960s Ireland's industrial output rose to a quarter of GDP, while it remained a predominantly traditional

agricultural economy. Ireland, as a result of a manufacturing 'boom', had achieved only semi-industrial status. Its trade and industry, and the economic policies involved, reflected years of economic under-performance, sparse industrialisation and indigenous exports reliant on foreign demand (still primarily the UK).

The global trading environment was being transformed, empires being replaced by a proliferation of neo-colonial states, post-war trading agreements and customs areas subjected to Cold War politics, global codes of conduct and governance in treaties and related institutions, all within an increasingly technological physical construct. The spread in the adoption of market-led openness facilitated unconstrained change at an accelerated pace; national and firm competition intensified; and the nature of employment, consumers, subsistence was affected globally and affected lifestyles universally. Political, economic, financial and legislative strategic reconstruction occurred while transportation, communication, scientific and technical change excelled. By the end of the 1960s alternative theories for trade enhancement were being sought, resulting in Competitive Advantage and Ohin's (1933) Economies of Scale gaining favour. Both continued to assume a liberalised free-market international trading environment.

3.2.4 Geographical location

A state's level of development, socio-political culture and legal economic framework can all affect a country's ability to sustain economic development whether negatively and positively (Porter 2004). Ireland's peripheral geographical location and its historic relationship with the UK have heavily influenced economic and socio-political development, and the policies, procedures, norms and cultural behaviour of the business environment.

In 1972 Ireland joined the EEC. It was energised by the assimilation into Europe as a means of distinguishing its identity from the UK's. Due to sterling's volatility, Ireland joined the EMS at its inception in 1979 and parity with sterling was discontinued. Ireland's motivation to 'separate' from the UK, while simultaneously escaping from its peripheral location through assimilating with the Continent, was a significant factor in such a state policy. The UK in recession did not join; at the time 50% plus of Irish exports were still UK-reliant. Ireland's proximity and shared history with the UK played a part in attracting multinational investment (the vast

bulk of which was US-based), into Ireland. The IDA was said to be deterring development of indigenous industry in the 1980s by offering US multinationals favourable deals in order to achieve its employment-creation targets, leading to its eventual split into three entities in 1994.

EMS and later membership of the Eurozone meant Ireland was a part of a globally strong currency. The US ties with Ireland – its closest European neighbour, and with 40 million US citizens of Irish extraction (partially a consequence of historical UK connections) – and the UK's retention of sterling increased Ireland's attractiveness as a Euro base for US companies. Furthermore, Ireland was the only European country apart from the UK with English as the primary language. Policies to develop infrastructure, stimulate jobs and equate the Irish standard of living to that of its European counterparts were supported by high taxation rates; in 1975 the top rate was 80%, though by 1985 it was down to 65%. Inflation, benefiting from EMS membership, had been successfully cut back from 19.6% in 1981 to 4.6% in 1986. However, by 1987 Irish government debt led to severe austerity in order to avoid IMF or EU intervention (Jacobsen 1994:177). High inflation, high taxation, high government spending and fiscal instability left the average growth rate at 1.9% from 1973 to 1986 (Peillon 2001).

In 1988 an article in the *Economist* titled 'The poorest of the rich' noted the lingering effect of historical experience:

> *Take a tiny, open ex-peasant economy. Place it next door to a much larger one, from which it broke away with great bitterness barely a lifetime ago. Infuse it with a passionate desire to enjoy the same lifestyle as its former masters, but without the same industrial heritage or natural resources. Inevitable result: extravagance, frustration, debt.*

3.2.5 Structural programmes

In the late 1960s Ireland exhibited a high growth rate, but it failed to converge with the European average standard of living. The disparity actually grew. It took the 13 years from fiscal entrenchment in 1987 to 2000 for Ireland's standard of living to catch up, and in some cases surpass, its European counterparts (Powell 2003).

Entry into the Eurozone was one of the main attractions for US companies seeking to access the market, although the American political advantage in supporting Ireland cannot be discounted. A small 'open' state in Western Europe can provide political stability as well as economic flexibility (Katzenstein 1985). 'Social partnership agreements' aided in facilitating Ireland's growth through promoting labour-force compliance. National Development Plans (NDPs) focused on employment and income levels, specific attention being paid to new technologies (Tallon & Kraemer 1999), specifically IT and pharmaceuticals (Durkan 2001). Hence, they too were FDI-centric and endorsed stimulants that had proved beneficial historically.

Ireland's developmental status as part of the EU benefited from agricultural subsidies via CAP structural funds and increased national government investment.

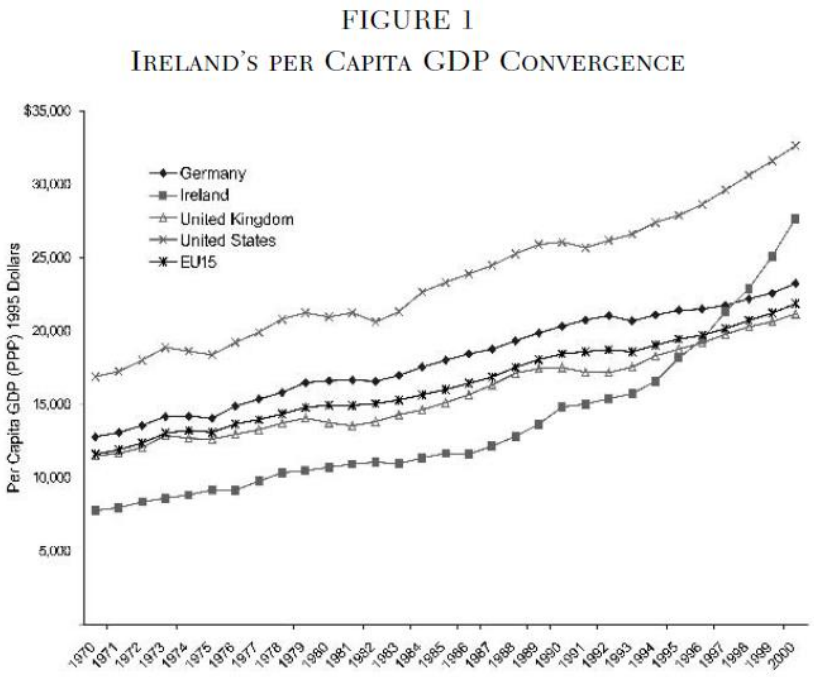
Table 3.2: Structural Funds Programmes in Ireland

		1989-1993	1994-1999	2000-2006
		€ million	€ million	€ million
(1)	National Development Plan (total)	12,275	16,800	57,111
(2)	(of which) Co-financed Investment	8,339	10,383	7,680
(3)	(of which) Structural/Cohesion	3,672	6,921	3,739
(4)	(2) as % of (1)	67.93%	61.80%	13.45%
(5)	(3) as % of (1)	29.91%	41.20%	6.55

An accurate calculation of the impact of infrastructure improvement and development grants, which by their nature facilitate long-term growth, is complicated by the additional factors that facilitated Ireland's economic progress. Agricultural subsidies can hinder economic development not only by showing rural incomes as being artificially high but in maintaining subsistence in an area of economic activity that is non-competitive (McMahon 2000: 89–90). In Ireland's case, the skewed low interest rates further exasperated this by increasing the value of

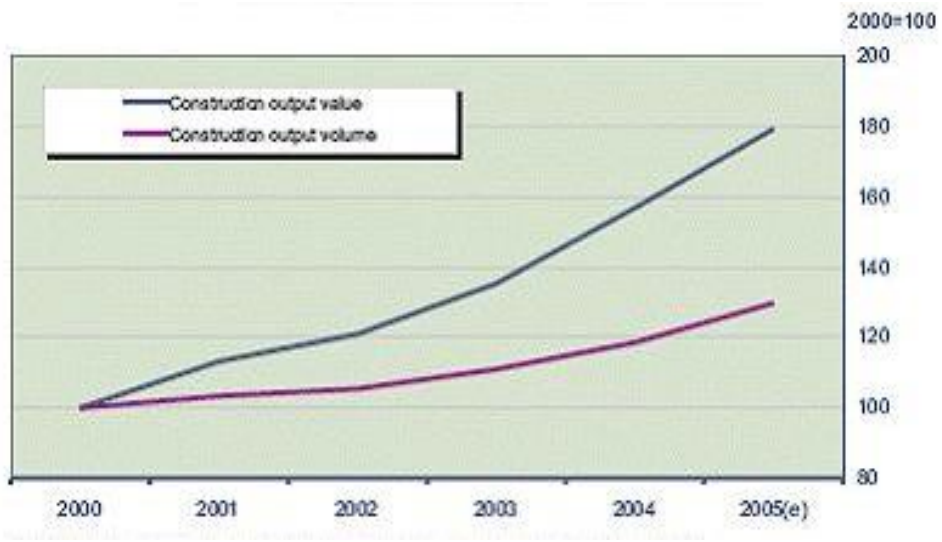
land for private dwelling construction. As finance through credit became readily available, agricultural land on the outskirts of urban centres was in demand.

Figure 3.1: Ireland's per capita GDP convergence



Integration of the economy and market had obviously involved an 'openness' that went beyond trade tariffs and local regulations and involved, as is evident from transitional economic studies, a shift in ideology. However, the speed of ideological imposition did not cater for time and thus led to behaviour that was reactionary, not evolutionary (Powell 2003). From 1987-2000 Ireland's infrastructure development, fiscal austerity measures and low interest rates (based on the ECB average), together with its high domestic inflation, led to low and negative interest rates facilitating consumer credit. Added to this, an inherent agrarian attitude towards private property and inheritance of same resulted in increasing private property development.

Figure 3.2: Index of Construction Output 2000-2005



House prices between 1996-2006 rose more rapidly than anywhere else in the developed world. Incomes, employment, net immigration and artificially low national interest rates all played their part (Morgan 1999, p.5). The construction of new properties, specifically housing – almost static in the Euro area and UK – rose by almost 500% from 1990-2006. In Ireland, as a result:

- The average income-house price ratio was second highest in the OECD
- Household debt was close to 100% of national income
- Residential properties comprised 2/3 of construction projects

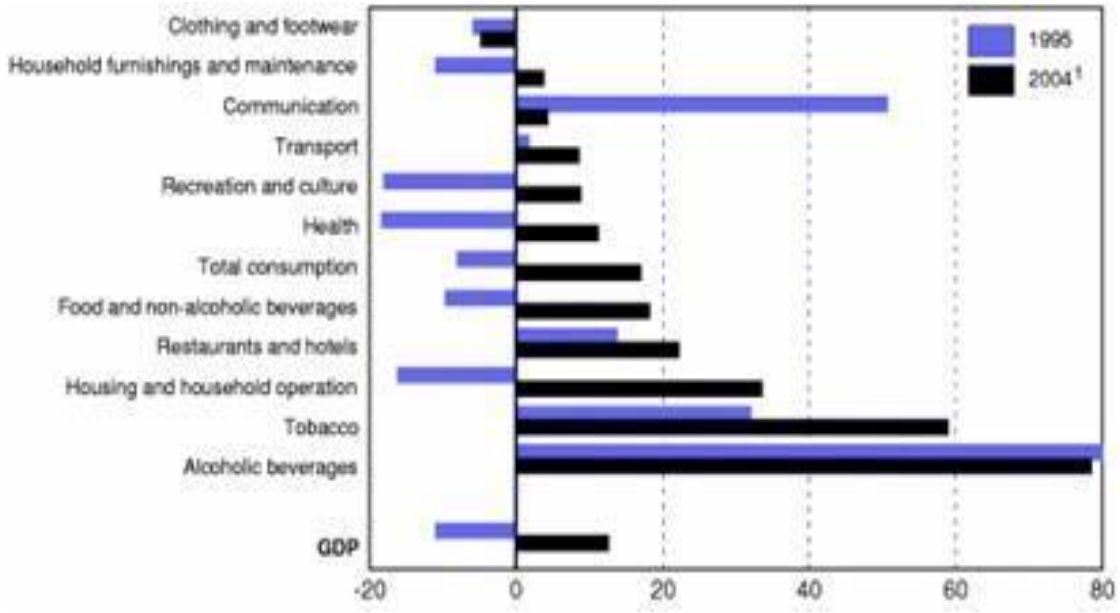
In 2005 people employed in the construction industry numbered 242,000, or 12.6% of the Irish workforce (see Figure 3.2). After the initial realignment Ireland incurred as a member of the Eurozone in the early 1990s, the sudden extension of credit fuelled the Irish domestic economy.

Academics followed politicians in proclaiming that the 'Celtic Tiger' was a result of an enlightened taxation system, a highly educated workforce (education and funding being directed by the State) and strategic forward planning by development organisations (MacSharry & White 2000). The magnitude of the economic growth can be illustrated by statistics; real gross domestic product grew by 137% between 1990 and 2003 and by 88% in 1995, while total employment grew by over 54% from

1,165,000 in 1991 to 1,799,801 in 2003.

Development affected lifestyles, families had fewer children, and education (including university) was free. In a decade the number of dependants (reliant on social security and family) on a hundred taxpayers had reduced from 230 to 115. Blue-collar employment was available to young graduates, the service and manufacturing industries providing an alternative, while demographically there was a significant rise in those aged 24-55. The IDA's adoption of 'industrialisation by invitation' as a means of attracting industries was crucial but led to large disparities between indigenous and MNC companies, which contributed to Ireland's extreme vulnerability in the global crisis (Murphy 2000). 'Brand Ireland' proclaimed that the speed and extent of 'development' had facilitated Ireland surpassing industrialisation, establishing it as one of the leading global powers in the technological/knowledge age. Prices in Ireland rose (electricity, telecommunications, wages, land, construction). Ireland, while competing with other emerging nations in Europe and Asia, was no longer value-for-money in spite of the low corporation tax.

Figure 3.3: Difference in sectoral growth (%) between Ireland and EU15, 1995-2004



Source: *OECD Economic Survey of Ireland 2006: Boosting growth through greater competition*

In 2007, the World Bank rated Ireland as the fifth most expensive economy after Iceland, Denmark, Switzerland and Norway. The source of the bulk of FDI in Ireland, the US, ranked only 20th.

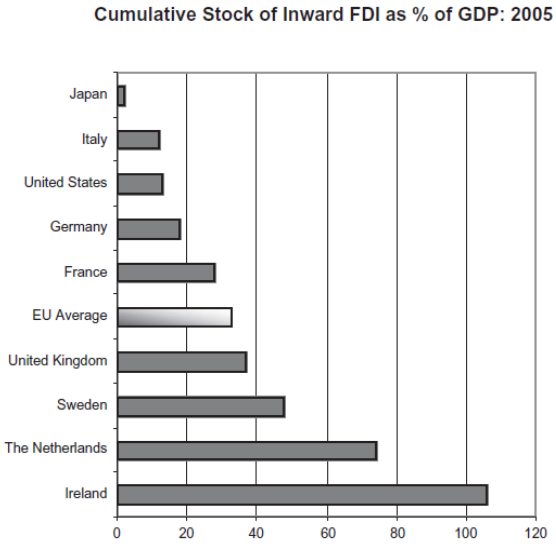
After the restructuring of Ireland's development agencies from the mid-1990s, the agencies began to focus on establishing higher value-added activities with the existing transnational corporations (TNCs) in an effort to cater for the increasingly educated workforce, establish higher-paid employment and mitigate the foreseeable exodus of manufacturing to lower-cost nations. Supply chain management (SCM), customer services, R&D and manufacturing requiring sophisticated measures of control were thus focused on (Barry 2007), Begley, Delaney & O'Gorman 2005). In 2005 the key priority for future development was declared to be:

> *The expansion of existing clients . . . is important because their contribution is something we expect to grow in the future. This is happening not only because it is a logical consequence of the critical mass we have now built up in several sectors, it is also now a key focus of policy.* (IDA 2005:ii)

3.2.6 The Irish economy

The effective corporation tax level (second only to Luxembourg in the EU) and extensive financial inducements directed at FDI are cited by numerous critics for skewing the statistics on Irish growth levels (O'Gráda 2002, O'Hearn 2002).

Figure 3.4: FDI as a percentage of GDP (2005)



Source: *UNCTAD World Investment Report 2006 (United Nations 2006 and Forfás 2007)*

The indigenous benefits of FDI subsidies and the resulting 'growth levels' were further queried when significant evidence of double-accounting of profits and transfer pricing was exposed. Was the Celtic Tiger just a result of US timely outsourcing? Did Ireland simply represent a US territory (O'Gráda 2002, O'Hearn 2002). The 'Irish' subsidiary of Microsoft, Flat Island Company Ltd, showed profits of $802.4 million tax-free. The incentive to persuade TNCs to establish higher-level sustainable employment through emphasis on R&D activities was apparently used to exploit intellectual property and avoid taxation through 'relocation' (Beesley 2005, Kenna 2005, Lillington 2005). The spill-over effects anticipated from FDI in terms of indigenous business links are not evidenced. Large US mobile corporations based in Ireland appear to have used the advantages in access to European markets. Intel produced chips in Ireland, Dell imported Intel chips from the Philippines; networks and integration between TNCs were not established (Plice & Kraemer 2001, Ó'Grada 2002). Was the pursuit of an exogenous route to development sustainable exclusively or did it have a negative effect on the indigenous sector (O'Gráda 2002, O'Hearn 2002). Successful indigenous entrepreneurial companies were swallowed up by MNCs, government policy being focused on employee numbers. The current position as declared by the IDA is also under scrutiny:

> *The business value proposition Ireland offers today to the increasingly mobile multinational customer is best described under the following three headings: World Class Innovation and Development; Superior Performance and Business Integration, Service and Support*. (IDA 2005)

The upgrading of skills from manufacturing to servicing, as with Dell and others, involves employees in call-centre-type scenarios, facilitating FDI to further exploit the language, educational level, geographical position and availability of labour.

The *Economist* in May 1997 stated:

> *How much longer the Irish formula will deliver such striking success is difficult to say . . . Ireland grew quickly for more than 30 years because it had a lot of catching up to do, and because policy and circumstances conspired to let it happen. Success of that kind, impressive and unusual though it may be, contains the seeds of its own demise*. (1997: 24)

Examination of the evolution of the Irish economy alone can only explain a degree of the collapse. The banking and continuing financial crisis that hit the US and Western Europe in 2010 certainly played a part. However, the lack of foresight in national strategic planning and disregard for the conditions and culture that were being radically transformed are reflected in the extent of Ireland's economic collapse. This is clearly demonstrated by the NDP and Social Partnership agreements being prescribed for five years in advance, and concerned with growth rates rather than sustainable living standards. Casti 1991, Whelan 2009 and Murphy correctly identified the reasons for Ireland as a choice: its underdevelopment, ability to grant new industries tax breaks without impacting on the BOP due to under-industrialisation, integration in the Euro market, English-speaking workforce, skilled and available labour, and historic ties with US (Hewitt-Dundas *et al.* 2005, O'Riain 2004). Does the present position demonstrate sustainability through embeddedness or, as Gould (2002) suggests, are policymakers continuing to wallow in positive change without preparing for its consequences?

3.3 Part 2: The Pharmaceutical Industry

3.3.1 Introduction

The 'modern' pharmaceutical industry, in the wholesale production of drugs and chemical concoctions designed for use in the manufacture of goods, began to emerge in industrialising countries during the 19th century, most notably in the United Kingdom, France, Germany, Switzerland and the USA. From the outset, R&D featured in the development of drugs and in the evolution of chemical substitutes to replicate and enhance the utility of organic chemicals, particularly in the dyestuffs for manufactured products. The industry has continued to diversify, using technological advances and complying with legal, ethical, regulatory and social realities.

In 1883 the Paris Convention for the Protection of Industrial Property was concerned with the application of patents to safeguard and promote investment in research; this convention has since been intermittently amended. Debates on the applicability and benefit of patenting processes and end products or both in the pharmaceutical industry are ongoing. The case for supporting expensive R&D by patenting both

processes and products saw France, with a 40% share of the dye market, lose the entire industry to Switzerland, which patented neither, and Germany, whose patents applied to processes alone. The German pharma industry grew from small entrepreneurial companies, while large French 'safeguarded' firms disappeared. Switzerland, and Basel in particular, remains synonymous with pharmaceutical firms. Patenting, while a significant dynamic, does not in itself stimulate, safeguard or entice R&D.

The protection of intellectual property remains a bone of contention. Ironically, diversification in legislation has stimulated innovation. It was the 'lag' that US firms endured between product design and eventual licensing that inspired pharmaceutical firms to apply their skills in synthetics and organic products to the beauty market during the 1950s. Numerous 'hygiene' and household consumables were to follow, the concept of 'rational design' emerging as a consequence.

3.3.2 Development of the pharmaceutical industry in Ireland

The lack of a pharmaceutical industrial presence in Ireland until the 1960s has been attributed to the lack of infrastructural development and the protectionist nature of the State pre-WW2, the first drug substance production being recorded in 1961 in County Wicklow (Galvin 1998).

The IDA prioritised the pharmaceutical and fine-chemicals industries in the 1970s, targeting high achievers in the industry (Childs 1996). Proactive marketing used the lack of indigenous industry (due to the large amount of capital necessary for the technology its manufacture necessitated), which implied an absence of local opposition to the fiscal grants and tax incentives that foreign companies enjoyed (Van Egeraat & Breathnach 2007). Geographical location, high unemployment, skilled labour, EEC membership and English as a common language were all highlighted to US MNCs. The high level of speculative investment necessary for pharma R&D and the lengthy duration from concept to market has led to the global industry being dominated by large MNCs. US companies dominated in 2000, surpassing Western Europe by $20 billion.

