

Manufacturing Industry in Scotland over the last Fifty Years

Table of Contents

Abstract

Manufacturing in Scotland has followed the path of industry in many parts of the developed world. After the industrial revolution it expanded exponentially, and enjoyed its status as a leading producer for much of the world. However, with the collapse of the British Empire (and associated closed markets) after WWII, together with the growth of lower cost industries in the now developing world, the Scottish manufacturing industry faced increasing competition.

Subsidized for a while, many of the major industries such as shipbuilding and steel production collapsed once they were asked to compete without government investment. By the mid 1980s much of the manufacturing industry had shrunk drastically. Since that time Scotland has taken advantage of the growth in high-tech industries and has become Europe's leading computer technology center. Foreign Direct Investment (FDI) has taken advantage of attractive tax incentives to locate in Scotland. Unemployment levels above 20% have now fallen to below 5%. Diversification of the high tech industry has occurred following the busting of the Internet bubble in 2000. Some traditional industries have remained successful, especially "niche" industries such as scotch whisky.

Future development of manufacturing will depend upon having a skilled workforce that is prepared to adapt to the rapidly changing economic needs of the 21st Century. Diversification of the high-tech industry, with particular emphasis on software development, together with the expansion of production for goods such as whisky, should assure the future of manufacturing in Scotland. Porter's Diamond is a useful model for considering how Scotland can continue with its quite remarkable economic recovery after the ravages of the 1980s. Porter will act as a framework against which the Scottish economy can be measured. In turn, the specific Scottish experience acts as a case-study that can be used to evaluate the efficacy of Porter's model. As Porter's work was based on country case-studies, this seems an effective tool for understanding it.

Introduction

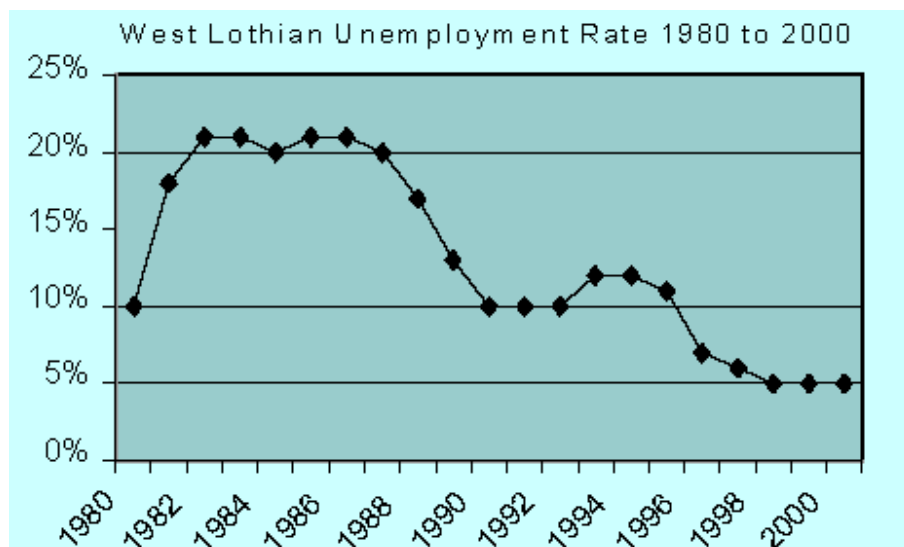
Manufacturing industry within Scotland has suffered from the challenges and setbacks that have been faced by many industrialized countries in the last decades of the Twentieth Century into the present one. These basically stem from the declining importance of Britain within the world marketplace (associated with the post WWII shrinking and eventual disappearance of the Empire) together with the growing challenge from other countries to its traditional manufacturing industries: namely ship building, coal mining and steel industry,

Together with this decline a remarkable rebirth in a different kind of manufacturing has occurred in the last two decades with the growth in the technology and service sectors. While the manufacturing of actual goods and materials has inexorably declined in Scotland, if the definition of “manufacturing” is expanded to include the manufacturing of such items as knowledge, banking systems and technology, then it is in fact growing.