Furthermore, the IDA had the insight to use the State's late electrification and public amenities development, cheap available labour and costs to entice pharmaceutical

FDI. From early on, the IDA worked with the Food and Drug Administration of the US, ensuring that the stringent safety standards required by the industry could be attained and monitored in Ireland. Indigenous focus on the manufacture of agri-products and food stuffs suited the pharmaceutical industry in a period when increasing licensing and R&D statutory requirements made diversification attractive.

The IDA married the government's priority to tackle regional employment and development disparities, hence providing capital inducements for regional development, with the pharmaceutical industry's specialist infrastructure requirements. Transport developments in line with the export focus saw Shannon and Cork initially being the focus (Drudy 1991).

Industrial requirements for sophisticated manufacturing with extensive fresh-water and electrical supplies and plants of adequate size to facilitate waste treatment and disposal, with easy access to labour, led to the identification of Cork as a suitable location. This foresight and strategic planning, using the advantages of the State's inherent and developing position, facilitated the establishment and growth of the bio-chemical pharmaceutical industry in Ireland. It was not simply fortuitous that pharma investment led to one of Ireland's strongest sectors of growth; tailored strategic planning facilitated sustainable growth in this area.

In the 1970s the IDA's pharma focus began to see real dividends. In 1972, 1,300 people were employed in the industry; this rose to 4,750 by 1979, most concentrated in drug substance and product production, while only two plants employed over fifty staff. The small number of indigenous companies was mainly concerned with the production of Over the Counter (OTC) drugs, although towards the end of the decade veterinary pharma production did emerge. Due to focus during the 1980s being on economies of scale, or entrepreneurial preference being to establish businesses from scratch, the few successful indigenous firms sold to larger entities. The continuance of preferential conditions for larger foreign companies cannot be discounted as an influential factor.

The 1958 industrial policy peaked in the 1970s. The early 1980s saw FDI employment stagnate while Irish employment fell considerably. Excessively generous policies for FDI over indigenous businesses and the manner in which grants and tax breaks were allotted were scrutinised. In the mid 1980s Irish industrial

policy was redirected. The development of desirable skills for up-skilling indigenous businesses and more stringent criteria directed at ensuring support for the larger sustainable competitive companies was introduced (Sweeney 1998, p.133). Capital grants were reduced and reliant on performance-rated targets being met and targeted at skilled employment. Similarly, the industries targeted for FDI, pharmaceuticals, software, electronics, tele-services and the financial industry were specifically selected to facilitate employment for an educated workforce and provide higher earning potential. As a result of the FDI strategy and national fiscal policy redirection, employment in manufacturing increased by 13% between 1986 and 1998 (O'Malley 1999, p.230).

3.3.3 Pharmaceutical infrastructure

An examination of the Cork Harbour pharmaceutical development since its inception in the 1970s provides a good insight into the evolution of the Irish pharmaceutical industry to date, illustrating the effects of national strategic planning. The national strategy implemented by the IDA to direct export-driven industrialisation to specific regions providing employment identified Cork and Shannon due to the supportive international transport links. As noted above, the pharmaceutical infrastructure need for large amounts of fresh water and local amenities led to Cork Harbour and the Shannon estuary being selected for plants producing quantities of effluent. Environmental concerns about locating such companies in heavily urbanised centres, planning restrictions and the cost of building such large purpose-built facilities further reduced Dublin's feasibility. A collaborative strategy between the Cork planning authorities, the Cork Harbour Commissioners and the IDA led to the Cork Harbour development plan. Ringaskiddy, complying with the pharmaceutical deep-water and disposal needs, was purchased and specifically developed by the IDA to attract pharma FDI (Brunt 1989). Large complexes with water, drainage, waste-water assimilative capacity, available planning permission and access to urban amenities and staff, together with the tax and financial incentives, saw pharma plants move into the area from the mid 1970s on. The harbour development ensured availability of processed water that surpassed any in the state (Gallagher 2003). Pfizer was one of the first companies to be used by the IDA as a 'flagship' to attract other pharma and highly competitive MNCs to the locale. The IDA's aggressive promotion of the

sites was reinforced by their need to sell on the investment. Out of 10 new drug substance producers between 1976 and 1985, six located in Cork and two went to Shannon (Breathnach 1982, Meyler and Stobl 2000).

The immediate benefit was a rise in employment in Cork that experienced the closure of manufacturing plants during the early 1980s, initial FDI employment being largely in the lower-skills areas for servicing and manufacture. The collaborative development also provided employment in-site and amenities maintenance and development of the harbour itself (Brunt 2005). Technologies, management and quality systems were wholly imported from the TNCs' externally based central offices. Material inputs were also almost entirely imported and products exported, but the concentration of companies provided work for service engineering firms. As a further benefit of the initial strategic collaboration, the planning authorities gained a reputation for efficiency in a specialist area, thus assisting in the attraction of pharma FDI by being able to provide specific environmental and safety requirements in line with the specialist nature of the processes concerned (Gallagher 2003). By the mid 1980s Cork was the pharma hub in Ireland.

The mid-1980s saw a national industrial strategic planning shift, Dublin being identified as an area in need of sustainable superior employers (White, 2000a). FDI and employment support was directed at skilled employment in an effort to remain competitive internationally and use the increasingly higher-educated workforce. A rise in qualified employees and a shift towards employing industry specialised staff, which the pharma presence in Ireland had encouraged to emerge, followed. The global industry was diversifying in response to technological advances and changes in sales and marketing due to communication advances, consumer ethical and environmental concerns and the growth in 'lifestyle' products and thus direct sales. The move to a 'second level' higher-skilled service employment focus was in response to industry employer requirements. Furthermore, these higher-skilled positions represented a simple move from manufacturing to desk jobs in the service sector.

New pharma companies from the mid-1980s increasingly opted for the IDA-promoted industrialised development areas in Dublin. Of the new pharma entrants from the mid 1980s to 2003 only two located in Cork (Drudy 1991). Higher-skilled

mobile employees' tendency to prefer sophisticated urbanised centres may have coincided with locations of choice for FDI management employees (Malecki 1979). Merrill Dow in 1987, fearing the association consequences of any pollution hazards from the existing concentration, opted to avoid Cork (Leonard 1988). It is also worth noting that existing plants expanded and were involved with mergers and acquisitions during the same period of 1986-2003.

The highest-paid and most educated of all manufacturing employees are employed in the Irish chemicals sector of which pharma is a sub-sector (Van Egeraat & Barry 2008). The Census of Industrial Production noted that in 2005 half of FDI employment in chemicals was in pharmaceuticals. Internationally, pharma sales increased by 9% between 2002-03, being worth $591 billion in 2004 – notably during a period in which manufacturing was intensified to exploit the patent rights expiring.

Between 2005 and 2007 there was a 7.5% reduction in employment in the Irish pharma sector. In line with the imminent end of crucial patents, product life-cycles shortening and R&D funding cuts, the industry consolidated and rationalised.

Figure 3.5: The Big Ten Pharmaceutcial corporations

THE BIG TEN

Company	Headquarters	Annual R&D expenditure	Annual Sales
Pfizer	New York, USA	US$ 7.4 billion	US$ 51.2 billion
GlaxoSmithKline	London, UK	US$ 5.8 billion	US$ 40.4 billion
Novartis	Basel, Switzerland	US$ 4.8 billion	US$ 32.2 billion
Sanofi-Aventis	Paris, France	US$ 5.1 billion	US$ 34.6 billion
Merck & Co	New Jersey, USA	US$ 3.8 billion	US$ 22.0 billion
AstraZeneca	London, UK	US$ 3.4 billion	US$ 23.9 billion
Johnson & Johnson	New Jersey, USA	US$ 6.3 billion	US$ 22.3 billion
Bristol-Myers Squibb	New York, USA	US$ 2.7 billion	US$ 19.2 billion
Wyeth	New Jersey, USA	US$ 2.7 billion	US$ 15.3 billion
Roche	Basel, Switzerland	US$ 4.9 billion	US$ 15.3 billion

Source: Based on 2005 figures from the companies' websites

Mergers and acquisitions (M&As) in order to acquire the diversification potential necessary saw larger global companies sustain and increase their market share. Pfizer

and Wyeth, significant employers in Ireland, merged in 2009, combining their biotechnological and pharmaceutical activities. While continuing to reduce manufacturing employment in particular, the company has retained eight units in Ireland, most involved in manufacturing. However, the establishment of a services, financial management and commercial sales centre show diversification similar to that which Apple Inc. has successfully implemented in its Irish base. While Pfizer expanded its Irish R&D facilities to include a high-containment development unit worth an estimated $30 million, it simultaneously opened an API plant worth $440 million in Singapore and expanded its clinical trials in India.

The attraction of generic production requires high levels of safety, and there are specific environmental requirements for production. This has been identified as a sustainable sub-sector that Ireland might benefit from in the medium to long term (PWC 2009). The pharma industry, already diversified, will undoubtedly expand further. R&D requirements and ever more sophisticated technologies have provoked increasing collaboration between industry players, and there is a clear prospect of combining specific processes to produce collaborative products and processes.

3.4 Conclusion

The importance of FDI to the Irish economy in the last twenty years cannot be overstated; attraction of FDI was the main contributor to the growth rates of the so-called Celtic Tiger. Such policies exposed the vulnerabilities of human behaviour and of the economic policies, at an extreme period of growth and collapse, in Ireland.

Employment increased by an annual average of 8% from the 1990s on and proved remarkably resilient during the 2000 global economic downturn. The pharmaceutical workforce increased from 12.6% to 15.4% in 2004 (Forfás 2005). FDI was traditionally prescribed for economies that sought to develop specific industries and aid government initiatives to stimulate growth and raise the standard of living. The rationale that investments are made almost entirely due to economic factors has led governments to use factors of comparative and absolute advantage where evident, and internationally compete by providing assistance packages to lure in targeted FDI. Business objectives dictate that locations be selected in order to maximise returns, facilitate sustainability and enhance competitive advantage. Competitive nation

states seek to enhance their BOP figures and stimulate growth, employment and living standards. It has been argued that the political construct of democratically elected policymakers favours an emphasis on short to medium-term sustainability. In the Irish case, after an initial two-stage development plan, strategic plans were redefined in order to correct economy failings. Objective long-term sustainability would require regular redirection in response to and in *preparation for* market eventualities. In light of the dramatic demise of the Celtic Tiger, the absence of strategy to respond to positive change is blatantly obvious. FDI strategists are not concerned with wealth distribution. However, the valuable financial incentives that governments endorse are justified by the tangible and intangible 'spill-over effects' that imported productivity can generate.

Global application of the 'open market' model has largely eliminated the necessity to produce in a locale in order to competitively access the markets. Globalisation has intensified competition through reducing the differentials specifically with market regionalisation (Rugman 2000). Further, corporate organisational transformation and geographical and skill diversity have led to an economic debate on the concept of territorial integration (Coe *et al.* 2004). TNCs often operate across numerous nations and organisational connections are continually being redefined. Mobility of employees, capital and resources and the effective transfer of knowledge/skills demand a re-evaluation of the importance of geographical locale (Jones 2008, White 2004).

By 1993 Ireland had the largest number per capita of science and technical graduates within the OCED (OECD 1999, 139 fn. 26). However, focus on the service sector as involving 'skilled' labour dominated IDA policies. The structural supply-side features that had attracted FDI in the first instance, such as low corporate profit tax rates, investment in education, infrastructural development (particularly in the competitively priced telecommunications), the social development plans which included trade unions and the government-funded bodies that provided both financial and bureaucratic support were continued. The surge in pharmaceutical manufacturing, powered by the need to exploit patented products with their demise rapidly approaching, did not lead to FDI requirements that would determine long-term establishments. The mobility of TNCs and internal competition in corporations escaped attention. The Cork 'hub' was established as consisting of large inclusive

complexes that related within the corporation's network more than with the local business environment.

Appendix I entitled *Framework for Embedding the Pharmachem sector* from IPCMF, now Pharmachemical Ireland, while stating the objective to be the establishment of an "integrated pharma and chemical industry", focuses on lower-cost supply-side factors which in turn would provide for manual and 'secondary' service employment. The dynamics that establish industrial regionalisation in the existence of large and small companies, an entrepreneurial supportive environment in which collaboration, inspiration and knowledge transfer is facilitated was not provided. The Cork complexes provide employment; the industry-specific skills such as evidenced by the local planning authority were segregated and did not attract the support and extension that an industrial hub would exhibit.

It should be noted that during the period of investigation, the financial crisis and global recession reduced investment in health care, and lack of funding for R&D and consumers moving away from expensive reputable brands greatly affected the pharmaceutical industry. There was a general upsurge in manufacturing during the first decade of the century as a number of vital patents were due to expire (patent cliff). This, and the aforementioned economic environment, led to considerable restructuring in the industry, mergers of large players and strategic acquisitions motivated by diversification, supply-chain integration and reducing R&D costs. This has led to the global industry to be dominated by a few large MNCs.

The speed of economic development did not equate with the socio-political development. Markets are driven by human behaviour; the lag in cultural activity did not guarantee sustainability, and there was a weakness in the decision-making actions of the external and internal strategists in Ireland.

A misinterpretation of the term 'competitive advantage', the myopic view of the term by pharma management thinking that economic growth was equivalent to economic development, this is not the case. The use of TQM as a copy-cat behaviour was used in pharma organisations to indicate their competitive advantage. The global pharma industry was changing; pharma management were aware of the pending patent expiry on block-buster drugs and merger activity was taking place, so the industry was in a period of change.

The original factors that had attracted the pharma MNCs to Ireland were not developed over time, once the industry became established, to sustain the sector in times of uncertainty and into the future. History has shown that any so-called 'boom' is rapid in both creation and demise. There was a lack of entrepreneurial support for indigenous MNEs and of clustering activity to ringfence the pharma sector in Ireland, because government policy favoured job creation and immediate growth, lobbying for a continuance of the low corporation tax rate to lure in MNCs.

The information gleaned from the primary and secondary research highlighted the need for a contextualised and evolutionary framework for Irish pharma management to use in the formulation stage of the strategic planning process – a prototype to persuade pharma management to question and stimulate enquiry, easily amendable in a cyclical process to guide the enterprise though change and uncertainty.

Chapter 4: Strategic Management and Performance Evaluation Systems

4.1 Strategic management

The industrial revolution and technological, transportation and communication transformation promoted the necessity of trade through every level of society. Increasingly, personal and national sustainability became trade-reliant. From the mid-18th century on, business and trading enterprises increasingly employed strategic planning methodologies to enhance sustainability; the pace and extent of change meant that 'tried and tested' and subjective reactive management techniques were no longer adequate. Furthermore, increasing numbers of workers and tiers of management necessitate structures and processes to be clarified and objective strategic planning to be designed. Change, it has been said, poses challenges and opportunities; hence the defensive structures such as patenting and other statutory safeguards were matched at ground level by the adoption of new technologies and methodologies in order that businesses remained viable against emerging competition. Strategic management, as an understanding of the objective and critical evaluation of the subjective environmental factors and internal constraints and competencies, thus developed and grew in popularity during this time (McKiernan 2006).

Chandler explored the importance and characteristics of *management* strategy in *The Visible Hand*, demonstrating the necessity of strategic direction for prosperity and sustainability, that is:

> The determination of the basic long-term goals and the objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals (1962, p.13)

This categorisation of business strategy, being formulated as a structured process and then implemented, emphasised the importance and role of organisational structure for implementing strategies and the distinction of capabilities (as limitations and goals) from activities (Whittington 2008).

4.2 Strategic management frameworks

Definitions of strategic management and frameworks for measurement and application are subject to constant review. For instance, the original emphasis on technological advance failed to reflect the current importance of government, entrepreneurial and capital market influence on modern business in a globalised information age (Fruin 2009). Similarly, the original assumption of strategic management being intentional omits the evolutionary consequences of organisational innovation, and entrepreneurial effort (Mintzberg & Waters 1982). Andrews' redefinition of strategic management objectives prescribes *aspirational* objective strategy formulation, facilitating diversification, in strategic formulation (Andrews 1971, p.28). Globalisation and the cultural socialisation of business enterprises have further attracted criticism in Chandler's omission of the relevance of contextual cultural influence in differential behaviourisms, norms and politico-socio expectations (Jones 2008). Chandler's input originated from an analysis of the US manufacturing companies; it was initially designed to be used by large corporations and has thus been amended to apply to smaller, entrepreneurial businesses (Wilkins 2008). Chandler revisionists have then largely amended and reclarified the original definition of strategic management in line with the modern and emerging business environment. The fundamental separations between strategy and structure and capability and activity, and, most importantly, the distinction between strategic *formulation* and *implementation* for sustainability remain the basis of most of the strategic management frameworks.

Statistical Product Quality Administration was generally promoted in manufacturing organisations after it was published and promoted as a professional course for technicians by the American Standard Administration in 1942, spreading globally after WW2. Numerous mechanisms to measure and provide the statistics that Chandler originally emphasised as essential in strategic management formulation have been developed to suit specific and general strategic management needs. Computation advances and accessibility facilitating better statistical data, specifically in the application of econometric statistics, were valued in strategic forecasting through providing numerical data in the depiction of dynamics (Spencer 1961, Pokemner 1970) .

A broad paradigm that encompasses the *internal* and *external* elements identified by Chandler's management of strategy, amendable to comply with environmental change and progression, is provided by Schendel and Hofer. Their framework encompasses *steps* (structure) and *tasks* (activities), both reliant on realised or projected statistical information externally and internally sourced to facilitate contextual sustainability, as follows:

- Environmental analysis
- Goal formulation
- Strategy formulation
- Strategy evaluation
- Strategy implementation
- Strategy control

Such a broad paradigm facilitates the incorporation of institutional intrapreneurism, knowledge and innovation cultures that are widely proposed today and might be applied to strategic formats for business and beyond.

The list of stages and tasks denotes that strategy is directed, managed and evaluated in formulation and practice, and hence assumes that management strategic planning is an *objective cyclical* process. The formulation of goals and strategies and environmental analysis for sustainable strategic planning relies on the quality of information and processes (activities) in sourcing, evaluating and directing strategy. The debate on styles and emphasis in designing and directing strategic management has been intense since the early 1970s. In the late 1960s subjective-based forecasting relying on intuition, expertise and experience, commonly used by the medical profession, political and economic strategists, managers and entrepreneurs, while providing speed and flexibility lost favour and was replaced by rational, objective strategic structures. Objective-specified methods – being replicable and thus comparable and hence more efficiently evaluated using computing and statistical analysis – were deemed to be more effective in establishing long-term sustainability (Armstrong 1968 & Spencer 1961).

Broad strategic management objectives necessitate being dissected and situated at source so that relevant management plans in specific areas such as manufacturing may be clarified. Quality for instance, may be interpreted to imply durability, superior performance, enhanced capabilities or presentation and adornment. Strategic

policies need to be linked to specific actions and aspirations (Garvin 1993, 2001).

Quinn (1978) observed that strategy formulation was fragmented and evolved through intuitive decisions and management reactions, particularly in response to the intense pace of change in markets and environmental conditions. Mintzberg in 1978 echoed this sentiment, noting how strategies 'emerged' from small tactical manoeuvres. He reclarified this in 1991 as an 'adaptive learning' management technique and continues in his later works (1991 and 1994) to argue for proactive, evolutionary, flexible strategic channels as opposed to a formally designed construct with rational clarified objectives and procedures that Ansoff, among others, proposes (Mintzberg 1974, 1978, 1991 and 1994, Ansoff 1991). While there are variances in Organisational Structures (OS), Organisational Cultures and Strategic Management Styles, the need for *directed strategic management* regularly informed by the collation of data and statistics through various *measurement systems* is not disputed, Mintzberg's (1994) 'Fall of Strategic Planning' largely being interpreted as a radical transformation of the same.

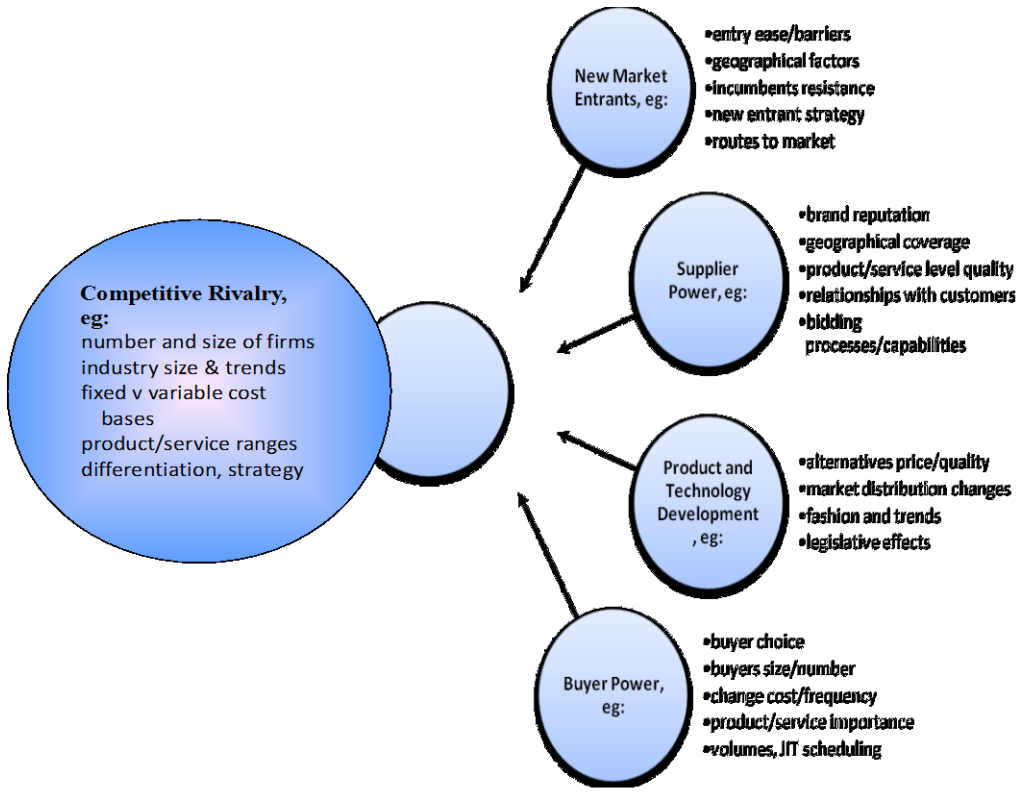
Damanpour's (1991) portrayal of *innovation* as a radical business-wide process is elaborated on by Druker (1994) into *innovation* being a discipline governed by a system that persistently facilitates innovative input and development feeding into formulated strategic planning. Entrepreneurial Orientation is defined by Kuratko (2007) as an incorporated part of the business strategy and is objectively promoted, directed and evaluated as such. Similarly, the necessity to include social, cultural and regulatory influence, in the current business environment, is incorporated into efficiency-seeking Institutional Theory. All of the preceding concepts are claimed to aid intrapreneurial, institutional behaviours (Tidd 2001, p.38). Larger organisations are likely to have reaped the benefits of innovation; however, size, organisational-wide 'cultural blanketing', stringently coded OS and OD structures and prescribed styles of management ensure they are largely innovation-averse (Manimala *et al.* 2006, McDermott, 2004). Reliance on market dominance by virtue of size and/or scope and exhibiting what Kaplan labels forceful-enabling leadership and strategic-operational leadership is not conducive to sustainability in the current business environment. Kaplan and Kaiser suggest these dualities in leadership styles and objective focus, which they refer to as the *What* and *How* of strategic leadership in Table 4.1.

Table 4.1: Model of Strategic Leadership

Leadership – What?	
STRATEGIC LEADERSHIP	**OPERATIONAL LEADERSHIP**
Plans ahead Long-term, broad-scoped perspective	Result-focused implementation of specific target-driven processes/procedures
Growth-centric Expansion, diversification	Efficiency maximisation Resources and costs
Innovation Enquiry, investigation, trial and error	Order Structured coded procedures/processes
Leadership – How?	
FORCEFUL LEADERSHIP	**ENABLING LEADERSHIP**
Takes charge Takes initiative, directs	Empowers Facilitates, gives ownership
Declares/decides Informs/instructs	Listens/includes Collaborates, consults
Pushes Expectations, accountability for results	Supports Appreciates, problem-solves

Internal organisation is a complex *dynamic structure* which is directed to adapt and evolve in response to the information gleaned from Porter's Five Forces of Competition Postion (see Figure 4.1).

Figure 4.1: Porter's Five Forces of Competitive Position



Figure

Porter's (1987) Five Forces of Competitive Position

Although Porter's theory has been criticised for being overly focused on the competition (blue ocean strategy), the five forces aligned with his theories for generic strategic application have proved useful in the recognition and proactive strategic management of market changes.

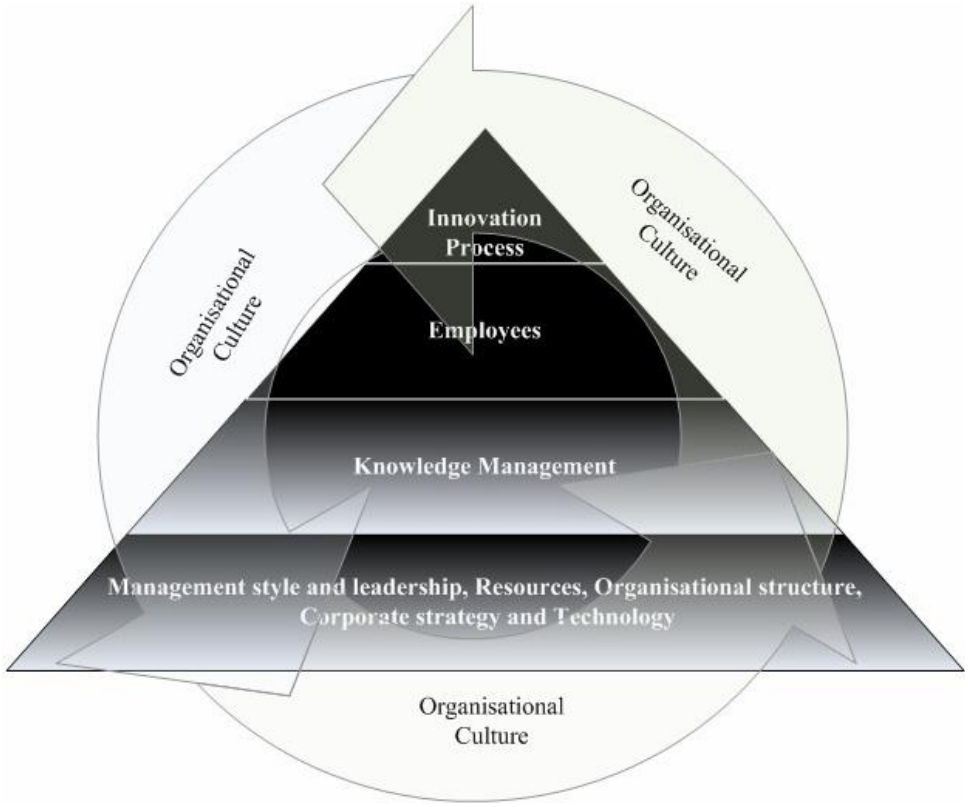
The internal competitive strategic structures have been reflected in research and theories on styles of leadership as well as OD cultures. Miles and Snow (1978) identified four generic Competitive Orientation typologies, listed in the order of proactivity and adaptability to market conditions: Prospectors, Analysers, Defenders and Reactors, the latter two being deemed the most inconsistent strategists. Differences in the formality of associated planning, specifically in emphasis on opportunistic diversification and cost-efficient, stringently clarified structures, have been suggested (Simmons 1987, Raymond, Julian, & Ramangalahy 2001). A study

on Irish SMEs highlighted the importance of strategic organisation and found that entrepreneurial businesses were more prone to formal strategic planning involving the subjective analysis of Porter's five influences (Gibbons & O'Connor 2005).

According to Porter, "the essence of formulating competitive strategy is relating a company to its environment (1980). Levie and Lichtenstein (2010) contextualise this in the current environment, pointing out that organisations are not directed by a genetic code, and despite externalities being referred to as 'organic' the firm can influence, pre-empt and anticipate environmental conditions by applying effective procedures in the *formulation* of strategic direction and manipulating internal dynamics and behaviourisms to comply with emerging and anticipated change.

The recent financial crisis and widespread recession has once again emphasised the importance of businesses incorporating strategy formation as an evolutionary process that prepares and adapts *internally* for market downturns and radical shifts in consumer behaviour (Stern 2009b.) The importance that firms placed on 'brand loyalty' pre-recession proved far frailer than expected, illustrating failings in strategic formulation and a continuance of subjective assumptions, based on historic experience, to direct forecasting, particularly in the US *pharmaceutical* and grocery industries (Edgecliffe-Johnson 2009). This is an example of what March (1991) referred to as '*Exploiter*' organisational strategy in focusing on optimisation of a competitive position rather than learning and venturing into new and enhancing practices as an '*Explorer*' organisation. Similarly, the exploitative popularity of outsourcing based on cost-effectiveness, facilitated by 'just in time logistics' and reduced supply costs in a globalised market, has proved vulnerable to rapid shifts in demand. Short-term strategic formulation in supply-chain management thus necessitates readjustment for sustainability. Effective value chains more flexible to demand shifts, such as partnerships for product development, have been suggested (Sodhi & Tang 2009).

Figure 4.2: The social side of mergers and acquisitions



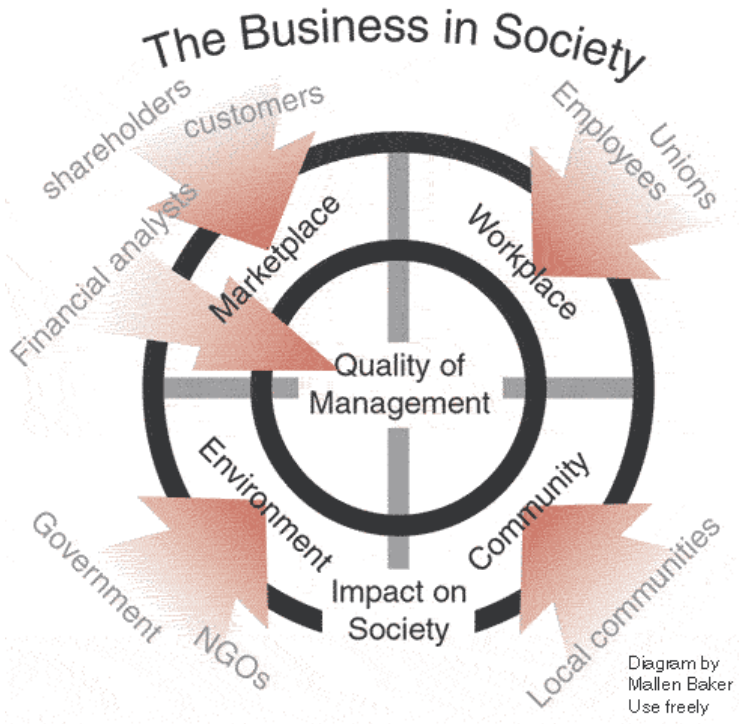
Source: Frensch 2005

Integration within an environmental culture of continual assessment and review that actively includes (rather than accommodates) cooperation and acceptance of a common objective at all levels is vital for synergy gain to be realised (Frensch 2005). Strategic communication aids cooperation and integration as an integral part of strategic management structured for competitive advantage (Gardner 2004, Hitt *et al.* 2001).

Given that the business environment of the late 20th and early 21st century has been described as exhibiting Contradiction, Chaos, Complexity and Change (Bettis & Hitt 1995), survival depends on innovative strategic management and structures. Competitive advantage is determined by factors internal and external to the firm. These strategies concerned are subject to numerous conditions and influences. Competitive advantage is a *process* which necessitates individualised tailoring to

comply with environmental and internal realities and predicted eventualities (Porter 1980, pp.41-4). Focus on internal performance data concerning capabilities and achievements, and emphasis on cost-effectiveness are not sufficient to ensure sustainability in competitive advantage. Schendel and Hofer's six aspects representing the firm's inter-reliance with its environment and the internal structures for directed strategic management are all equally part of the process. Organisational structures and processes cannot be effectively objectively directed at sustainability without Goal Formulation, Environmental Analysis and Strategy Formulation being continually performed as part of the process. Focus on economic performance-related data can be misplaced as part of the process. Innovative research into future possibilities needs to inform strategic direction to enhance sustainability (Sinha 1990).

Figure 4.3: The business in society



Source: Baker, 2010

The need to explore future environmental probabilities in sustainable strategy formulation has led to suggestions that the continuance of the present global politico-economic environment of free open markets needs to be re-evaluated. Organisational stress testing for worst-case scenarios at the strategic formulation stage has thus been proposed (Beinhocker *et al*. 2009). The process of strategic management is multi-faceted, dynamic and complex and depends on the data, external and internal, that informs it (Easterby-Smith, Golden-Biddle & Locke 2008). Creativity and innovation need to be facilitated and identified within the system so that opportunities which secure competitive advantage are realised (Carlsson & Stankiewicz 1991).

4.2.1 Strategic management frameworks and systems of measurement

The extensive changes in the business environment, technology, globalisation of international trade and construct of organisations in the last thirty years have triggered a practical and theoretical reformation in Business Performance

Measurement Methodologies (Neely & Bourne 2000, McAdam & McCreedy 1999). Schendel and Hofer's (1991) six stages can be divided into two distinct but inter-reliant sections:

- Policy formulation: Environmental analysis, Goal formulation and Strategy formulation
- Policy implementation: Strategy implementation, Strategy evaluation, and Strategy control

Both aspects rely on the quality of data that informs the processes and, as already discussed, all aspects of strategic management are continuous processes. A framework which encompasses all of the processes would then use systems of measurement to allow for comparisons and evaluations. Benchmarking, seen to prescribe competitiveness through focusing on comparisons, indicating differentiations and encompassing inspirational goals in the form of targets, is a popular 'measurement' technique.

Benchmarking, specifically as a business process, did not attract significant academic attention until the late 1980s, since when the literature on the subject has mushroomed (Deldridge *et al*. 1995, p.50). Benchmarking originated as a management tool objectively to improve operational performance, increasing productivity efficiency and hence cost-effectiveness in private businesses (Voss *et al*. 1994). Its evolution is thus entwined with that of performance evaluation measurements. Until recently it was predominantly practitioners who designed, proposed and tested the frameworks and selected the associated performance measurement tools. Today, the disassociation of academics from practitioners persists. Voss *et al*. (1994) noted a lack of diffusion and inventive cooperation in this area. Gable *et al.* (1993) pointed out the absence of a comprehensive systematic approach to valuing frameworks in practice. The absence of clarity and a systematic theoretical approach are evident in the continued ambiguity that the term 'framework' demonstrates when applied to business practice (Jackson *et al.*). Dated interpretations persist alongside those with differences in objective, purpose and utility. The resulting categorisations encompass some of the practical evolutionary interpretations:

Camp in 1989 defined benchmarking as "difference of a best industry practice", and its practical application to any work process that "is made up of an input, repeatable process based on a method or practice and an output".

Spendolini in 1992 defined benchmarking according to its focus, hence internal benchmarking focuses on the internal organisational performance standards (p.16)

- *Competitive Benchmarking* as an externally focused activity identifying work practices, products and services of direct competitors (p.18)
- *Functional Benchmarking* – again, externally focused, identifying the work practices, products and services of competitive organisations not necessarily in direct competition (p.20-21)

Early categorisations are activity- and process-orientated; later versions expand to include current business factors such as systems and cultures. The radically transforming nature of business activity, methodologies and construct and the lack of a systematic proactive practitioner-academic research approach have frustrated the formation of a unifying theory. Some such as Fong *et al.* (1998) have classified management frameworks into different typologies. From this researcher's standpoint such an exercise, within an ever-innovative business environment, is futile. The utility of any framework would depend on its versatility in application, and the division of frameworks according to focus constrains their applicability. External, competitive focus is crucial in strategy formulation and internal focus informs strategy selection. Hence, the broader definition is applied to benchmarking as:

> A continuous, systematic process for evaluating the products, services, and work processes of organizations that are recognized as representing best practices for the purpose of organizational improvement' Spendolini 1992, (p.9)

As already noted, the tendency for such measuring techniques to evaluate internal performance against historic achievements or historically set targets has been criticised since the late 1960s (Neely 1998). Measurement data used in strategic management formulation has been critiqued on many fronts:

- *Over-emphasis on financial/accounting measures* – emphasis on tangible/

quantifiable outcomes (Kaplan & Norton 2001), accounting procedures not suited to relational dynamics (Bittlestone 1994), do not equate for dominant non-financial drivers (Atkinson & Brown 2001), bias to financial/accounting management subjectivity in interpretation (Dixon *et al*. 1990), the selection of performance measures influenced by financial objectives and thus influential on consequential strategic planning (Sarkis 2001), functional as championed by HR or finance, systematic organisational approach necessary (Jackson 1994), financial metrics only evaluate physical capital, not suitable for intangible assets in knowledge-information economic environment (Barsky & Bremser 1999), lag- accounting report results not cause of strategic management (Druker 1993)

- *Over-emphasis on historical data* – financial measures are historical in nature, they report on outcomes (Kaplan & Norton 2001), denote comparisons and progress but fail to focus on differentiations crucial in today's competitive environment (Bittlestone 1994), traditional backward-looking and performance-based (Bourne *et al*. 2000), give misleading signals for continuous improvement and innovation (Kaplan & Norton 1992), encourage short-term problem-solving, reactionary strategy (Banks & Wheelwright 1979, Hayes & Garvin 1982)
- *Internally focused and directed* – self-evaluation encourages optimisation (Hall 1983), sectional performance measures not conducive to organisational structural changes (Stone & Banks 1997), ignore external factors such as customers and competitors (Kaplan & Norton 1992)

Performance measurement systems and measurements have been traditionally selected and managed by the financial accounting division, hence the static, quantifiable construct. The importance in the selection of performance measures to aid strategy formulation, reveal dynamics and illuminate differentials and opportunities has been undervalued. The effectiveness of performance measures is critical to strategic business management and organisational performance (Sarkis 2001). Many researchers have cited this as being detrimental to the development of an effective benchmarking concept (Dixon *et al.* 1990). Dixon *et al*. (1990) elaborated, claiming the currently popular performance measures provide *false alarms and gaps*. False alarms stimulate short-term corrective strategy formulation

facilitated by lag accounting techniques and gaps often caused by cost-based metrics, and lead accounting techniques fail to capture critical features.

Intensive technological advances, accelerated globalisation, changing work practices and organisational structures, increased competition and evolutionary internal and external dynamics redefining relationships with stakeholders have dramatically altered the business environment since 1970 (Anderson & McAdam 2004). A combination of business practice and academic theory has led to the emergence of various Strategic Management Frameworks (McAdam & McCreedy 1999). Some of these are:

- Organisational Learning (March & Argyris 1977), which has evolved into the Learning Organisation (Senge 1990)
- Supply Chain and Total Quality Management (TQM) (Deming 1982)
- The Balanced Scorecard (BSC) (Kaplan & Norton 1992)
- Business Process Re-engineering (Hammer & Champy 1993)
- The European Foundation for Quality Management (EFQM) Business Excellence Model (EFQM 1991)
- Six Sigma (Nonaka & Takeuchi 1995)
- Lean Accounting – Lean Business Management System

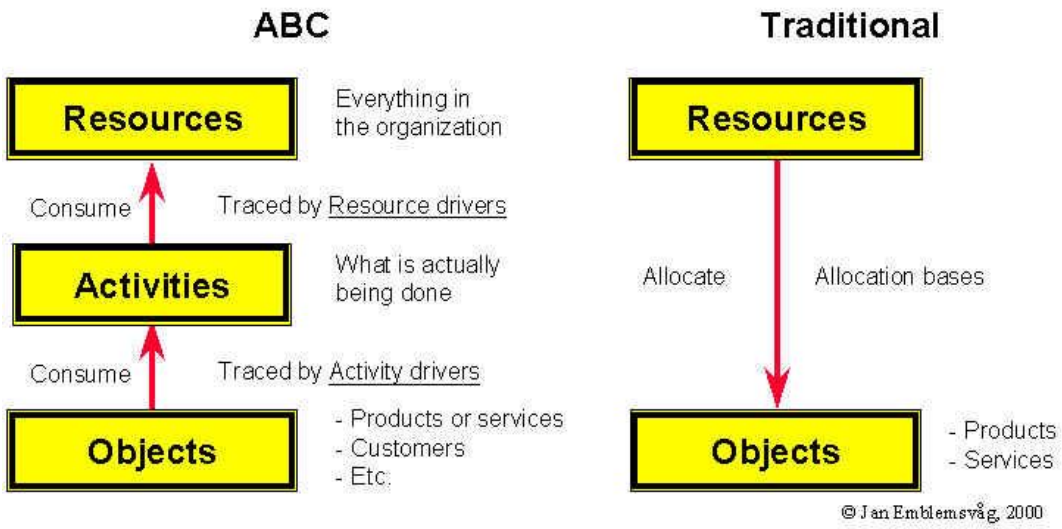
TQM, Lean Accounting, Six Sigma and the BSC are evolutionary in nature and emerged from industry strategic management techniques. They all claim to cater for tangible and intangible assets, amending the performance evaluation systems concerned in their construct and application. The current compulsion for businesses to achieve sustainable competitive advantage has led to their popularity. Critics, however, have noted the relevance of complementary dynamics in their successful application, such as CEO input, cultural and organisational objective influence. An article in *Fortune* claimed 91% of the researched companies adopting Six Sigma had experienced negative competitiveness. Six Sigma has further been portrayed as an amended model of TQM, which has been criticised for rigidity, over-reliance on lag accounting and an absence of predictive strategic stimulus. James Duran notes the dominating objective of existing performance evaluation constructs to fix existing processes rather than explore new opportunities. The necessity to reflect the

changing nature of the firm and business environmental transformation, particularly in the roles played by the public and private sector, has also been cited as missing (Saunders *et al*. 2008)

The necessity to move away from the single paradigmatic framework is essential in order that creativity, learning and adaptability are proactively encompassed in strategy formulation.

Even activity-based accounting that claims to dismantle the traditional structurally orientated evaluation system is excessively internally orientated, as is evidenced in Figure 4.4. The accounting system's predictive stimulation is heavily reliant on the subjective interpretation applied by strategy formalisers.