The transformation in Scottish industry in the last few decades has stemmed from a number of interdependent factors. Thus, while it was foreign competition that led to the demise of much of the traditional manufacturing industry by the mid 1980's, with associated unemployment, it is the existence of Foreign Direct Investment (henceforth FDI) that has led to much of the growth. Competition destroyed some elements of Scottish manufacturing, while leading to a rebirth in other sectors.

The fact that the massive unemployment rates of the mid 1980's have been effectively reduced to an "acceptable" level does not necessarily mean that similar success can be assured for the future:

Table 1 – West Lothian Unemployment



(Scotland 2006)

As the Scottish Executive suggests, the re-orientation from "traditional strengths in engineering and mining towards more mobile, high growth manufacturing" was "exactly right for the major and specific problems of the 1980s **but is not necessarily what will be required for the 21st Century.**" (Scotland, 2006)

To be succinct, past success does not guarantee future expansion.

This analysis will trace the historical development of Scottish manufacturing over the last 50 years, giving a basic chronology while examining the literature that has interpreted these changes. Particular emphasis will be laid on developments in the last 20 years, as they are essentially a prologue to

recommendations for future growth that will occur at the end. Historical trends may be highly useful in predicting the future, but revolutionary changes in the nature of manufacturing and how the word is basically defined may make some of that prediction moot. If Scotland is to continue with its success, and to avoid some of the recent hiccups within its progress, then it must be prepared for upheaval and a constant system of improvement.

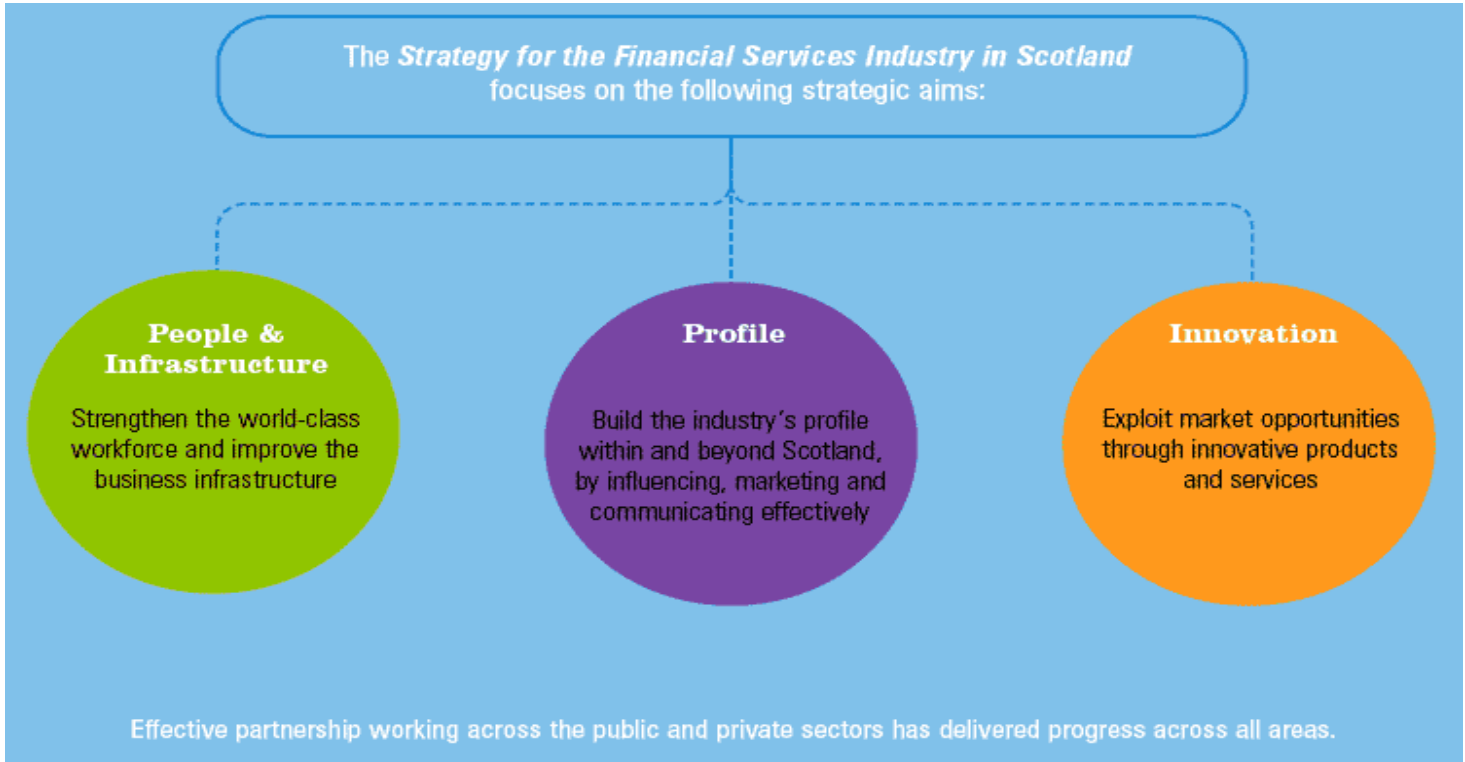
Porter's model for national competitiveness, known as "The Diamond" is a powerful tool for evaluating a particular economy: its present situation and possible developments. As will be seen, while Porter is useful, it suffers from the problems that all models suffer from: a lack of specificity vis-à-vis a particular case and a tendency towards generalization and demotion of those factors that do not fit in with the overall thrust of the authors ideas. The Scottish experience may act as a useful test of whether Porter's model is applicable outside of the specific countries (Japan, Sweden etc.) that he used in his research. The model and the case-study interact with one another and reflect one another's strengths and weaknesses.