Figure 4.4: ABC vs. traditional evaluation constructs

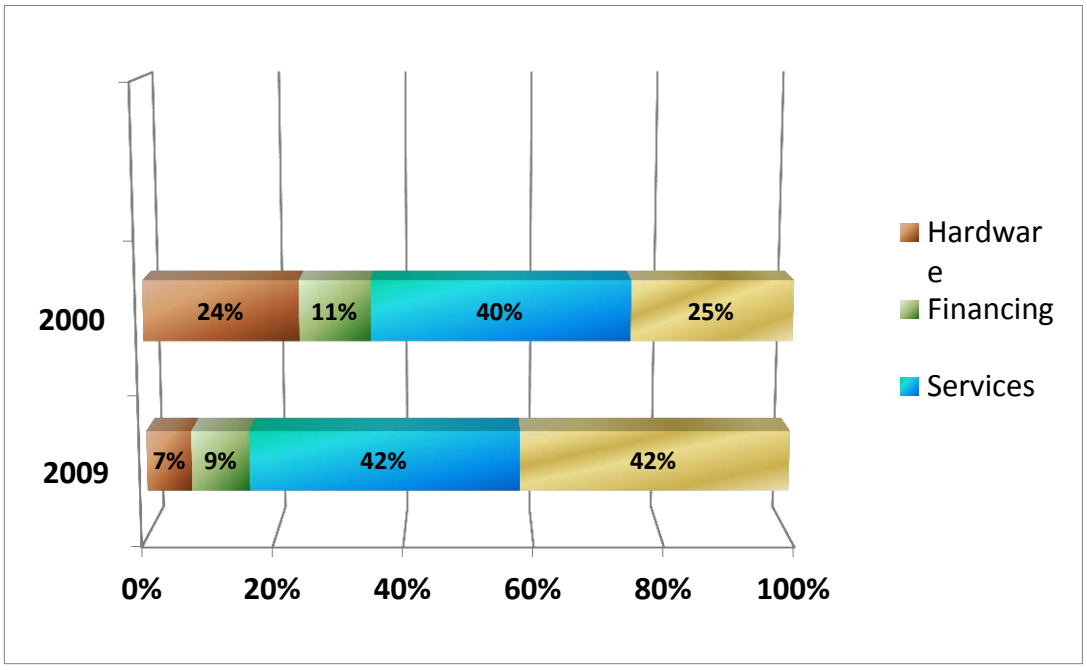


The pace of change and intensity of business competition today leads to strategists adopting vital short-term corrective measures. Reliance on cost accounting methodologies in evaluating attractive propositions, as being directly related to short-term remuneration, conflicts with long-term sustainable strategic formulation.

4.3 Conclusion

Strategic planning is objectively driven to prepare for change internally and externally and to exploit opportunities and stimulate the same. Competitiveness for short or long term sustainability is fundamental to all business activity in today's markets. The emphasis on *differentiation* and *diversification* is dictated by the pace of change and intensity of competitively. Blue Ocean Strategy proclaims to endorse business success through 'going to where the market is and competition isn't.' The recent realignment in the pharmaceutical industry which incurred Mergers and Acquisitions so that a few MNC's globally dominate, might be viewed to support such a policy. However, in reality strategic opportunities to encompass diversification were motivated by *sustainable* objectives. The scope of business activity being expanded, and diversified. The extent to which large corporations had to diversify being unable to rely on economies of scale for sustainable market share is depicted here in IBM's 2009 report on business sectored activities.

Figure 4.5: IBM growth 2000–2009



Source: IBM (2009)

The recent economic downturn has witnessed the fickleness of Brand Orientation, promoted in the 1990's as an intangible asset comparable to Intellectual property. The firm's dynamic integration in society, the dynamics between the public and businesses, the importance of business image and established perception has however increased both in significance and complexity. Transparency, Social responsibility, community connectivity, ethical conduct environmental and moral concerns are now integral to a business's global reputation. Managing diversity and the necessity of a synergetic approach in order to achieve the institutions objectives is compounded by the rapidly evolving market environment and time constraints (Kirrane 1990:55). Personal, managerial, social, institutional and global market interests all factor in to everyday management (Lankard, 1991b).

Figure 4.6: Social Enterprise Model (Sustainable Enterprise 2006)

The Social Enterprise model illustrates the dynamics of the 4 domains that global consumers, communities, governments and the media are concerned with and which then impact on a corporations reputation and hence profit margins.

The necessity for strategic management to encompass preparation for change and inspire change through innovation and differentiation demands proactive predictive planning. Internal and external cultural factors necessitate incorporation in order to encompass influential dynamics in the present and future. Progressive evaluation techniques need to encompass innovative possibilities and reflect the dynamics within the organisation rather than simply sectional structural competencies. A Strategic management framework needs to include stimulants to ensure exploratory predictive strategy formulation and implementation is embedded. It being reliant as

Porter and Chandler noted on the quality of data informing the planning, evaluation statistics need to be contextualised environmentally and include probability and stress-testing mechanisms.

Chapter 5: Competitiveness and the Application of Game Theory

Leading on from the previous chapter's examination of Strategic Management planning, the Performance Evaluation Systems and associated Frameworks that direct strategy formulation, an examination of the application of Game Theory is conducted here. The literature review supports its inclusion in clarifying that sustainable strategy formulation requires examination of the competition and stimuli that highlight probability evaluations.

The factors for national competitive advantage were identified using the Delphi technique. Another matrix model namely Game theory will be tested and applied at this stage of the research study as a new and novel way to measure the competitiveness of Ireland as a country against 2 other chosen countries, each one also having pharmaceutical operations. The application of Game Theory is an area of interest for the researcher's supervisor who suggested the exploration of it as a potential research tool.

Game Theory is most applicable to problems solving contracts, co-operation and public goods; such situations are important components of economic theory. It is a scientific quantitative technique that can be used by players to arrive at an optimal strategy. Its strengths and weaknesses are remarkably similar to the strengths and weaknesses of economic theory.

Game Theory looks at human behaviour; it does not distinguish between money and the markets. Markets are reliant on human behaviour, not on rational, informed decisions. Enhancing the effectiveness of sustainable (predictive) competitive advantage requires strategists to chase change rather than simply react to it. Human behaviour is irrational, and the application of assumptions and cognitive preference for repetition restricts differentiation being achieved, a fundamental aspect of competitive advantage.

5.1 Competitiveness of nations

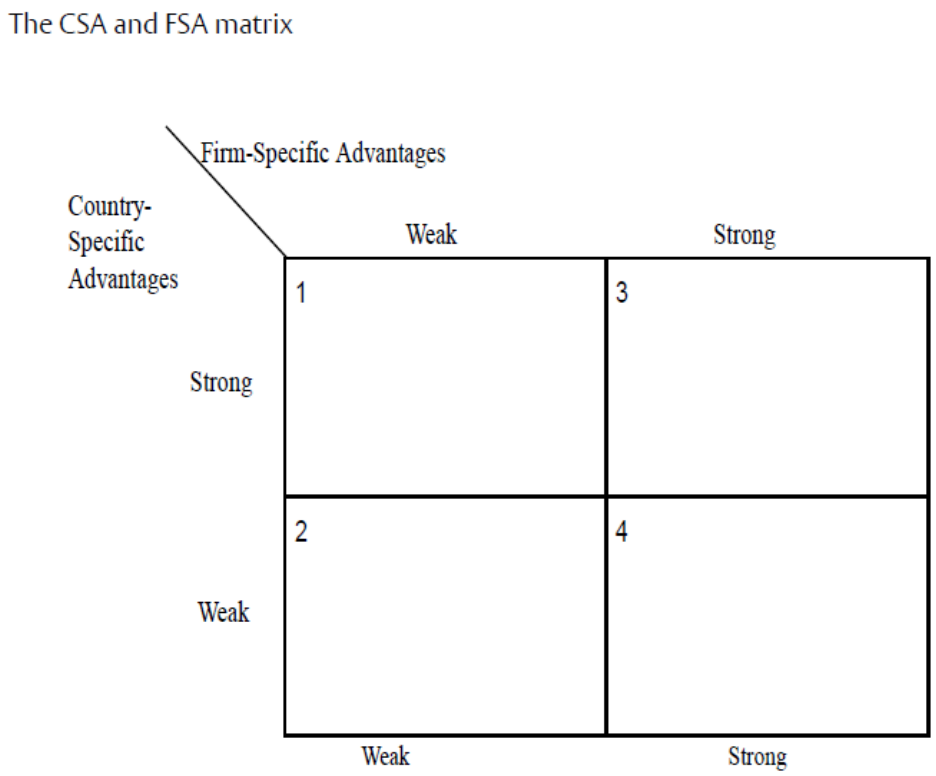
The establishment of a global marketplace has intensified competition and established competitiveness as a critical necessity for all business activity. Nations seek to be competitive in order to establish and maintain an environment that is conducive to productivity and wealth creation in order to facilitate prosperity and a

high standard of living for citizens. Thus, nations seek to establish an environment that supports enterprise competitiveness. According to Porter, sustainably competitive nations are dynamic, follow a strategic long-term business-friendly plan, have established an innovative, collaborative educational and industrial environment and are globally directed (Porter 1990). Strategic continued investment is necessary for a nation to achieve sustainable competitiveness. Porter (2008) claims sustainable national competitiveness necessarily progresses through three stages, from factor-driven to basic requirement development to efficiency-driven development in order to achieve innovation-driven sophistication and innovation factors. Economic development takes time to mature, in line with development of a knowledge economy.

Firms seek competitiveness for survival, sustainability and growth (World Competitiveness Yearbook). Firms achieve competitiveness through innovation in the quest for differentiation from competitors. Innovative behaviour develops ideas for improvement or introduction that is beneficial. It is applicable to all firm activities, processes, products and services and is therefore strategically facilitated and encouraged.

Since this research is specific to Ireland and focuses on the Irish pharmaceutical industry, Rugman's (1981) internalisation theory, which examines international competiveness through an analysis of the firm's and country's advantages, has been selected. This theory accommodates both indigenous and 'foreign' trans or multinational companies (TNCs or MNCs), in keeping with Ireland's pro-FDI and export-focused national competitive strategy. The relationship between nation and firm competitiveness is represented in the Country-Specific Advantages (CSA) and Firm-Specific Advantages (FSA) Matrix (see Figure 5.1).

Figure 5.1: CSA and FSA Matrix



Source: Rugman 1981

CSAs are competitive strengths and weaknesses that the country exhibits. Competitive advantage is ensured through strategic measures, but a country's advantages might include comparative advantage elements such as natural resources specifically in the factor-driven stage. In Ireland's case, strengths might include EU and Eurozone membership, educated workforce, etc.

FSAs are strengths and weaknesses that are firm-specific and which the firm controls. For an Irish pharma firm, these might include efficient and sophisticated production or global brand recognition.

In **Square 1:** CSAs alone are important. This relates to Porter's factor-driven stage of national competitiveness. Inherent and natural factors dominate, such as natural resources or labour availability.

Square 2: Both CSAs and FSAs are insignificant, indicating a firm's unsustainability.

Square 3: The FSAs improve through the CSAs. This relates to Porter's stages 2 and 3 of national competitiveness when efficiency and innovation drive national strategic development. This is the optimal square for the attraction of FDI and the selection of location in a firm's competitive strategy.

Square 4: Here only FSAs matter. This relates to a closed protectionist economy or possibly where a firm's required presence dictates national strategy and therefore strategic CSAs for the organisation.

A firm's strategists need to have an extensive insight into both the CSAs and FSAs, particularly in the current environment with collaboration, outsourcing and geographical dispersion being used to enhance competitiveness. As both Dunning (1998) and Porter (1990) stress, the FSAs in isolation from CSAs hold little validity. The geographical spread of MNCs and the construct of organisations, especially with increased mobility and business activity diversification, facilitate temporal FDI location. The emphasis on regional, cultural and relational dynamics has increased as national competiveness intensifies. CSA determinants are being requalified as nations seek differentiation for competitiveness, and are increasing in importance, specifically in the location of FDI.

5.2 Game Theory defined

Game Theory is the science of rational decision-making in interactive situations. It is a mathematical analysis of what choices differing players are likely to make within a 'game', given specific rules and options. John Nash used the earlier work of von Neumann and Morgenstern, proposing the 'Nash equilibrium' to enable forecasts of *rational* players' behaviour within a given construct, the equilibrium being reached by all players selecting strategies that maximise their position, in light of the other players applying their best strategy. The concept of equilibrium is central to the theory. It occurs when each player is using the strategy that will provide them with the optimal payoff in light of the strategies of all the other players. It is important to note for its application here that Nash equilibriums correspond to 'comfort zones' in the marketplace. They are not necessarily the best outcome for all players involved; for instance, a group of pharma companies might form a cartel or cluster to increase their payoffs – essentially altering the rules of the game. Under fairly general

conditions, a strategic game has one, an odd number or an infinite number of Nash equilibriums (with different payouts to the players).

Game Theory was used in this study because it focuses on how groups of people interact (a new way of reasoning about human behaviour; taking precautions and being exploitative); predicts behaviour; demands an objective but informed approach, and has the advantage over other optimisation techniques that it is grounded in the rules of the marketplace.

In strategic games, two or more players engage in marketplace competition. In its pure form, each player must select a strategy for the game from a finite set of possible strategies. Sometimes, a game can be repeated infinitely, so a player selects strategy i with probability (or relative frequency) p_i; in this case, the players are said to use mixed strategies.

Each player has to consider the full range of strategies available to all the other players, thus avoiding the dangers of isolated (myopic) decision-making. Randomness can be introduced into the model by adding an additional player, 'nature'; the only difference between nature and the other players is that she selects her strategies purely at random. The debate on the application of rational behaviour is polarised between those in favour of objective goal-driven strategies and those who purport the psychological subjective model (Klandermans 1984), where terms are perceived and thus subject to differing influences (Gamson 1992).

It should be noted that solving strategic games is a difficult mathematical problem. Computerisation has aided its calculation greatly, however; as with the historically focused performance measurement systems, it is subject to the data that informs it. The collation and objective bias of input statistics come from secondary sources.

5.3 The application of Game Theory

5.3.1 Rationale for choosing the economies

The rationale for selecting Singapore and India to be compared with Ireland was multifaceted and hence representative of the competitive nature of nations today.

As far as the pharmaceutical industry is concerned, India and Ireland are at similar stages of development, as summarised below.

Factor-Driven – English-speaking, low-waged qualified workforce, indigenous industry level facilitating market establishment, manufacturing competency, access to consumer base (India domestic, Ireland regional).

↓

Efficiency-based – employing highly qualified science students in higher-paid employment, using indigenous workforce for management and supervisory positions, integration with locally based inter-industry professionals, establishment of 'hubs' and clusters of pharma units, progression to sophisticated R&D and top-end processes of manufacture and R&D

Singapore and Ireland differ in political systems and level of development, and of course Singapore is a multilingual 'city state' whereas Ireland is more conservative and rural. Their similarities are:

Small, peripheral entities, export-focused, with highly educated workforces seeking 'professional' positions, with purpose-built industrial complexes and regional networks ensuring easy access to markets

The researcher also consulted with subject-matter experts – Dave Shanahan, Global Head of Life Sciences, IDA Ireland and Ashish Joshi, Development Lead Genzyme, a Sanofi company – on Singapore and India respectively. They ratified the choice of Singapore and India based on their knowledge of living and working in these countries.

India is viewed as a viable competitor to Irish pharma, with generic manufacturing, a well-educated workforce in Science and Engineering, cheap labour, weak patent protection, and a strong indigenous pharma sector.

Singapore transformed its economy, while in recession, from predominantly toy manufacturing to become a key global player in a number of high-tech industries by developing clusters, using its educational and infrastructure advantages, to become one of the most competitive economies in the world.

South Korea and China were considered as comparators. However, it was found that there were no striking connections in terms of these countries being competitors to the Irish pharma sector.

The following table compare the two countries with Ireland in terms of the Global Competitive Index (GCI).

Table 5.1 Competitive features – Ireland, China and South Korea

IRELAND: overall GCI is 29; a stage 3 economy	
Factor	***Ranking***
Access to funding	26.7
Inefficient government bureaucracy	18.8
Inadequate supply of infrastructure	13.8
Restrictive labour regulations	9.9
Policy instability	7.0
Tax rates	5.8
Poor work ethic in the national workforce	4.0
Inflation	3.7
Tax regulations	3.0
Inadequately educated workforce	2.2
CHINA: overall GCI is 27; a stage 2 economy	
Factor	***Ranking***
Access to funding	13.2
Policy instability	10.1
Corruption	9.5
Inefficient government bureaucracy	9.0
Inflation	9.0
Tax regulations	8.4
Inadequate supply of infrastructure	8.0
Inadequately educated workforce	7.4
Tax rates	7.1
Poor work ethic in the national workforce	5.7
SOUTH KOREA: overall GCI is 22; a stage 3 economy	
Factor	***Ranking***
Access to funding	15.3
Inefficient government bureaucracy	15.3
Policy instability	15.2
Restrictive labour regulations	12.7
Tax regulations	8.1
Inadequately educated workforce	7.7
Corruption	5.9
Inadequate supply of infrastructure	5.5
Tax rates	3.9
Inflation	3.7

The GCI data above indicates that Ireland is on par with both China and Korea in terms of competitiveness. Both Ireland and Korea are stage 3 economies, while China is a stage 2 economy.

Korea possesses a world-class infrastructure and excellent education system, and remains one of the world's innovation powerhouses. Its main weakness is its labour-market flexibility, difficulties in hiring and firing employees (severance pay, for example, is equivalent to 91 weeks' worth of salary). Access to credit and financing has become more difficult in Korea; the business community are questioning the banking system, an experience similar to Ireland in recent years.

China's main strengths are its large and growing market size and relatively sophisticated innovative businesses, with access to credit and financing a slight improvement on Ireland and Korea. China has made small strides in the quality of higher education but there is much room for improvement.

A review of each of the three economies suggests that the number of similarities outweighs the differences. Since the key to competitive advantage is differentiation, there is no value in applying Game Theory to such economies. The pay-offs identified in the games between Ireland, India and Singapore are more viable and will pay dividends to Ireland as it operates in a global economy

The rankings suggest that there are common features between Ireland and Korea. The 'can do' attitude of a well-educated workforce is a strength for Ireland, as is a strong infrastructure for Korea. A similar situation would be noted for a potential game between Ireland and China, with education being a positive strength for Ireland, and market size for China.

Based on this consideration, the choice to use India and Singapore to assess Ireland's competitiveness as a pharmaceutical manufacturing location is justified. The differences between each of the three economies outweigh the common features that exist between the alternative ASEAN economies such as China and Korea.

Table 5.2 summarises the competitive features as between Ireland, Singapore and India.

Table 5.2: Competitive features – Singapore, Ireland and India

	SINGAPORE	IRELAND	INDIA
Development phase	Sophisticated – innovation	Factor – efficiency	Factor – efficiency
MANUFACTURING	High level of competency-superior machinery-	Medium-high wages. High safety standards and technology. Quality management.	Low cost, efficiency-driven structures, processes from Japanese industry similar to Lean manufacturing.
R&D	Strong support intra and inter- industry. Higher end, innovation emphasis. Strong collaboration with academia.	Strong government support. Academic collaboration: UCD Centre for Molecular Innovation and Drug Discovery, The National institute for Bio Processing Research and Training NIBRT	Clinical trials. Society of Biomedical Technology (SBMT) working in collaboration with government departments, establishing centres using indigenous supplies targeted at indigenous customers.
Workforce	Higher wages for lower skilled jobs than neighbouring states. Availability of highly qualified international employees.	Highly educated – subject specific. Fewer science graduates.	Highly qualified, business-orientated. Availability of PHD science and medical staff.
Transport	Highly sophisticated multidimensional global focus.	Road, air and sea freight, high costs of fuel.	Problematic logistically. Emergence of hubs and purpose-built industrial parks targeted for specific pharma processes.
Utilities	World-class use of seafront and islands integrating urban with specific pharma needs.	Purpose-built complexes. High cost of power and diesel. Urban access from purpose built units.	Electricity supplies weak. Government support in accessing water etc.
FDI attraction	Very strong, targeted industry sectors to enhance innovation.	High level of financial and bureaucratic support. Specific financial incentives for R&D. IP tax benefits.	Limited and subject to compliance with local industries and consumers
Regulatory Framework	Full IP protection.	Established collaboration with US. Development organisation assistance with local regulatory needs. IP protection.	Newly compliant with US and international standards.
Suppliers	Local network for outsourcing and imports.	Almost entirely imported.	Strong indigenous, entrepreneurial. Can incur transport logistics and costs. Supply chain can be geographically dispersed.
Consumer Base	Export-driven regional access to Asia/Australasia.	Export – strong regional network. No domestic.	Domestic with growth potential and regional.

5.3.2 Global competitiveness

According to the Global Competitiveness Index 2010-11, India, Ireland and Singapore are ranked as follows:

Country	Rank 2008-9	2010-11
India	50	51
Ireland	22	29
Singapore	5	3

The ratio values for each matrix were derived by dividing the competitiveness weight by the overall country competitiveness index to get a fraction. A further computation was performed, along with a judgement of the state of advantage/competitive disadvantage to result in the ratios provided in the tables below.The movement of competitiveness from 2008/9 to 2010/11 and improvement, maintaining or sustaining competitive advantage was also considered.

From the Global Competitiveness Reports 2008/9 and 2010/11, the following factors and indices for competitiveness were identified for each country, as follows:

Table 5.3: Ireland overall competitiveness 2008 - 2011

GCI: 2008/9 = 22; 2010/11= 29

IRELAND

Factor	Metric	2008/9	2010/11	weight
Innovation advantage	Quality of scientific research institutions	17	16	16
	University-industry collaboration	16	17	
Ease of business advantage	FDI and technology transfer	2	1	10
	Internet bandwidth	27	21	
Infrastructure comp. disadvantage	Quality of overall infrastructure	64	69	48
	Quality of air transport	46	52	
	State of cluster development	26	32	
Government comp. disadvantage	Wastefulness of government spending	45	93	68
	Pay and productivity	76	56	

Table 5.4: India overall competitiveness 2008 - 2011

GCI: 2008/9 = 50; 2010/11= 51

INDIA

Factor	Metric	2008/9	2010/11	weight
A. Business style advantage	Special economic zones/ clusters	24	29	25
	FDI and Technology transfer	20	28	
B. Education advantage	Quality of math & science education	37	38	
	Quality of scientific research institutions	27	30	20
	Availability of scientists & engineers	3	15	
C. R&D comp. disadvantage	University-industry collaboration	45	58	
	Government procurement of adv. technology	88	76	50
D. Labour market comp. disadvantage	Pay and productivity	45	61	
	Hiring and firing practices	104	89	85
	Flexibility of wage determination	54	61	

Table 5.5: Singapore overall competitiveness 2008-2011

GCI: 2008/9 = 5; 2010/11 = 3

SINGAPORE

Factor	Metric	2008/9	2010/11	weight
L. Ease of business advantage	FDI and Technology transfer	1	3	3
	Prevalence of trade barriers	2	5	
M. Clusters advantage	Quality of infrastructure	2	3	
	Cluster developments	3	5	3
N. Innovation advantage	Quality of scientific research institutions	13	11	
	Company spend on R&D	10	8	7
	Government procurement of adv. technology	1	2	
P. Technology advantage	Availability of latest technologies	14	20	
	Broadband subscribers	22	22	18

5.4 Game Theory computation

The researcher was concerned only with the application of Game Theory as a research tool. All of the mathematical calculations and conclusions were completed by the researcher's supervisor. Interpretation and integration of the data into the thesis discussion was performed by the researcher.

5.4.1 Applied Game Theory results – Two-Player Bi-matrix Games

In a two-player bi-matrix game the payout to the players is represented by a table, with two entries per cell. The entry ($a_{i,j}$, $b_{i,j}$) in cell (i,j) is the payout to player A (player B, respectively) if A selects strategy i and B selects strategy j.

- **Game 1. Two- Player, Bi-matrix Game: Ireland vs. India**

In the Pharmaceutical Marketplace, suppose that Ireland might select the strategies

1 – Investment in Innovation

2 – Investment in Facilitating Business

3 – Investment in Infrastructure

4 – Investment in Government ***

And India might select the strategies

A – Business Style

B – Education

C – R&D

D – Labour Market

The pay-outs to Ireland and India are given by the bi-matrix table, with values being represented in €billions.

	A	**B**	**C**	**D**
1	12, 10	12, 8	12, 20	12, 40
2	6, 10	12, 16	6, 20	6, 40
3	16, 8	32, 16	20, 20	32, 40
4	25, 8	25, 5	40, 16	20, 20

- **Game 2. Two- Player, Bi-matrix Game: Ireland vs. Singapore**

Singapore might have the strategies

L – Investment in Ease of Business

M – Clustering

N – Innovation

P – Investment in Technology

With the associated bi-matrix game:

	L	**M**	**N**	**P**
1	12, 2	11, 7	18, 6	20, 20
2	9, 3	10, 6	12, 8	12, 24
3	20, 2	12, 4	21, 3	30, 11
4	25, 4	18, 8	25, 6	30, 8

Solution Procedures for Two-Player Bi-matrix Games

The Lemke-Howson algorithm is an efficient algorithm for solving two-player bi-matrix games. It has the advantage that it can easily be modified to find a large number of (possibly all) Nash equilibriums.

For example, in the Ireland vs. India bi-matrix game, the Lemke-Howson algorithm found the single Nash equilibrium:

Nash 1.

Ireland selects the probabilities {0,0,1,0} and so only plays strategy 3, with the expected payout 32.0

India selects {0,0,0,1} with expected payout 40.0.

For the Ireland vs. Singapore bi-matrix game, the Lemke-Howson algorithm found three Nash equilibriums:

Nash 1.

Ireland selects probabilities {0,0,1,0} with expected payout 30

Singapore plays {0,0,0,1} with expected payout 11

Nash 2.

Ireland selects probabilities {0,0,0,1} with expected payout 18

Singapore plays {0,1,0,0} with expected payout 8

Nash 3.

Ireland selects probabilities {0,0,0,1} with expected payout 30

Singapore plays {0,0,0,1} with expected payout 8.

It is also possible to formulate a bi-matrix strategic game as a Linear Complementarily Problem (LCP). In the case of the Ireland vs. India the LCP is as shown:

LCP:

$$u_1 = 12\,\eta_1 + 12\,\eta_2 + 12\,\eta_3 + 12\,\eta_4 - 1$$

$$u_2 = 6\,\eta_1 + 12\,\eta_2 + 6\,\eta_3 + 6\,\eta_4 - 1$$

$$u_3 = 16\,\eta_1 + 12\,\eta_2 + 20\,\eta_3 + 32\,\eta_4 - 1$$

$u_4 = 25\,\eta_1 + 25\,\eta_2 + 40\,\eta_3 + 20\,\eta_4 \quad -1$

$v_1 = 10\,\xi_1 + 10\,\xi_2 + 8\,\xi_3 + 8\,\xi_4 \quad -1$

$v_2 = 8\,\xi_1 + 16\,\xi_2 + 16\,\xi_3 + 5\,\xi_4 \quad -1$

$v_3 = 20\,\xi_1 + 20\,\xi_2 + 20\,\xi_3 + 16\,\xi_4 \quad -1$

$v_4 = 40\,\xi_1 + 40\,\xi_2 + 40\,\xi_3 + 20\,\xi_4 \quad -1$

with $u, v, \xi, \eta \geq 0$ and $u_1\,\xi_1 = u_2\,\xi_2 = u_3\,\xi_3 = u_4\,\xi_4 = v_1\,\eta_1 = v_2\,\eta_2 = v_3\,\eta_3 = v_4\,\eta_4 = 0$

and $\xi_1 + \xi_2 + \xi_3 + \xi_4 = \eta_1 + \eta_2 + \eta_3 + \eta_4 = 1.$

However, attempts to solve this as a set of linear equations using Mathematica failed to converge. Equally, Merill's algorithm, using the techniques of Simplified Fixed Point Theory, failed to converge. This points to the inherent difficulty of solving Linear (and Nonlinear) Complementarily Problems.

5.5 Multi-player games

When we introduce a third player, the underlying problem becomes a Nonlinear Linear Complementarily problem with quadratic terms. For n players, the NCP has order n-1 equations and the data requirements are extremely large.

In many n-person games, the number of interactions between the players is limited and is often confined to mutual interactions. These are called network games, as they have many applications in pricing models for the Internet.

Example 3 Network Game of Ireland vs. India and Ireland vs. Singapore

The LCP equations are:

$u_1 = 12\,\beta_1 + 12\,\beta_2 + 12\,\beta_3 + 12\,\beta_4 + 12\,\gamma_1 + 11\,\gamma_2 + 18\,\gamma_3 + 20\,\gamma_4$

$u_2 = 6\,\beta_1 + 12\,\beta_2 + 6\,\beta_3 + 6\,\beta_4 + 9\,\gamma_1 + 10\,\gamma_2 + 12\,\gamma_3 + 12\,\gamma_4$

$u_3 = 16\,\beta_1 + 32\,\beta_2 + 20\,\beta_3 + 32\,\beta_4 + 20\,\gamma_1 + 12\,\gamma_2 + 21\,\gamma_3 + 30\,\gamma_4$

$u_4 = 25\,\beta_1 + 25\,\beta_2 + 40\,\beta_3 + 20\,\beta_4 + 25\,\gamma_1 + 18\,\gamma_2 + 25\,\gamma_3 + 30\,\gamma_4$

$v_1 = 10\,\alpha_1 + 10\,\alpha_2 + 8\,\alpha_3 + 8\,\alpha_4$

$v_2 = 8\,\alpha_1 + 16\,\alpha_2 + 16\,\alpha_3 + 5\,\alpha_4$

$v_3 = 20\,\alpha_1 + 20\,\alpha_2 + 20\,\alpha_3 + 16\,\alpha_4$

$v_4 = 40\ \alpha_1 + 40\ \alpha_2 + 40\ \alpha_3 + 20\ \alpha_4$

$w_1 = 2\ \alpha_1 + 3\ \alpha_2 + 2\ \alpha_3 + 4\ \alpha_4$

$w_2 = 7\ \alpha_1 + 6\ \alpha_2 + 4\ \alpha_3 + 8\ \alpha_4$

$w_3 = 6\ \alpha_1 + 8\ \alpha_2 + 3\ \alpha_3 + 6\ \alpha_4$

$w_4 = 20\ \alpha_1 + 24\ \alpha_2 + 11\ \alpha_3 + 8\ \alpha_4$

with the complementary equations

$u_1\ \alpha_1 = u_2\ \alpha_2 = u_3\ \alpha_3 = u_4\ \alpha_4 = v_1\ \beta_1 = v_2\ \beta_2 = v_3\ \beta_3 = v_4\ \beta_4 = w_1\ \gamma_1 = w_2\ \gamma_2 = w_3\ \gamma_3 = w_4\ \gamma_4 = 0,$

With non-negative variables and the normalisation requirements

$$\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 = \beta_1 + \beta_2 + \beta_3 + \beta_4 = \gamma_1 + \gamma_2 + \gamma_3 + \gamma_4 = 1$$

We can deduce the solution of the network game from the solution of the two bi-matrix games.

Nash 1.

Ireland selects strategy 3 – probabilities {0,0,1,0}

with expected payout 32 + 30

India selects strategy 4 – probabilities {0,0,0,1} with expected payout 40

Singapore selects strategy 4 – probabilities {0,0,0,1} with expected payout 11.

5.6 Game Theory findings

The *Two-Player, Bi-matrix Game: Ireland vs. India* solution achieved Nash equilibrium when Ireland invested in infrastructure and India promoted its 'labour' advantage.

With Singapore in the same framework three equilibria emerged:

1.	**Ireland**	Infrastructure	**Singapore**	Technology
2.		Government		Clustering
3.		Government		Technology

The networking solution is built on the bi-matrix solutions and thus suggests that Ireland opt for infrastructure.

5.6.1 Theories on competitiveness

Before discussing the findings of the Game Theory application, it is necessary to evaluate the validity of the data which informs it. Cross-country comparisons of growth are aggravated by the data provided being subject to differing definitions in variables and techniques applied in their collation. Hence, comparisons of international data should be cautiously approached. The figures provided are based on the collation of data by Performance Evaluation Systems and thus subject to similar concerns as those expressed in the previous chapter when their internal application within a firm was explored.

The statistics arrived at derive from an amalgamation of performance data collated historically and so subject to lag accounting restrictions. Of potential relevance here are the following:

Dixon's (1990) theory of such accounting methodologies noted false alarms, inspiring corrective short-term strategies and more importantly *gaps* caused by the omission of critical factors which cost-based metrics and lag/lead accounting techniques fail to identify. Notably, with Game Theory differentiation is concerned with established (historic) elements of competitiveness and fails therefore to identify emerging innovative elements.

Upper Echelon theory implies that the collation, interpretation and comparison of data is influenced by the cultural subjectivity of system directors and designers. Potentially, then, the final statistics for international comparisons of national data have been subjected to multiple tiers of such activity within the nation and by 'international' bodies. The statistical validity for application with a predictive tool based on rational objectivity, such as Game Theory, is thus weakened considerably (Hofstede 1991). Furthermore, strategists' cultural influences affect their perception of the environment and are therefore reflected in their formulation of strategies. These have been noted as being specifically relevant, implying objective treatment of individual countries in international comparisons could be tainted (Katz *et al.* 2000).

The variables here are unclarified and could be interpreted very differently. The concept of 'clustering' is the subject of much debate and a universal definition has not been definitively clarified. Singapore, currently, and Ireland in the 1980s dealt with their telecommunications policies as being 'infrastructure'; however, its

distinction from 'technology' is highly ambiguous, especially in the current broadband era.

The statistics compiled by the World Competitiveness Yearbook (WYC) used here view 'International Competitiveness' to be a combination of inherent assets, created assets and the processes that convert assets into national economic results. This is not reflected in the manner in which nations assess their own competitiveness or collate their national statistics.

Competitiveness is examined at three levels: the firm, the industry and the country. One definition of competitiveness does not, however, fit all. Differing criteria apply according to time and *context*. Competitiveness is a relative concept (Ozcelik & Taymaz 2004). The amalgamation of statistics gleaned objectively at firm level and applied to industrial or national and then international level is questionable. The list below explores some definitions of competitiveness for the three strata:

- A firm's international competitiveness is defined by Porter (1990) as the application of International Trade Theory. According to D'Cruz and Rugman (1992) it is the ability to create and effectively market a superior alternative to that of your competitors. The international competitiveness of a firm is said by Milberg and Houston (2005) to involve competing for global market share through exports and competing with global manufacturers at home for domestic market share.

- Industrial competitiveness is defined by Porter (1990) as consisting of five competitive forces determining viability, profitability and attractiveness. These are: the threat of new entrants and substitutes, the bargaining power of suppliers and buyers, and the intensity of rivalry within the industry. Industrial competitiveness is then only reliant on a nation's competitiveness in relation to the development policies impacting on productivity and costs. There is, however, no parallel between industrial competitiveness and national competitiveness on a statistical level.

- National competitiveness – the capability of a nation to increase welfare and thus supply-side costs but remain sustainably competitive internationally (Saji 2002). Krugman (1996) asserts that nations do not compete and that

national wealth is determined by traded and non-traded productivity. International competitiveness is *not* a zero sum game; there are no winners and losers. It is not then about establishing a trade advantage over another nation but about achieving effective trading for the nation's benefit, relating to a nation's productivity and prosperity. International competitiveness cannot be based on a nation's exports alone as national trade is encouraged to facilitate reciprocal benefits and nations are concerned with balancing the BOP. National competitiveness and hence international competitiveness is different to the competitive advantage of a firm.

5.7 Interpretation of the Game Theory results

- **Game 1. Bi-Matrix Ireland-India**

Nash equilibrium for Ireland and India was arrived at when Ireland opted for an infrastructural development plan and India focused on labour. It should be noted that the Nash equilibrium does not always ensure the optimal option for each player.

The information is clearly historically related, based on historical statistics derived from the collation of information over time. Ireland is in a recession and has just emerged from over fifteen years of extensive private/public investment in infrastructural development. The national strategic focus is to use the existing infrastructure to attract efficient, innovation-driven employment.

India, like most developing countries, has used an available workforce to encourage manufacturing and low-skill employment. However, government strategies for the attraction of FDI were always conditional on local market integration and focused on the creation of higher-skilled professional employment and indigenous entrepreneurial activity. The academic system is funded through a combination of public and private investment and produces highly qualified personnel in a number of areas; the quantity and calibre of science and medical students has gained global recognition. The national strategic focus on 'labour' as regards the pharma industry has been concerned with retaining highly qualified citizens by promoting medical tourism and efficient, innovation-driven pharma enterprises. The attraction of pharma manufacturing is growing due to the low labour costs, growing domestic market demand, competitor presence and diversification potentials.

The Game Theory results are enlightening as a snapshot, but do not reflect the national progressive development strategic stance nor the requirements in context. The fundamental assumption of a 'game' with the same 'rules' does not apply; the cultural realities, policies and aspirations of the players differ, and their objective for playing the game and desired results are not the same. Ireland and India want to be competitive but they are not competing with each other; their national assets, potential and aspirations differ.

- **Game 2. Bi-matrix Ireland-Singapore**

The three Nash equilibriums reached were:

1.	**Ireland**	Infrastructure	**Singapore**	Technology
2.		Government		Clustering
3.		Government		Technology

Singapore has emerged as a sophisticated innovative location. Its differential 'competitive factor' is in being an international hub entirely export-driven and a strong academic and business base that views itself as competing with cities (rather than nations) in developed states. According to the IMF, Singapore ranked 11th worldwide for GDP in 2011 (ahead of the US). On Purchasing Power Parity against GDP per capita, Singapore was rated third after Qatar. Singapore's advantage of being an exporting 'city state' implied that the effects of the financial crisis were limited to demand-side shortfalls. Significant internalisation of the financial industry did not apply. The indigenous populace experienced minimal flux in living standards. According to the Singapore prime minister, the strategic development objective is to continue to pursue innovation and sophistication, the service industries benefiting from this providing for lower-level employment. Increased prosperity has led to higher wage costs than those in neighbouring states. Mass lower skilled employment is then not viable.

Technological development in the supply of telecommunications was indeed a feature at the beginning of the century. However, the physical framework has been established and a competitive industry is in existence today. By virtue of its geographical space and strategic policy, Singapore has been established as a business hub. Unable to exploit mass manufacturing, it has focused on blue-collar and highly

skilled employment. Sophisticated industries have been targeted and thus there is significant inter-industry networking and knowledge spill-overs. Investment in education has led to largely private industry universities attracting scholars from the region and collaborating with industries to their mutual benefit. The main industries range from finance and education to pharma-chemical and software. As such then, Singapore could be said to have a business cluster. Its size dictates that concentration on a sector such as pharma could leave it extremely vulnerable to market fluctuations.

As already noted, Ireland's strategic industrial policy, reflecting rises in wage costs and living standards, is focused on establishing skilled labour in the transformation from a factor to efficiency-seeking economy. Infrastructure has already been discussed; the emphasis on government reflects the financial crisis and need for long-term sustainable strategic development planning. A sustainable business environment requires a stable and predictable economy, and senior strategies that enhance competitiveness through investment in the supply-side factors such as education, innovative business-friendly taxation systems and flexibility in responding to business needs. Since the 1950s Ireland has sought FDI to promote industrial development. Low corporation taxation, financial incentives and support from government agencies have featured strongly. As an export-driven 'open' economy, the BOP and GNP have been highlighted as demonstrating the success of such policies. However, as the Irish economy changed and became more prosperous strategic development policy was only redirected to higher-skilled employment. Ireland still relies on low taxation rates to promote employment and prosperity. The significant differences between GDP and GNP were not reflected by timely development policies to support indigenous businesses and focus on integration of existing FDI enterprises to enhance sustainability. Mobility within the globalised marketplace has left Ireland exposed to exploitation in enterprises locating skeletal businesses in order to exploit taxation benefits, especially in IP turnovers. Large-scale industries have been insulated in purpose-built complexes that benefited from available, competitively priced labour and low taxation, and were integrated within the larger global corporation importing supplies and exporting products. Minimal integration into the indigenous business environment facilitated ease of mobility as supply-side cost factors rose. Additionally, the workforce was left without

comparable indigenous employers. The Irish taxation system supports entrepreneurs with ten or more employees but fails to inspire innovation at the conceptual stage. R&D financial support packages have been welcomed, particularly by the pharma industry, but international mobility risks being temporal. Outsourcing of manufacturing and relocation to gain advantages from intra-industry collaboration has not been adequately prepared for.

5.8 Conclusion

Once the analysis of theoretical and exploratory research had established Irish industrial cultural practice and barriers to good strategic practice, an investigative application of Game Theory at national level was conducted to explore predictive stimuli. In looking forward to reason backwards, Game Theory adopts a realist view of the market as dynamic rather than as a static continuum. Its reliance on rational human behaviour, however, leads to co-operation endorsing a failing outcome as being a strategically preferable option. The business compulsion is to survive and there is emphatic pressure to maximise profit for shareholder benefit.

Academic frameworks use financial indicators to measure performance. Lag accounting as opposed to lead financial data shows profits and does not depict differentiation. Academic models do not look at the reasons for the use of financial metrics but accept them based on published material, nor do they suggest ways to counter-balance the use of data in tandem with questioning and enquiry at the formulation stage to fully inform the senior strategists to make better decisions in strategic planning.

In reality the ‘game’ involved in competitiveness depends heavily on differentiation. Game Theory uses historic elements of competitiveness to predict behaviour. The game is evolutionary; rules are being altered, created and discarded continuously. While Game Theory predicts dynamic behaviour, it applies dynamics from the past to the future.

The concept of business ‘clusters’ or ‘hubs’ is founded on the premise that like or inter-reliant businesses benefit from being in close proximity. While the concept is not new, the underlying assumptions have altered significantly in the global market environment, and the perceived benefits of ‘clusters’ have led governments and

development authorities to proactively target their establishment. Theorists have long sought to analyse the necessary components that establish and sustain a 'cluster', an exercise that has been frustrated by the pace of change and the influence of local socio-political cultural traits, industrial realities and personalities in strategic positions. There has always been an assumption that a cluster consists of a variety of firms and includes SMEs, inter-reliant firms, competitors and large firms (Markusen 1996, Porter 1998). The establishment of agglomeration economies facilitates economies of scale, reducing the cost of co-operation and influence (Maskell 2001) and intensifying innovative competition through the ease in diffusion of knowledge (Boschma & Iammarino 2009). Most significantly, clusters aid firms' 'external' integration and influence, establishing what Amin and Thrift (1995) refer to as 'institutionally thick' environments, in which political, regulatory, social and economic stakeholders collaborate in establishing an environment conducive to locational sustainability.