Literature Review

A wealth of sources exist for a review of Scottish manufacturing during this time period. They can be divided into three basic sections. First, government documents that outline the changing nature of manufacturing, together with policies towards it. Second, scholarly and business publications that analyze Scottish manufacturing. Third, more general texts that may be used to build a theoretical and model-based background for the specifics of this particular study of Scotland. As will be outlined in the research methods, it is the contrasting and comparing of these different types of literature that may enable an understanding of some of the quandaries facing the Scottish economy.

Official government publications claim to be objective but are often actually subjective in nature. The contrast often provides evidence for analysis. One major source of both information and policy on Scotland in general and for manufacturing/industry in particular are the *Scottish Executive Publications* (Scotland, 2006). Publications normally combine policy and facts. The facts lead, supposedly logically, to the policy. Thus the “Annual Report for the Strategy for the Financial Services Industry in Scotland” (Scotland, 2006) suggests that there is a need “to build on Scotland’s long history of outstanding financial services success” and suggests a strategy for doing this. The document is essentially a mixture of analysis, policy review and selling of future strategy. A number of illustrations that are long on rhetorical devices and short on specifics:

Table 2 – Strategy for the Financial Services Industry in Scotland

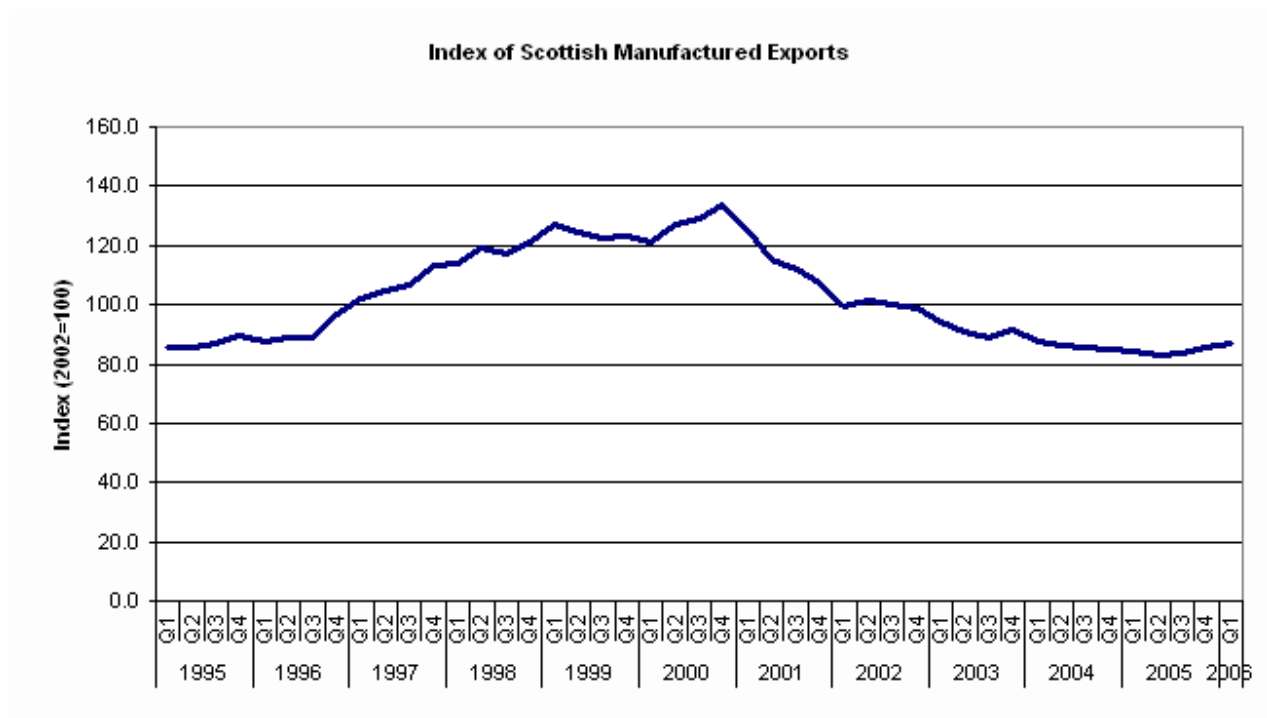


(Scotland, 2006)

Apart from these rather complex documents, that offer a range of material for interpretation, the Scottish Executive also published a large variety of raw data that gives basic figures. Thus a single web page gives links to *Latest GDP Trends*, *GDP Longer Trends*, *Gross Value Added at Basic Prices by Industry*, *Final Demand*, *Compensation of Employees by Industry* as well as larger segments on *Exports* and *Manufactured Exports*.

A number of useful graphs appear within many of these documents, giving an easily readable summary of overall trends within Scottish manufacturing. For example, the following occurs with in the *Manufactured Exports* report:

Table 3 – Manufacturing Exports