However, geographical proximity alone does not secure the innovation and increasing returns that Storper and Venables (2004) refer to as 'buzz'. Moodysson and Jonsson (2007) point out that a lack of diversity, in firm size, objective, activity and industry, can stifle innovation through reiterating 'sameness'. This is a possible reason for the localisation of multinational manufacturing pharma firms in Cork Harbour not resulting in significant 'spill-over effects' or the establishment of a cluster. The importance of 'pipelines', purpose-built relationships and connections between a range of local and diverse institutions and businesses is fundamental to innovation. Local and regional buzz is dependent on the diversity of sources of knowledge and construct of the participants (Doloreux & Parto 2005). A proactive business environment that supports innovative activities at all levels – educational, institutional, at SME and TNC levels, inter-industrial – and stimulating collaborative networks beyond geographical proximity, through communication infrastructure, institutional representation and trade promotions (national and international trade fairs, and umbrella institutions) determines sustainable innovative economic activity (Maskell *et al*. 2006). The foundation of greater innovative capacity within and outside clusters relies on diversity in firm size, sector, construct and culture, and heavily depends on the proactive, openminded outlook of managers, which is why novel radical industries are more likely to establish cluster formations.

The examination of Game Theory did not illuminate the necessities for cluster formation; it simply noted their relevance. National and industry strategists in practice are not benefiting sufficiently from the findings in academic literature. Financial representation fails to reflect the constituent dynamics. Ireland continues to focus on targeted industries for FDI, expecting 'spill-overs' and the development of clusters. The industry strategists use mobility to view location as temporal, possibly due to many being based abroad, and do not proactively seek to establish and exploit 'pipelines' that would bring financial reward.

Ambiguity in the definition of competitiveness has been discussed already. Fundamentally, objectives for playing the game and desired solutions differ. Policy-makers seeking re-election are prone to adopt short-term strategies and apply 'one shot' gaming strategies.

The complexity of the calculations used in Game Theory, historical selection of criteria, the subjectivity of strategists and, critically, inaccurate identification of the rules of the marketplace in context hinder its practical utility for firm strategists. Although Game Theory can model any *rational* human behaviour and provides a mathematical depiction of the same, it is not sufficient to be of practical utility in this case. The quality of the data informing the model, the subjectivity that determines the model and 'game' being tested, and the requirement for all players to behave rationally, weakens its wholesale practical utility. However, its application did stimulate objective predictive investigation. It pre-empts 'competitor' behaviour and essentially asks questions – a vital component of sustainable strategy formulation, which is lacking in performance evaluation systems.

The term competitive advantage is an economic term. One of the findings from the Delphi study was how the term was misinterpreted by practitioners as a term defining performance management.

The online survey confirmed the lack of differentiation or innovation within Irish pharma companies, which were happy to follow TQM methodologies as a means to improve their comparative, not their competitive, advantage. Pharma management need to realise their position as influencing national policy in order to protect their organisations from shocks in the environment, to pre-empt change and strengthen their sustainability.

The period of the study, following the start of the recession, was timely, in confirming the lack of innovation, even in adversity, to overcome the negativity of the economic climate favouring replication over innovation.

The application of Game Theory is an area of interest for the researcher's supervisor who suggested the exploration of it as a potential research tool.

Game Theory provides an insight into several less well-known aspects which arise in situations of conflicting interest. It is a scientific quantitative technique that can be used by players to arrive at an optimal strategy. Its strengths and weaknesses are remarkably similar to the strengths and weaknesses of economic theory.

The purpose of Game Theory was to compute the pay-offs and to predict the criteria that would favour Ireland as the preferred pharmaceutical manufacturing location and so improve its competitiveness over the other two economies. Ireland, India and Singapore are competitors in phamaceutical manufacturing. Ireland's rating in the Global Competitive Indes lies in between the high competitive Singapore and not so competitive India. Based on the results of this computation, it was discovered that a similar assessment would not be transferable/appropriate to organisational competitiveness. Game Thory as an instrument for strategic management is complex and mathematical. Upon further analysis, the researcher considered that it might be possible to 'borrow' the method and to apply its predictive stimuli in a novel, practical and inductive way to inform the development a sustainable framework.

The use of the technique made the researcher take a more objective view of the comparative advantages of each individual economy, and to consider Game Theory as a springboard for strategy formulation, more forward-thinking and more enquiry, and where all options are investigated as to whether they are viable or not.

Chapter 6: Development of the Framework Prototype

This chapter discusses the development of a framework prototype for practical use by Irish Pharmaceutical companies. It was discovered from the secondary research, literature review, that most theories on framework development were based on historical data and past experience. There is a need to develop a framework that will stimulate the senior management in Irish pharma organisations to think and formulate a strategy that is sustainable and will improve their competitive advantage.

6.1 Evaluation of the primary research

The principle research question that this thesis seeks to answer is as follows:
What framework structure is most appropriate for use by an Irish pharmaceutical enterprise to drive and sustain its competitive advantage?

The desirable elements for a framework driving sustainable competitive advantage for practical utility in the Irish pharmaceutical industry needs to be contextualised, in the national, global and industrial cultural experience. Without this, strategic predictive policy would risk being highly speculative, based on subjectivity and assumptions. Further, as has been affirmed through the primary and secondary research, the framework needs to be more than flexible. The construct demands continuous review and adaption in order to remain contemporarily relevant and proactively approach innovative change. The objective is to create a framework that will *stimulate* predictive exploratory strategy formulation in order to achieve sustainability. In essence, the framework is focused on *strategy inspiration* endorsing differentiation, innovative and objective strategy formulation and the vital components for sustainable competitive advantage.

This was confirmed in the primary research specifically with the on-line survey which facilitated an examination of strategic practice during a period of global and national economic crisis. A lack of strategic preparation for a downward business cycle turn was clearly evident even if the global financial crisis could not have been foreseen, negative shocks had not been adequately prepared for. Within Ireland the cultural changes that had been incurred due to the economic boom had not been

internalised into either business or national strategies, the consequence of *change* has been missed.

The findings from the application of Game Theory highlighted it as a measurement tool, with some predictive properties, in computing comparable tangible data, but with no consideration for the dynamics (or context) between pharmaceutical organisations.

6.2 General overview of the prototype framework

The 'firm' is assumed here to be a business enterprise that seeks to profit from market trade through the exchange of goods or services. Objectives and interpretations of sustainability, and indeed competitive advantage, differ greatly between organisations. An entrepreneur might wish to establish a business and at the optimal moment sell it to the highest bidder, demonstrating a shorter perception of sustainability. The motivation might be the challenge of a 'single-shot' game and not its durability. The definitions of TNCs and MNCs in today's market, with outsourcing and the extensive mobility of finances and personnel, are obscured A small Irish firm that outsources a process or service on a regular basis or collaborates with an international supplier might be referred to as a TNC. Would a non-indigenous company with an office in Dublin for IP management be considered as an MNC? A firm will be seen as a productive enterprise that exchanges goods or/and services in the marketplace. All businesses compete in the global market, domestically against imported alternatives and abroad in foreign markets. The assumption that exports are vital for international competitiveness has not been applied.

The framework prototype structure is tailored to suit the objectives of the individual entertprise; with a vague direction intentionally, to allow for all possibilities of *change* to be *considered*, *researched*, *discussed* and *implemented* as necessary by all of the employees at every level of the enterprise.

6.3 Utility of the prototype framework

The framework has been designed for practical application by strategists in the Irish pharmaceutical industry, as a preliminary exercise in strategy formulation**.** To this

end the findings from the literature review were applied as they were contextualised in the Delphi, on-line and Game Theory research**.** This framework was designed to comply with these findings. Its rationale is as follows:

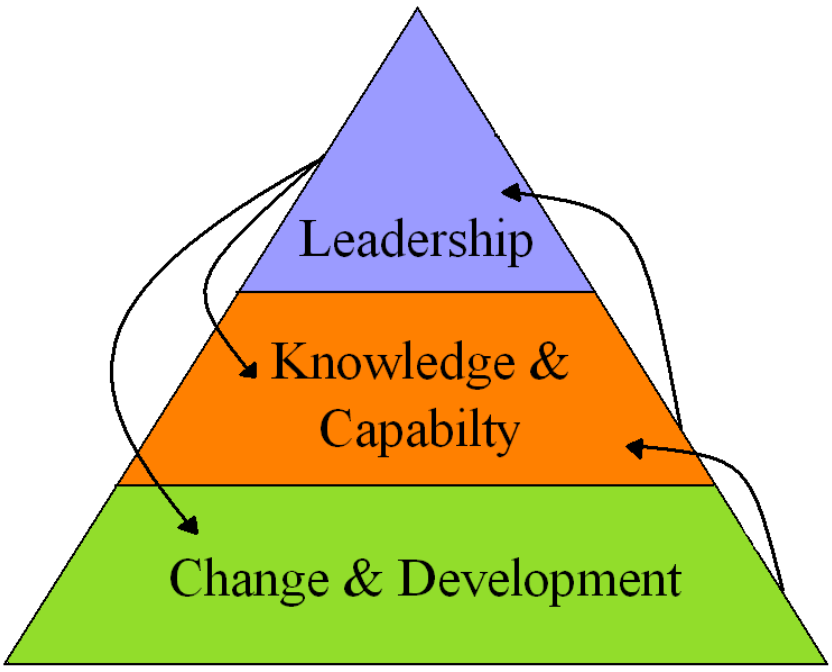
- The framework is intended to be part of a continuum, and be regularly reviewed, updated and discussed.
- In an effort to make it practical and of assistance to strategic practitioners who inevitably have time constraints, it has been designed to fit an online format. This would facilitate strategists inputting ideas and observations (critical for innovation) in an ad-hoc manner, as an ongoing process. Such a utility would facilitate other strategists analysing and researching information prior to scheduled meetings, thus enhancing communication and the quality of information on which strategies rely.
- The application of open questioning in an informal construct facilitates the communication of ideas that formal decision-making rejects as time-wasting.
- The structure initially endorsed a dualist, external and internal, construct. However, findings from the primary research, together with the recent Irish industrial experience, emphasise the negative consequences of such a myopic stance. The enterprise has thus been viewed as a participant in local and global markets and is therefore subject to all of the inter-relational dynamics therein.
- The use of questions resulted as a consequence of the Game Theory application which was seen to stimulate predictive enquiry.

The following table is an overview of the application of the prototype, not citing particular examples, but showing, in a **general way** how it will operate. The specific questions/statement/prompts are not given here, but are contained further into the chapter. In keeping with the terminology used in the earlier methodologies, the three component factors are '***Change & Development'***, '***Knowledge & Capability*** ' and '***Leadership***'. For each factor, there are three columns that will 'prompt' the user to apply routine and non-routine thinking; in the order of the *potential shift*, suggest *positive possibilities* and a *strategic evaluation* by the senior strsategist.

Table 6.1 Explanatory table of the terms of the prototype framework

	1. Change & Development Predictive,speculation	2. Knowledge & Capability Evaluation in line with objectives	3. Leadership Implementation of proposed changes
Potential shifts Informal observations	Observations of human behaviour, new and maybe unrelated, that involve change (alter or eliminate) Start of the on-line discussion in the orgn	Look at an intangible requirement within the organisation, identify what is available and what is needed	What change is needed, because the benefits of the previous system have no value
Positive possibilities How to respond in context, responsible person researches the detail of the observation to come up with factual information to progress	Strategist decides how to respond proactively to the observations from above	Improve the existing allocation of resources to remedy the deficiency	Capture the knowledge gained from implementing the change using non financial metrics
Strategic re-evaluation Question the previous 2 in time	Question original strategy and the latest observation, How? Why? Ask are the strategies still relevant in context within the market, organisation and time	Evaluate it in line with competitors and re-evaluate, change direction if this is deemed to be worthwhile	Evaluate the new change in line with performance results , learn form the experience so that leaders are ready for the next potential shift

Fig 6.1 Prototype framework for sustainable competitive advantage



6.4 The proposed prototype framework

The structure is a three-tiered, directional framework construed to direct exploratory '*what if*?' objective analysis during the strategy formulation stage in an enterprise which utilises a continuous improvement methodology.

Initially, general guidelines should critically be tailored to suit organisational short/medium/long-term objectives, structure and requirements.

It is assumed that suggestions and observations could be made at several strata and would involve anonymous contributions by personnel, using an intranet (which would necessarily prevent users from altering existing input but be observable and potentially share dynamic information with all). The inclusion of inductive, environmentally formulated observations and ideas would inform strategists, stimulate exploration and counteract the constraints of financial performance systems. Strategists are presumed to be at the top tier of the organisation and their working and social life and would be involved in meetings with professionals, suppliers, bankers and trade-union personnel.

Introductions, rather than amendments or elaborations, should be additional. Periodic review of these would eliminate previous experience with no future relevance (for example, due to technological advance).

The retention of historical factors could be represented in different colours or formats. This would allow for extensive exploratory innovation in the scope and depth of probabilities informing strategists. Further, it would apply the 'lessons learnt' concept continuously.

The design has attempted to induce positive and negative input, hence constraining undue influence due to periodic circumstantial experience.

This is not an all-inclusive but evolutionary framework that is designed to inspire routine and non-routine thinking. Following on from table 6.1, the criteria listed are intended to be suggestive and not extensive, but sufficiently detailed to prompt enquiry at all levels of the enterprise. The three component '*templates'* are provided in the next section of this chapter.

Table 6.2 Template 1: CHANGE AND DEVELOPMENT

FOCUS	CRITERIA
Potential influential shifts	**Competitor behaviour- restructuring, R&D, diversification, value added features?** Business processes, output, activities observed that might be adapted to suit organisation's objectives **Perception of business/company by –** competitors? Regional markets? Industry personnel? Media? Supply chain? Policy organisations? **Changes in policy?** – Domestic/foreign governing bodies, local/global regulatory frameworks, infrastructural change/development, academic institutions, community, ethical relations (media, social media and local), advertising standards? **Strategic collaborations (negative and positive) –** local enterprises, government bodies, suppliers, retail outlets (including ecommerce), academic/training institutions, regulatory bodies, intra-industry (technology, administrative, advertising promotions, market/funding possibilities for intra-industry proposals). **Consumer base –** emerging trends/opportunities/threats. In general and specific consumer habits.
Positive possibilities/ capabilities to develop	**Networks of communication, influence, information?** Employees, intra-and inter-industry, business, policy and community connections. Consumer, supplier, competitor, intra-inter industry, council, government organisations, academic, media, formal and informal contacts? **Procedures, Applications, Structures –** Improvements, tweaks to existing frameworks that would enhance productivity (specifically communicated, directed, and resulting from collaborative efficiencies) while complying with overall strategic objective. **Identification of potential skills, competencies for efficient productivity –** Internally new skills proficiencies emerging due to processes, structures or personnel dynamics (causes might be introduction or change). Opportunities for intersectional, vocational, objective collaboration. **Skills/training/knowledge/loyalty inducing activities –** Potential for retention and/or expansion of consumer base, projectile integrative work practices, 'employer/employee/consumer' enhancing practices, sustainable productivity enhancers. Progression routes (internal and personal development), social activates, time and conducive environments,
Strategic re-evaluation. Inefficiencies, absences,	**Review of strategic planning with the benefit of hindsight.** **Opportunities missed or not exploited.** Networking/influence/input. Markets, Value-added novelty, productivity, employs facilitation/recognition (team, individual, divisional).

demand.	**Shortfalls failings in identifying/preparing for change.** **Potential and realised shortfalls** – networking, markets, productivity, efficiency, quality, interactivity, reputation. **Benchmarking** misconstrued or directed. Targets not achieved. Why?

Table 6.3 Template 2: KNOWLEDGE AND CAPABILITY

FOCUS	CRITERIA
Potential influential shifts	**Efficiency of strategists vis a vis competitors?** How prepared has the firm been for market changes? Did the firm plan for the available opportunities and shocks or was reflective action taken at the last minute? **Perception of quality and best practice –** staff? Competitors? Regional markets? Industry personnel? Media? Supply chain? Policy organisations? **Perception of development of new differing produce/services in the future?** Staff? Competitors? Regional markets? Industry personnel? Media? Supply chain? Policy organisations? **Opportunity to learn new skills techniques etc at work from colleagues**? **Support for individual training and development?** **Flexibility of work timetabling etc to reflect lifestyle needs?** **Opportunity of career development, promotion, new sectors, project-style work?** **Introduction of Quality Awards group, organisational and individual?** **New relationships through changing work routines, practices or team work? Social events etc?** Personal contact with those in differing roles within organisation? **Is the company strategic policy known and does it makes good sense to?** Staff? Local enterprises, community groups, consumers? **Has change in policy been sudden or planned alongside staff?** – Has Head Office imposed new criteria without consultation?
Positive possibilities/ Capabilities to develop	**Challenging changes offering new opportunities for academic and practical qualifications?** i.e. through collaboration with government and academic bodies. **Support for employee-led and inspired, community/charity benefit?** Time, skills and knowledge assistance in organisation of company-sponsored activities? **Proposals by individual/group feeding directly to senior strategists?**

	Use of local networks and methods to promote company as positive presence? **Connections with local enterprises that offer benefits for company employees?** **Company valuing of employees' opinion and work?** Productivity, feedback, holistic care provisions, health and safety standards? Infrastructural amenities (canteen, health club crèche, communal lounges etc)
Strategic re-evaluation. Inefficiencies, absences, demand	**Existence of structural processes that reduce efficiency through red tape?** Time-wasting team, group meetings, training, excessive paperwork, continued introduction of new administration procedures, sudden imposition of new differing practice without consultation. **Inability to experiment at work, room for trial and error learning?** **Focus on cost efficiency involving more repetitive tasks and less development?** **Collaborative team planning for achievement of benchmark criteria –** understanding of time and finance constraints and team effort and input into meeting deadlines.

The prototype framework is designed to complement a progressive evaluation/quality management network and provide insights into the *tangible and intangible aspects* of the organisation.

In order to enhance the framework's potential, this is the template that all employees, directly or indirectly employed by the organisation, should be requested to fill out regularly. Irish-based organisations having sufficient influence to guide corporate decisions; seemingly insignificant or 'little' nuggets of information can provide the company with competitive advantage by connecting internally dispersed skills and strategic planning to exploit them. The information could then be collated by supervisory staff and reported back to all personnel for feedback (without divisional or job status being identified).Vertical and horizontal communication would be facilitated, enhancing the utility of the proposed framework prototype. Strategists would then evaluate the range of input against performance results and be better informed in their formulation of responsive and proactive strategies. Such an activity would simultaneously assimilate company strategic objectives, establish knowledge sharing, team work, innovation and hence competitiveness.

Table 6.4 Template 3: LEADERSHIP

FOCUS	CRITERIA
Potential influential shifts	Management mobility restricting strategic planning opportunities for discussion to scheduled formal meetings. Collaboration with suppliers/enterprises causes replication of practices for competitive advantage? R&D partnerships shifting goal posts and objectives. Internal corporation structure. Global industry alignment. Political elections influencing policy direction?
Positive possibilities/ Capabilities to develop	Staff feedback and collaboration. Individually tailored management approaches to promote effectiveness. Increased staff socialisation/communication through internal amenities, events, training. Suggestions for projectised work from practical employees – engineers, technicians, designers, IT experts etc. Introduction of team work. Progressive evaluation systems, quality and objectivity for data. Assimilation of importance of quality awards throughout company.
Strategic re-evaluation. Inefficiencies, absences, demand	Evidence of rushed strategic decisions resulting in simple replication of past strategies? Sufficient quality data, research, environmental and cultural information available to strategists? Ability to introduce new methodologies supporting strategy formulation, evaluation and implementation? Ambiguities/non-standardisation in interpretation of strategic goals? Lack of feedback on utility of staff feedback and how reflected in strategic policy. Celebration of competencies and achievements. Effective induction for new employees.

Template 3 is designed to facilitate a continuous revaluation of leadership tasks and processes. It is assumed that the information gathered from the templates would be collected as an ongoing process and benefiting from online discussion, and that the responses would be evaluated by the strategists. Any general framework would crucially have to facilitate ease of amendment, stimulate change, query all assumptions, be embedded as an organisational dynamic, be subjected to scrutiny and evaluation at all levels and, as Chandler (1977) emphasised, be directed.

6.5 Conclusion

The proposed framework incorporates the necessity for continuity in strategy formulation. It was designed as an evolutionary utility allowing for change in its content to reflect contemporary realities and strategic objectives. The framework is designed as an additional feature to assist existing structures and processes. A dualist in nature, it aims to inform strategists on intangible features that financial data misses and inspire strategists to investigate future possibilities. It uses the primary data further in suggesting that the utility be placed online, and thus be continuously accessible, informing all other users and allowing for anonymity (Delphi import). The objective is that it be effective as an online forum, enhancing communication, vertical, horizontal and interdivisional, while targeting areas for investigation, reflective opinions and the implication of strategic policy. In effect, it would be a networking tool that feeds into progressive evaluation, endorsing the dynamic organisational cultural constructs popularly promoted today, while assimilating strategic objectives in a manner that minimises misinterpretation. The research and extent of inquiry necessary to inform knowledge-based strategic formulation has also been accommodated in the suggestion that this aspect be designated to an administrative section with the necessary research skills. The inclusion of proactive collaborative behaviour represents the necessity for organisations to maximise control over influential relationships while attempting to correct the perceived ‘insularisation’ of business from environmental circumstance that was found to be applicable in the Irish case. The framework attempts to induce the predictive enquiry element of Game Theory within a practical, approachable and applicable format.

Chapter 7: Conclusion

7.1 Study overview

The research objective was to design an *applicable* framework for sustainable, competitive advantage for the Irish pharmaceutical industry. The dynamic complexities of multi-faceted human behavioural influences on trade and business management, combined with the necessity for effective *practical* strategic processes, was further complicated by the predictive element implied by sustainability.

An exploratory construct was applied to establish what a practically applicable framework would necessitate, and then to propose a design that contained the critical features. This involved an extensive qualitative literature review encompassing research on the Irish economic, political and social experience and pharma development within the State. The inclusion of behavioural and cultural science, accompanying the historical perspective for contextualisation, had not been pre-empted when the study started in July 2008.

Primary research was conducted entirely in an exploratory manner. The Delphi study was used to identify the opinions and experience of practitioners on the ground. Round one was carried out within a short period, facilitating a range of participants to respond to feedback, on the minimal number of open questions determining prevalent factors with minimum researcher influence. They were then asked to rate the amalgamated results in order to establish the significance of influences on the ground. The significance of time as a factor, derived from the secondary research, led the researcher to conduct a survey over time, facilitating patterns of behaviour and emerging influences to be noted as well as providing an estimation of the effectiveness of strategic predictive management through evaluation of the consequences with the benefit of hindsight. Experience from the Delphi study pointed to the issue of retention of participants who claimed time constraints were to blame. Hence, a self-assessment tool for evaluation was designed, sectioned into popular elements of competitive advantage: Knowledge & Capability, Leadership, Infrastructure, Regulatory Measures, Government, Drive for Improvement and R&D, and placed online. The period under investigation, 2008-2012, facilitated an examination of strategic practice during a period of extreme economic change.

While there were limitations in the application of Game Theory related to lag accounting and generalisations applied in comparisons, it did work as a stimulating factor in encouraging forward-looking exploration and investigation.

An inductive approach was taken, the researcher being aware that her own subjectivity and assumptions could negatively influence the quest. Hence each relevant theory was explored, compared and contrasted before it was deemed relevant for testing.

A strategic framework for sustainable competitive advantage necessitates incorporating stimuli that would promote the identification of external and internal relational dynamics, and that as an evolutionary process (Porter 1980, 9, pp.41-4), as such it would have to be easily amendable to assimilate change. The first priority was to identify features of effective strategic management and stimuli that might enhance the attainment of competitive advantage. This involved an extensive qualitative literature review that was necessarily inter-disciplinary to accommodate theoretical rationalities for strategic procedures, business, competitive advantage (at national and organisational levels) and industrial development, as well as a socio-political investigation into the 'Irish' and 'pharmaceutical' environmental cultures to facilitate contextualisation. The researcher being of a scientific background, an inductive exploratory approach was taken and findings were continually comparably analysed to establish relational dynamics and determine relevance.

The objective of the research study was to produce a strategic tool to assist pharmaceutical businesses in Ireland that would also be adaptable to environmental circumstances elsewhere. Three varied research methodologies were employed to answer the primary research question:

What framework structure is most appropriate for use by an Irish pharmaceutical enterprise to drive and sustain its competitive advantage?

This objective has been achieved, a framework prototype which is appropriate for use by a pharmaceutical enterprise to drive and sustain its competitive advantage.

7.2 Main research findings

7.2.1 Human behaviour: Any framework developed has to have a stimulus to motivate strategists' human behaviour. The research exposed the vulnerability of human behaviour and the inadequacy of economic policies at an extreme period of growth and collapse in Ireland.

7.2.2 Level of development: Ireland was a predominantly agrarian and conservative country; its development was fast-tracked from factor-driven to innovation-driven; a stepped or phased approach was not taken, and thus the efficiency stage was omitted. A significant finding here was that the primary research exposed the nation's 'level of development' in the attitudes of industrial practitioners.

The anticipated knowledge spill-over effects or convergence with other nations in Europe did not happen. Convergence during the economic boom, based on BOP and GNP, did occur for a short period, but the economic development lasted for a limited period and the growth and convergence were based on credit borrowing from the future rather than on a strong foundation of building for future development.

7.2.3 Socio-political culture: Government policies favoured FDI, and corporate tax rates did not encourage an entrepreneurial spirit. The primary research shows that pharma management are change-averse, and expected past policies and experience to continue into the next 5-10 years. Their perception was that government is responsible for the development of Ireland's socio-political culture.

The research showed a historic continuum in Ireland from the 1930s when CPT bands broadened. Government policy continues to value employment over initiative and innovation, and static, temporary measures. Firms need to use their influence more to benefit their CA in the future and facilitate a higher quality of information informing strategy.

7.2.4 Legal economic framework: The Irish pharma industry exhibits all three competitions: absolute, comparative and competitive advantage, as follows: the introduction of the open market; FDI policies encouraged pharma companies to locate in Ireland in the 1960s, bringing differentiation and promise into the economy (competitive advantage); Ireland's late economic (industrial and infrastructural) development facilitated growth through inherent factors and development of comparative advantage; the basis of trade; absolute advantage (the patent structure

protects some enterprises to the detriment of co-operation), as witnessed early in the last century in relation to Switzerland, France and Germany.

The criteria for government and firm are different; BOP drives the nation, while growth drives the organisation. The Irish government declared sophisticated development using factor-driven development policies.

7.3 Research limitations

The limitations associated with this research study, related to the nature of doctoral research, are as follows:

a. This research study was a learning experience, serving to raise issues rather than necessarily provide definitive answers.
b. As an independent researcher, the research methodology was labour-intensive; more ideas and concepts might be analysed by a team of researchers.
c. Constraints on finances and time prevented the contextualised study over time being conducted as a case study. Case-based research would give rise to a valuable contribution to the area of strategic management in the Irish pharma sector.
d. The format of the prototype might appear vague, but strategy formulation is not a definitive science, and not appropriate to human behaviour. The corresponding strength (prescriptive and not descriptive as traditional frameworks tend to be) is the complicity to adhere to continuous input.
e. No similar research pertaining to the Irish pharmaceutical industry has been carried out, which meant that comparison could not be made with specifically located findings.

7.4 Future research

Two papers have been prepared for publication concerning a framework for sustainable competitive advantage, and will be submitted to the following journals: *Journal of Business Strategy* and *Pharma via Communications Ltd*.

The following conferences have been identified as suitable for presentation of the research findings: Proceedings of the Irish Academy of Management Annual Conference and EIASM European Institute for Advanced Studies in Management.

It is planned to refine the framework prototype in a case study of pharmaceutical enterprises in Ireland (including those that participated in the study), examining if such a study could be facilitated through the IDA/EI agencies.

7.4.1 Future work project proposal

- Use 'visualisation techniques' as advocated by Richard D'eveni (1995), to revamp the presentation of the prototype to facilitate effective delivery and use by the host companies.
- Commence a piece of practitioner engagement with companies that participated in the earlier stages of the study to 'test the prototype', using case-study methodology over four business quarters (12 months).
- Set up an introductory session with the site management team in each organisation, explain the concept of the revamped prototype, with examples of its application, requesting the support mechanisms of online utility.
- Suggest the use of the prototype as a 'change management' tool at the regular management meetings, fortnightly (weekly too frequent) for the first three months and then decrease frequency to one month for the later three months of the trial.

Table 7.1 Case study schedule

Activity	**Description**
Case duration	Initially propose a year-long case study to validate the proposed prototype
Scope of the case study	Use of competitive advantage prototype in chosen pharmaceutical companies in Ireland
Case selection process	Environmental criteria Internal criteria
Research instrument	Researcher as the primary instrument in the application of the research method
Research technique	On-site observation and reflective diaries independently generated by the practitioners, supported by formal contact with the researcher
Data management	Audit trail of data, collection methods and process, balance of observation and participatory action

Adapted from Klein & Myers (1999)

The data-collection activities, observation schedule, in-situ communications (formal and informal) and reflective diary would provide valuable data in the context of validating the practical utility of the prototype.

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APPENDICES

Appendix A: Round 1 Questionnaire

Appendix A

Questionnaire Flow Chart for Research Study
Title: A Study of Competitive Advantage within Research and Manufacturing Pharmaceutical Companies in Ireland.

Round 1 Questionnaire June 2008

List 6 factors (for example, an educated workforce) that have supported Ireland in establishing a competitive advantage in the pharmaceutical industry.

1
2
3
4
5
6

List 6 factors (for example, operational efficiency) that would be required in the future to ensure Ireland will maintain its competitive advantage in the pharmaceutical industry over the next 5-10 years.

1
2
3
4
5
6

Please email your response to bwhelan@wit.ie.
I wish to complete the analysis of Questionnaire 1 by the end of October. To achieve this, I would appreciate if you would return your completed response as soon as possible.

Thank you again for your participation.

Bernie Whelan

Appendix B: Letter of Introduction

Appendix B

Waterford Institute of Technology,
Cork Road,
Waterford.
June 2008.

Dear Panelist,

Further to our recent conversation, please find attached supplementary information and a copy of the first round questionnaire for my research study entitled "A Study of Competitive Advantage within Research and Manufacturing Pharmaceutical companies in Ireland".
I would like to thank you for agreeing to participate in the study and please note the following detail in relation to research study.

Background

Throughout Ireland pharmaceutical companies are looking for new ways to be effective in order to gain and sustain market share. They are seeking new paradigms for operational efficiency in an effort to achieve their corporate goals for quality and sales in a rapidly changing environment.
Ireland has seen very rapid growth over the past 20 years, when the unemployment figure was 17%; the country was a nation of emigrants. In the 1990's Ireland was one of the top three countries in the world for attracting foreign investment, second to Hong Kong. This foreign investment along with tax incentives and cheap labour encouraged multi-national companies into Ireland turning the economy around. The celtic tiger was born, the result was well-paid employment, guaranteed income and a transformation of people's lives. Unfortunately the economic climate is changing. Since 2000, 31,000 labour intensive manufacturing jobs have been announced as factories lay-off employees. This tend is set to continue. The Economic and Social Research Institute (ERSI) have predicted that unemployment could be 6% by the end of 2008. The success of our economy has also meant higher wages and higher costs. Management in manufacturing companies are now under pressure to move Irish operations to cheaper destinations in order to maximise competitiveness.

Apart from the eastern European counties, India, in particular is becoming a key player in the pharmaceutical industry with its predicted sales expected to increase to €25 billion in 2015 from €12 billion in 2008. Demand in India us growing markedly due to rising population figures, the increasing number of older people and the development of incomes. The country is also benefiting from the low wage cost advantages over western companies when it comes to producing medicines.

Companies within the Irish Pharmaceutical Sector manufacture to extremely high quality standards, making the industry a highly regulated one. The manufacturing processes are licensed and are subject to compliance audits by the regulatory bodies and its products are well-established and under patent.

The industry in Ireland is a highly sophisticated one, incorporating advanced manufacturing technology, state-of-the-art equipment and stringent quality control. Many of them are large companies employing >250 employees, operating 24 hours per day, 7 days per week.

Nine of the top ten Pharmaceutical companies in the world have operations in Ireland. Over 120 overseas companies employ 20,000 people and export US $32 billion annually. This represents over 29% of total exports and makes Ireland one of the largest exporters of pharmaceuticals and fine chemicals in the world.
Ireland has benefited from the merger and acquisition activity that has restructured the Pharmaceutical Sector globally.

Research Question

What is the ideal framework to drive future sustainable competitive advantage for multinational pharmaceutical companies engaged in Research and Manufacturing (R&M) in Ireland?

Research Methodology

The Delphi Method is a technique used to obtain the most reliable consensus of a group of experts through the use of a series of questionnaires interspersed with controlled opinion feedback. The experts who participate in the study will be chosen from government, business and academic communities, base on their knowledge of the Irish Pharmaceutical industry.

Procedure for selecting the Panel of Experts
The Delphi study does not depend on a statistical sample that attempts to be representative of any population. It is a group decision mechanism requiring qualified experts who have a deep understanding of the issues.
The experts will be divided into 3 panels (government, practitioners, and academics); each comprising of 10-18 people and each bringing a different perspective to the research topic.
Potential experts will be identified as follows:

1. An EXCEL spreadsheet will be generated to help to categorise the experts before identifying them, staying at a high level to identify 'classes' of experts. For example, identify relevant discipline or skills, relevant organisations and, academic and practitioner literature.
2. The spreadsheet will be completed with the names of individuals based on categories listed above. The telephone or email will be the means of contacting the identified organisations.
3. The next stage will be to contact people in these organisations who are experts themselves or who can provide alternative and/or additional contacts within or outside of their own organisation.
4. A panel will be formulated, one for each discipline and the experts are categorised to the appropriate panel. It will be necessary to obtain basic biographical information for every expert on the panel in order to determine what qualifications they possess to make them experts. The criteria for selection will be as follows:
    a) Significant experience; 10 years+ experience in their area of expertise
    b) Senior Decision Maker with international experience.

c) Respected contributor to the enhancement of competitive advantage in the research topic
d) Objective in their opinions
e) Number of publications/conferences

5. Telephone or email contact will be made with each panelist to explain the subject of the study, the procedures required for it, including the commitment required. For this research study, it is anticipated panelists will be asked to commit to completing 4 x 15 minute questionnaires and return them within 5 working days of receipt.

Please be assured that your response will be treated with anonymity; none of the information you give will be attributed to you by name and no-one other than this researcher will know the complete composition of the Delphi panel(s).
A copy of the research findings will be available to each panelist when the study has been completed.

Research Schedule

Month	Task
June 2008	Circulate Round 1 questionnaire (Q1)
September 2008	Circulate responses from Q1
November 2008	Circulate Round 2 questionnaire (Q2)
January 2009	Circulate responses from Q2
March 2009	Circulate Round 3 questionnaire (Q3)
April 2009	Circulate responses from Q3
June 2009	Circulate Round 4 to get consensus
July 2009	Circulate the completed analysis

About the Researcher

The researcher is a Lecturer in Pharmaceutical Science at Waterford Institute of Technology (WIT) since April 2000 and has been responsible for initiating and developing programmes to meet the needs of the pharmaceutical industry. Her main interests are in current Good Manufacturing Practice (GMP), Operational Efficiency (OE), Lean Manufacturing and Quality Management. Before joining WIT, Bernie Whelan worked for a number of multi-national corporations within the pharmaceutical industry for 13 years in both Quality and Manufacturing roles with increasing responsibility as her career progressed.

For the purpose of matching the capabilities of each panelist with the requirements of the research study, I would be grateful if you would complete the following section using the following headings: the term that would best describe your occupation, number of years of tenure, work area of interest and any notable achievements/publications/conference proceedings.

Please confirm that you are satisfied with the above detail and that you accept the invitation to become one of the panelists in the research study.

Signature: _____ Date: _____

Thank you for your co-operation.

Bernie Whelan.
bwhelan@wit.ie
(086) 8957108.

Appendix C: Summary of Round 1 Responses

	BR	EM	FS	JP	JL	JPr	MM	PM	PC	SON	TC	TK	RK	AD	BOD	Total	Percent Consencus
Well educated workforce. Availability of Degree and PhD Graduates in the Sciences	1			1	1	1	1	1	1	1	1	1	1	2		13	14%
Low rate of corporation tax	1	1			1		1	1	1	1	1		1	1	1	11	12%
English speaking (pharma market is USA dominated). A developing country which was part of Europe but also had strong ties with the US.	1		1		1	1		1	1	1		1				8	9%
Commitment of government to supporting/enabling the pharma industry. Political Friends who were looking out for Ireland. IDA		1	2		1	1					1					6	7%
Proximity to continental europe. 3 Within "business hours" contact of the US. Euro Zone		1								1	1	1		2		6	7%
Availability of suitable workforce for manufacturing operations. A flexible can-do business environment. Sincerity of workforce. Adoptability to change		1	1	1					2			1				6	7%
Presence of other Pharma companies gives new entrants confidence. Large pool of experienced workforce (due to large pool of companies)	1			1	1			1		1			1			6	7%

Strong reputation for cGMP compliance. Good regulatory record. Experience and ability to work effectively within the compliance framework – the more pharma industry that is clustered in Ireland, the better this has become	1				1	1		1	1		1	6	7%
A nation of people who were driven by improvement, willingness to find solutions. A generally competitive cost environment. operational excellence		1			1	2	1					5	6%
Availability of the right calibre management	1					1					1	3	3%
Low cost base. A generally competitive cost environment		1	1									2	2%
Modern infrastructure		1										1	1%
'First world' laws and regulations		1										1	1%
Free access to third markets – Ireland is one of the most open economies in the world				1								1	1%
Very low numbers of days lost to strikes in the Pharma sector					1							1	1%

Lack of competition for resources from other heavy industries	1					1	1%
No corruption in planning/environmental legislation		1				1	1%
Middle level wage costs		1				1	1%
Research			1			1	1%
Senior Irish managers in US multinationals			1			1	1%
Strong economy- ability to attract workforce				1		1	1%
Availability of suitable locations, water, sea..					1	1	1%
Cluster of support expertise from service providers					1	1	1%
Low risk environment							
Project execution skills					1	1	1%
					1	1	1%

Appendix D: Round 2 Questionnaire

Round 2 - Delphi Method Questionnaire - Section 2 of 2

Future Validity & Significance of Contribution

Listed below are the factors identified by the expert group, that will be required in the future to ensure Ireland will maintain a competitive advantage in the pharmaceutical industry.

The factors are not rated in any specific order or priority

Please rate each line under two headings:

a. How valid you consider this statement to be true in contributing to Competitive Advantage in the future.

b. How significant this factor contributes to Competitive Advantage in the future.

Use the Rating Scales identified on the right to determine your scoring

Identify the elements that make up any factors you determine will have a significant contribution to Competitive Advantage.

Future Validity Rating	**Significance of Contribution Rating**
1 - Truein all situations	1 - Extremely high significance
2 - True but is situa tion dependant	2 - High Significance
3 - Equal chance of being true or false	3 - Significant
4 - Is False more often than being true	4 - Low Significance
5 - Is always false	5 - Insignificance

Factors	Future Validity Rate 1 - 5	Significance of Contribution Rate 1 - 5	Element 1
EXAMPLE : A supply of educated workforce.	**1**	**1**	**Provision of Pharma specific Degrees and Phds**
Availability of a well educated workforce			
Availability of Science undergraduates at Degree and PhD level.			
Promotion of Science and Engineering as careers to students. Greater Career guidance towards the Pharma industry.			
Large pool of experience due to the large presence of Pharma companies in Ireland.			
Universities with strong Research & Development capabilities with which to form partnerships with industry.			
Competitive Corporate Tax Rates			
Ireland maintains a competitive corporate tax rate			
Strong Linkage between US and Europe			
A strong link in the relationship between Europe and US			

Factors	Future Validity	Significance of Contribution	Element 1
	Rate 1 - 5	Rate 1 - 5	
Ireland is an english speaking nation.			
Irish based organizations having sufficient influence at corporate level to guide corporate decisions.			
Within working business hours of the US and Europe.			
The presence of many Irish Managers holding senior positions at corporate level within multinationals.			
A Strong Can-Do Business attitude			
Sincerity of Irish workforce.			
Adaptability to change in an ever changing market.			
High Calibre Irish Management within the Pharma industry.			
Benchmark and adopt best practice from other sectors e.g. Lean Sigma, built-in quality, supply chain excellence. Creative adoption and adaptation of new technologies to deliver manufacturing and regulatory compliance efficiencies.			

Factors	Future Validity	Significance of Contribution	Element 1
	Rate 1 - 5	Rate 1 - 5	
Encouragement of an entrepreneurial spirit.			
Maintain good industrial relations . Focus on Human Resource Management within industry to make Pharma 'The Industry of Choice'.			
Governmental support for the Pharma industry in Ireland			
Continued Government support for the Pharma Industries.			
Strong political friends to promote Ireland.			
Enhancement of the role of the IDA and other such organisations.			
Greater focus on Development & Manufacturing in Ireland			
An ability to integrate upstream activities such as clinical trials and fundamental chemical research into existing manufacturing operations.			
Establishment of further Process Development Facilities in Ireland.			
Ireland sites become centers of excellence for launch of new products to market.			
Greater tax incentives for Research & Development in Ireland.			