What these figures actually imply, i.e. their interpretation is of course more difficult, but the Scottish Executive does provide the raw materials for such an interpretation in a remarkably clear manner within these basic statistics. Indeed, it offers more readily available statistics than the British government as a whole.

It is within these statistical analyses that the Executive is less prone towards rosy optimism, as it is reporting what has occurred rather than what it hopes to occur in the future. Thus in its analysis of manufactured exports, the

Executive reports that “since 2000 Q4 (the last peak), the level of manufactured export sales has fallen by 35.2% in real terms . . . this represents an average quarterly decline of 2.0 per cent” (Executive, 2006).

For statistics before the establishment of the Scottish Executive in 1998 (Scotland Act, 1998), those for Scotland need to be gleaned by separation from the overall United Kingdom statistics for the time. Thus the National Statistics website (www.statistics.gov.uk) gives a number of useful reports, such as “The UK Economy – Analyses at a glance, 1992-2004”. However, such reports tend to be comprehensive in nature, thus covering the whole of the United Kingdom. Thus a comment such as “in 1999, the manufacturing industries contribution to total GVA at current basic prices fell below 20.0 percent for the first time” (Mahjan, 2006), needs to be taken within its context and applied as far as is possible to the individual circumstances of the Scottish economy. As will be seen in the *Results and Discussion* section of this analysis, at times Scotland mirrors the rest of the UK, and at other times it does not.

Turning to scholarly and business works, perhaps the greatest number of books in the former deals with the time of the Scottish Enlightenment, more than 150 years before the commencement of the period that is being considered here. This perception of Scottish greatness in the past has however spawned a genre of scholarship that seeks to compare what occurred at the turn of the Nineteenth Century to that which is taking place at the beginning of the Twenty-First. Thus *The Renaissance of the Scottish Economy* (Lythe, 1982) was published just before the devastation that was about to be wreaked on the Scottish economy

from Thatcherite monetarist policies, but also envisioned a new growth for that economy within the as-of-yet neophyte technology industries.