Factors	Future Validity	Significance of Contribution	Element 1
	Rate 1 - 5	Rate 1 - 5	
Focus on Research & Development to fuel innovation and improvement in products, processes and manufacturing costs.			
The development of Irish-owned research based organizations able to compete on world stage.			
Develop expertise in specialist support/consultancy e.g. sterile manufacturing, freeze drying, packaging, etc.			
Good Regulatory Record			
Greater collaboration between regulators and industry, striving for greater innovation and creativity; better customer service.			
Comparable level of Good Manufacturing Practice (GMP) regulations in other EU Member States - Mutual Recognition.			
Maintain a compliance culture (GMP, Financials & Environmental), but coupled with an efficiency culture.			
Low Cost Base			
Ability to manufacture at 'low cost'.			
Continuing drive for continuous improvement.			
Solid infrastructure in place			

Factors	Future Validity	Significance of Contribution	Element 1
	Rate 1 - 5	Rate 1 - 5	
An enhanced physical & IT infrastructure & 'First world' public services. Efficient, cost effective transport and communication infrastructure.			
Low cost renewable energy			
Identify any additional factors not outlined above that will contribute to future competitive advantage in the Pharma Industry			

Appendix E: Summary of Round 2 Respones

	BR	EM	FS	JP	JL	JPr	MM	PM	PC	SON	TC	TK	RK	AD	BOD	Total	Percent Consensus
Well educated workforce. Availability of Degree and PhD Graduates in the Sciences	1			1	1	1	1	1	1	1	1	1	1	2		13	14%
Low rate of corporation tax	1	1			1		1	1	1	1	1		1	1	1	11	12%
English speaking (pharma market is USA dominated). A developing country which was part of Europe but also had strong ties with the US.	1		1		1	1		1	1	1		1				8	9%
Commitment of government to supporting/enabling the pharma industry. Political Friends who were looking out for Ireland. IDA		1	2		1	1					1					6	7%
Proximity to continental europe. 3 Within "business hours" contact of the US. Euro Zone		1								1	1	1		2		6	7%
Availability of suitable workforce for manufacturing operations. A flexible can-do business environment. Sincerity of workforce. Adoptability to change		1	1	1					2			1				6	7%
Presence of other Pharma companies gives new entrants confidence. Large pool of experienced workforce (due to large pool of companies)	1			1	1			1		1			1			6	7%

Strong reputation for cGMP compliance. Good regulatory record. Experience and ability to work effectively within the compliance framework – the more pharma industry that is clustered in Ireland, the better this has become	1					1	1			1		1			1	6	7%
A nation of people who were driven by improvement, willingness to find solutions. A generally competitive cost environment. operational excellence			1			1	2		1							5	6%
Availability of the right calibre management	1						1								1	3	3%
Low cost base. A generally competitive cost environment			1	1												2	2%
Modern infrastructure		1														1	1%
'First world' laws and regulations		1														1	1%
Free access to third markets – Ireland is one of the most open economies in the world				1												1	1%
Very low numbers of days lost to strikes in the Pharma sector					1											1	1%
Lack of competition for resources from other heavy industries						1										1	1%

No corruption in planning/environmental legislation								1								1	1%
Middle level wage costs								1								1	1%
Research											1					1	1%
Senior Irish managers in US multinationals											1					1	1%
Strong economy- ability to attract workforce														1		1	1%
Availability of suitable locations, water, sea..													1			1	1%
Cluster of support expertise from service providers													1			1	1%
Low risk environment															1	1	1%
Project execution skills															1	1	1%
D &M skills															1	1	1%
Do we have a Competitive Advantage/																0	0%

Appendix F: Online Self-Assesment Tool

Drive for improvement & Generation of New Ideas, Products & Services

There is a desire and infrastructure in place to identify and develop new products, ideas and services which add greater Value Add to the customer. Formal processes are in place to embody the concepts of Innovation, Creativity, Lean Thinking and Six Sigma. Employees are educated and involved in decision making and the generation of process simplification.

	Excellent	Very Good	Good	Poor	Very Poor	Non Existent	Not Applicable	Score
The organisation has developed a strategy for continuous improvement.	1							6
The organisation has optimised plant performance through the execution of a series of projects in line with the CI strategy	1							6
The organisation communicates with all stakeholders with clearly defined targets to enhance the culture of shop floor excellence.				1				3
The key processes relating to the business (e.g. customer service, manufacturing, product testing, transportation, etc.) have been identified.		1						5

A Value Stream Map has been created for each of the key processes. Details such as Lead time, Inventory, Energy Usage, Resources, etc. has been captured on the Value Stream Map.			1				4
The concept of waste is understood and each process is viewed as a series of Value Add & Non Value Add steps. Non Value Add steps are targeted vigorously for elimination.				1			3
The concept of Variation is viewed as waste and is vigorously targeted.				1			3
For processes that are governed by Regulatory requirements, processes are designed to be simple, effective with minimal bureaucracy.					1		2
Risks, Weaknesses and Vulnerabilities have been identified. Corrective Actions have been identified and are in place.				1			3
The business has a competitive advantage by responding quickly to customer demands and has developed agile processes.			1				4
Each of the key processes are measured, monitored regularly and acted upon. Any Deviations are addressed with root causes identified and eliminated.				1			3
Employees have been educated on the concepts of Creative Problem Solving.				1			3
Employees are encouraged to participate in the generation of ideas and problem solving activities.				1			3

A culture of Improvement is encouraged and supported. Problems are addressed in a structured manner.						1		1
Opportunities for all employees to input into making the processes better are encouraged and acted upon.				1				3
Accountability for each part of the process is understood and accepted. Actions required to control the process are taken at the right level.			1					4
All employees understand the importance and responsibility of transferring their individual knowledge into the process or business.			1					4
Number of Occurrences	**2**	**1**	**4**	**8**	**1**	**1**		**60**
Total Number of Questions	**17**	**17**	**17**	**17**	**17**	**17**		
Distribution Percentage	**11.76%**	**5.88%**	**23.53%**	**47.06%**	**5.88%**	**5.88%**		

Individual Score		**12**	**5**	**16**	**24**	**2**	**1**	
Sum of Scores	**60**							
Maximum Score possible	**85**							
Percentage of Maximum score attained	**71%**							
Actual Rating	**3.53**							

Government Support

The ability to provide incentives to attract value adding roles to Ireland. By offering low corporate tax rates, grants for Research & development as well as Process Development capabilities, it will incentivize the creation of a community of the top Pharma companies in Ireland.

	Excellent	Very Good	Good	Poor	Very Poor	Non Existant	Not Applicable	Score
Sub-criteria – Enabler								
Economic Policy								
The government has developed an economic policy to attract and retain Pharma companies in Ireland.	1							6
Government is actively promoting Ireland as a country that can offer competitive advantage to the Pharma industry.		1						5
Government is actively benchmarking Ireland against the Best in Class Pharmaceutical Regions around the world.			1					4

The goverment is taking inputs from the various Pharma organisations to develop future policies and legislation.					1			2
Tax Benefits								
The government offers an attractive Corporation Tax regime for Pharma companies in Ireland.						1		1
The government is offering additional tax consessions and incentives to support the Pharma industry in Ireland.								0
Knowledge regarding the access and availability of government funding is communicated to the Pharma industry.						1		1
						1		1
Information Support								
The Government provides a streamlined, effective support, advice, to each business.				1				3
The goverment has established a series of support organisations to assist the startup and improvement of pharma companies.				1				3
The support organisations are intuitively structured to support international, national, regional activities.					1			2
Number of Occurences	**1.00**	**1.00**	**1.00**	**2.00**	**2.00**	**3.00**	**0.00**	**28**
Total Number of Questions	**10**	**10**	**10**	**10**	**10**	**10**	**10**	
Distribution Percentage	**10.00%**	**10.00%**	**10.00%**	**20.00%**	**20.00%**	**30.00%**	**0.00%**	
Individual Score	**6**	**5**	**4**	**6**	**4**	**3**	**0**	

Sum of Scores	**28**
Maximum Score possible	**60**
Percentage of Maximum score attained	**47%**
Actual Rating	**2.55**

Infrastructure

A suitable infrastructure exists to allow the Pharma industry to do business. This includes Information Technology, Transportation, Utilities, Waste Management

Excellent	Very Good	Good	Poor	Very Poor	Non Existent	Not Applicable	Score
		1					4
		1					4
			1				3

Sub-criteria – Enabler

The organisation views Infrastructure (facilities, utilities and transportation) as an asset that will have a positive impact on its operating costs.

The organisation is developing a modern Infrastructure to support its overall strategic plan.

The organisation has made a significant investment into its Information and Communication Technologies to support the workings of the business.

The organisation believes that the development projects arising from the National Spatial Strategy will enable the pharmaceutical sector to move its people and products throughout the country in an effective manner.				1				3
The organisation reviews its Green policy to exploit waste management reduction through the use of new technologies to improve energy efficiency, pollution prevention and resource conservation.			1					4
Effective access to the national road, rail, air and sea networks exist .						1		1
Reliable, secure and cost competitive energy supplies are sufficient and available.					1			2
Effective telecommunications, including broadband is sufficient and available.					1			2
Effective water supply and waste water disposal systems are sufficient and available.					1			2
Effective waste management structures and facilities are sufficient and available.				1				3
Number of Occurrences	**0**	**0**	**3**	**3**	**3**	**1**		**28**
Total Number of Questions	**10**	**10**	**10**	**10**	**10**	**10**		
Distribution Percentage	**0.00%**	**0.00%**	**30.00%**	**30.00%**	**30.00%**	**10.00%**		
Individual Score	**0**	**0**	**12**	**9**	**6**	**1**		

Sum of Scores	**28**
Maximum Score possible	**60**
Percentage of Maximum score attained	**47%**
Actual Rating	**2.80**

Knowledge & Capability

The ability to obtain sufficient resources with the skills, capabilities and attitude to perform current responsibilities as well as the abilities to develop new skills for future objectives. Learning and development involve the continual improvement of competencies in the organization designed to change attitudes or provide knowledge and skills required to meet its goals and objectives. Learning and development may relate to skills or knowledge required to perform current responsibilities or the acquisition of new knowledge or skills necessary for the achievement of planned objectives.

	Excellent	Very Good	Good	Poor	Very Poor	Non Existent	Not Applicable	Score
Sub-criteria – Enabler								
Identifying Needs								
The organisation has a formal Needs Analysis process to determine its current and future competencies.	1							6
A Learning & Development strategy has been developed and implemented to develop the competencies identified.		1						5

The Learning & Development strategy is aligned to the overall Business Strategy.		1					5
The organisation has a formal Benchmarking process to assess itself against Best in Class both internal and external to the Pharmaceutical sector.			1				4
An active Succession Planning process is in place and delivers tangible results that support the business.				1			3
An active Career development process is place and actively delivers a business benefit.			1				4
A structured performance management system is in place and is used to provide real communication to employees regarding past performance and future expectations.			1				4

Academia

The organisation develops strong links / relationships with key academic institutions.				1			2
The organisation is actively involved in the design and development of key competencies and programmes with academic institutions.			1				3
The organisation co develops processes, products, technologies in association with colleges and other educational institutions.			1				4
The organisation actively encourages the placement of students in industry to promote careers in the Pharmaceutical industry.		1					5

The business actively promotes science and the pharmaceutical industry through sponsorship and associations with science fairs and events.	1							6
The organisation promotes the education of Science and Engineering as key competencies for the future.		1						5

Industry Involvement

The organisation develops strong links / relationships with key Pharma networks e.g. Pharmachem Ireland.		1						5
The business promotes assignment opportunities for its employees to experience and understand other aspects of the business.			1					4

Intellectual Property

A mechanism for developing and protecting Intellectual Property is in place.		1						5

Specific Competencies

Specific competencies have been developed regarding Regulatory requirements.			1					4
Specific competencies have been developed regarding Government Grants and Government support structures.				1				3

Number of Occurrences	**2**	**6**	**6**	**3**	**1**	**0**	**0**	**77**
Total Number of Questions	**18**	**18**	**18**	**18**	**18**	**18**	**18**	
Distribution Percentage	**11.11%**	**33.33%**	**33.33%**	**16.67%**	**5.56%**	**0.00%**	**0.00%**	

Individual Score		12	30	24	9	2	0	0
Sum of Scores	77							
Maximum Score possible	108							
Percentage of Maximum score attained	71%							
Actual Rating	4.05							

Leadership

What (How) the site leadership manages, develop and release the knowledge and full potential of its employees at an individual, team and organizational level, and plan these activities in order to support its learning and development strategy. The company's efforts to develop an appropriate working environment to support its employees to develop their skills and competencies and to improve the site to achieve competitive advantage
Leadership, development of management style, CEO activity.

	Excellent	Very Good	Good	Poor	Very Poor	Non Existent	Not Applicable	Score
Sub-criteria – Enabler								
Vision, Mission, Strategy								
The organisation has defined a Vision, Mission and Strategic Plan.	1							6
The Vision, Mission and Strategy have been communicated to all employees, shareholders and customers.		1						5
The strategic plan is translated into goals & objectives and ultimately individual objectives.			1					4
The business has completed an organizational review to determine the most effective organizational structure.				1				3

The organisation regularly reviews the strategic plan and makes revisions where required.			1					4
There is a job description available for each employee which clearly identifies roles, responsibilities and objectives.				1				3
A culture to support the strategy has been defined, communicated and role modelled.					1			2

Communications

There is a process to communicate the Vision, Mission & Strategic plans to all employees in the organisation.			1					4
There is a formal two way communication process within the business.				1				3

Employee Involvement

There is an active level of employee involvement in the decision making process across the organization.			1					4
A Recognition programme is in place to recognise teamwork and active involvement.				1				3

Leadership Development

Managers are encouraged and expected to role model the expected behaviours for the business.				1				3
An active Leadership Development programme is an integral part of the role of the manager in the organisation.				1				3
The Leadership Development programme includes some for of mentorship for each manager.			1					4

Number of Occurrences	**1**	**1**	**5**	**6**	**1**	**0**	**0**	**51**
Total Number of Questions	**14**	**14**	**14**	**14**	**14**	**14**	**14**	
Distribution Percentage	**7.14%**	**7.14%**	**35.71%**	**42.86%**	**7.14%**	**0.00%**	**0.00%**	

Individual Score		6	5	20	18	2	0	0
Sum of Scores	**51**							
Maximum Score possible	**84**							
Percentage of Maximum score attained	**61%**							
Average Rating	**3.64**							

Regulation

The ability of an industry to regulate its performance and ensure it complies with all national and international requirements. Regulation in this context applies to GMP, financial, environmental, health & safety and employment law.

	Excellent	Very Good	Good	Poor	Very Poor	Non Existent	Not Applicable	Score
Sub-criteria – Enabler								
GMP Compliance								
The GMP Regulator and Industry have a common objective to ensure that high quality pharmaceutical products continue to be available to the public.	1							6
The GMP Regulator is actively involved in benchmarking regulatory Best Practices and adopting these for the Irish industry	1							6
The GMP Regulator is actively involved in evaluating ways to enhance supplier quality management including supplier selection and qualification.	1							6

The GMP Regulator is actively involved in evaluating ways to improve supply chain distribution controls for incoming materials and components		1						5
The GMP Regulator is actively involved in evaluating ways to improve supply route security and verification, verification of incoming components and materials and authentication of supporting documentation.				1				3
The GMP Regulator is actively involved in evaluating ways to Improving Analysis and Testing Strategies and Technologies				1				3
The GMP Regulator is actively involved in evaluating ways to Improving Monitoring and Responding to Signals in the Marketplace			1					4
The GMP Regulator is actively involved in evaluating the use of Process Analytical Tools to facilitate the manufacture of pharmaceutical active ingredients and drug products in a reproducible manner.						1		1
The GMP Regulator is actively involved in evaluating the sharing of knowledge between pharmaceutical firms and the Regulator to define risk in a culture of trust.					1			2
The GMP Regulator issues guidance's to provide a clear interpretation of current regulations governing expectations, filings, supplements, and inspections.				1				3
The Environmental Regulator and Industry have a common objective to ensure that the Pharma industry does not impact any environmental laws / regulations.	1							6
The Environmental Regulator is actively involved in evaluating the sharing of knowledge between pharmaceutical firms and the Regulator.	1							6

The Environmental Regulator in conjunction with the industry is actively involved in evaluating the use of new technologies minimise the support greater environmental compliance.	1							6
The Pharma industry and the Health & Safety Regulator collaborate to promote an industry with a world class health & safety record.	1							6
The Health & Safety Regulator is actively involved in the sharing of knowledge between the authority and the industry to promote greater health & safety performance	1							6

Number of Occurences	**8**	**1**	**1**	**3**	**1**	**1**	**69**
Total Number of Questions	**15**	**15**	**15**	**15**	**15**	**15**	
Distribution Percentage	**6.67%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	

Individual Score	**48**	**5**	**4**	**9**	**2**	**1**	
Sum of Scores	**69**						
Maximum Score possible	**90**						
Percentage of Maximum score attained	**77%**						
Actual Rating	**4.60**						

Research & Development

Suitable incentives are in place to attract and retain Research & Development as well as Process Development activities in Ireland. Greater involvement in early drug development and New Business Introduction is supported and encouraged generating greater Value-Add roles within the industry. Focus is in getting new products/services to market quickly and safely.

Sub-criteria – Enabler

	Excellent	Very Good	Good	Poor	Very Poor	Non Existent	Not Applicable	Score
The organisation views its Research and Development (R&D) activity as a vehicle to facilitate the development of the pharmaceutical sector in Ireland.		1						5
The organisation participates in national and international Science and Technology research activity and so raise the profile of Ireland as a premier location for pharmaceutical research.		1						5

The organisation is participating in the PRTLI and SFI Research and Development programmes.			1					4
The organisation employs Science and Engineering PhD graduates to develop the capability of its Research and Development processes.				1				3
The organisation is increasing the recruitment of staff with advanced qualifications in Science and Engineering				1				3
The Research and Development strategy of the organisation provides career paths for the retention and promotion of R&D employees.					1			2
The organisation actively liaises with the relevant bodies to promote the formation and advancement of inter-company networks to strengthen the research capability within the country.					1			2
The organisation actively liaises with academic institutions to develop its R&D capabilities and resources.				1				3
The organisation understand the concepts of Patent Protection/Intellectual Property and is actively protecting ideas and products to drive greater competitive advantage.				1				3
The organisation will liaise with Government to modify the R&D grant structure to make the system more accessible to a wider number of pharmaceutical companies.			1					4

Number of Occurrences	**0.00**	**2.00**	**2.00**	**4.00**	**2.00**	**0.00**	**34**
Total Number of Questions	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	**10.00**	
Distribution Percentage	**0.00%**	**20.00%**	**20.00%**	**40.00%**	**20.00%**	**0.00%**	

Individual Score		0	10	8	12	4	0
Sum of Scores	34						
Maximum Score possible	60						
Percentage of Maximum score attained	57%						
Actual Rating	3.40						

Appendix G: Letter for expression of interest in on-line survey

Hi connection name,
Thank you for connecting with me through LinkedIn!
I am currently doing a research study into the operations of Development & Manufacturing (D&M) Pharmaceutical companies in Ireland and arising from this work a Framework has been developed to measure the Competitive Advantage of Pharmaceutical companies with Irish operations. It is intended that the Framework will be circulated to participants as an on-line survey and would be used as an accessible self-assessment tool to support Irish Pharma companies to remain competitive.

The idea being that companies, actively looking to improve, would complete the Framework at t=O and repeat the assessment at regular intervals to benchmark their performance over time. The various statements that make up the Framework will prompt the user to think about their own company's systems and identify changes or remedies needed to optimise their performance. The score for the assessment should increase after each attempt, where serious consideration is given to the factors being measured.
I am hoping to get a good representation of pharma companies in Ireland so that we can generate a pattern of the competitive position of these companies and identify best practice within peer organisations.

As a Key Decision Maker in a pharma company would you be interested in using the Framework to participate in this research study?

The survey will take approx. 20 mins to complete. Once complete, you will receive a summary of the result. Details of your name or your company's name will NOT be revealed or identifiable from the assessment. All information will be treated with the strictest confidence.

Your participation will be valuable as the content of the Framework is based around the Business Excellence models and will make an original contribution to the limited knowledge about operations and future prospects of the pharmaceutical industry in Ireland.

Please reply to this message/email if you are interested in participating and I can organise to send the survey link to you. I am also happy to meet with you to discuss the study in more detail.

Appendix H: IPCMF Framework for Embedding the PharmaChem Sector

IPCMF Framework For Embedding the Pharmachem Sector

THE IRISH PHARMACEUTICAL & CHEMICAL MANUFACTURERS FEDERATION

MISSION

To position Ireland as the most productive, best serviced, added value, integrated location in the world to develop and manufacture Pharmaceutical and Chemical Products

TOP PRIORITIES

1. Competitiveness/ External Environment
2. The Employer of Choice
3. Availability of Quality People
4. Best Practice HSE
5. Superior cGMP Culture
6. Development Of Industry Base
7. Advocacy for the Sector

2003-2008 STRATEGIC OBJECTIVES

- Ensure taxation environment remains advantageous to the sector
- Monitor and influence pending EU legislation - HSE, Energy, Social Policy, etc.
- Retain future relative global competitiveness
- Participate effectively in National Partnerships
- Influence White Paper on Chemicals Policy
- Ensure industrial infrastructure supports development of the sector

- Ensure that industry operates the type of human relations programmes that will make it the employer of choice.
- Develop innovative strategic training initiatives for the sector.
- Liaise effectively with the Human Relations Division of IBEC to keep companies abreast of developments and best practice in this field.

- Actively support the promotion of science across all educational levels
- Actively promote careers in the sector to all relevant stakeholders
- Engage in training and development at company and industry level
- Support the development of Graduate Development Programmes at company level

- Utilise & leverage Responsible Care programme to improve industry performance
- Work closely with EPA and HSA
- Promote compliance with relevant legislation and regulations in HSE within the membership
- Advance "corporate social responsibility" throughout the sector

- Promote compliance with cGMP within the membership
- Facilitate good working relationship with regulatory bodies such as the IMB, EMEA and FDA
- Support training and development in GMP and Regulatory Affairs; develop guidelines where necessary
- Arrange seminars and conferences in order to advance overall knowledge in quality related areas in the industry

- Promote the concept of Development and Manufacturing (D+M) within member companies by increasing support for development activities at plant level in order to further embed the sector in Ireland
- Foster strong working linkages with the research sector in Ireland
- Promote and support R&D in the pharmachem and life science sectors in Ireland and the development of Intellectual Property in the country.
- Liaise with bodies responsible for investment in research such as SFI, HEA etc.
- Promote a favourable taxation environment for R&D in Ireland

- Advance the profile of the industry
- "Open" communications with key stakeholders
- Partner with Government, & Gov. agencies
- Partner with IBEC to promote development of the pharmachem Sector
- Promote and support Responsible Care