In more recent years, scholars have attempted a similar parallel, one based upon the factual kind of renaissance that appears to be taking place throughout the world with the rapid advance of computer technology and all industries associated with it. Thus Jamieson (2003) states that such an analogy is not too far-fetched. Others have used the Scottish experience to suggest wider models that can be used in any “small, advanced country” (Coyle, 2005). Coyle concludes that government policy can actually be highly important in opening up “flows of knowledge, investment and migrants” (Coyle, 2005), which she argues are so important for the future health of the economy. Coyle argues that government policy does not necessarily need to be either draconian (as Conservative policies in the 1980s were) welfare-orientated (as 1970s Labour policies tended to be), but rather can support the economy in general, and the sensitive manufacturing sector in particular through a mixture of needed changes and policies that encourage investment. A natural suspicion of government intervention, together with “entrenched institutional barriers to policy reform” (Coyle, 2005) make such changes difficult, but Coyle argues that they are vital for future growth.

In some fascinating recent scholarship, a number of writers tackle the question of whether Scotland has a more radical industrial climate than the rest of Britain. This is a vital quandary within the manufacturing sector in discussing what changes can occur and how they can be instituted. Gall (2005) argues that

there is a fusion between traditional trade union militancy and national identity that causes a more radical outlook within Scotland. The “national question” (Gall, 2005) brings about an awareness and a sensitivity within the Scottish worker that does not exist in the rest of Britain, except for perhaps more minor examples in Wales and Northern Ireland. The belief (whether valid or not) that government policies stemming from London deliberately crippled the Scottish economy and led to the massive unemployment/despair of the 1980’s leads to the deep cynicism and suspicion surrounding any government policies. Gall argues that the new Scottish Executive may at least partially alleviate this situation. The fact that it is *Scottish* (rather than English) in nature may enable the Executive to work with unions etc. in a more cooperative manner than has occurred in the past.

The idea that overall change within Scotland is necessary for its economic growth has been pursued by a number of scholars. Corbett (1995) suggests that a massive change in Scottish housing is needed for economic growth. He states that areas of Glasgow such as the Gorbels are essentially a limitation on economic growth that have an influence beyond their actual geographical borders. If the image of “Scotland” is indelibly linked to our impressions of depressing Glasgow, then the ‘reality’ will be lost. On the other hand, ‘Scotland’ may also render images of the Scottish highlands, pure malt whiskies, pipe players on mountain tops etc.. The question is which version of ‘Scotland’ comes to dominate or whether, as is probably more likely, the two will co-exist without any resolution.

Moving into scholarly business research that does not deal with Scotland specifically, but which can be applied to the Scottish experience, the idea of *strategic planning* is particularly relevant. A strategic plan is necessary for a company to succeed because, without it, the business is likely to meander from decision to decision without any sense of priorities or goals as to where it is going. An analogy would be that a company without a strategic plan is without an explorer without a map: the explorer may get somewhere interesting, but it will be an accident. With a map the likelihood of finding his way, and perhaps of discovering new places of interest increases. Similarly, a company without a strategic plan may become accidentally successful, but it is much more likely to achieve success, and to maintain its profitability, if it has a plan in place. A company with a strategic plan will know how it has got to current success and thus may be able to continue on this path in the future.

Scotland needs a strategic plan that is more than an improvisational scurrying from one crisis to another, from one opportunity to another. A strategic plan within a Capitalist economy, which is by definition not a “controlled economy” is difficult. A government may attempt to at least prod industry and manufacturing in one direction or another, but it is individual company decisions, both domestic and international in nature, that essentially make (or break) a country’s economy. The relationship between national policy and private company decisions essentially is the fulcrum around which the concept of *national competitiveness* revolves.

One of the most powerful models for evaluating the growth of a country's economy, and the nature of its overall competitiveness, is Porter's *The Competitive Advantage of Nations*. It will be considered in detail here. Porter, a noted Harvard University Professor, conducted a detailed and comprehensive study of ten nations to discover what leads to an advantage and success. Porter was testing the hypothesis that existing classical theories on comparative advantage are inadequate, and perhaps even misleading. For the purposes of this study, Porter will be regarded as part of the kaleidoscope of theory that can be used in the evaluation of Scottish industry. It is not the purpose of this analysis to valorize one theory over another, but rather to use them as tools.

A summary of Porter's theory would read as follows:

- a nation attains a competitive advantage if its firms are competitive. Firms become competitive through innovation. Innovation can include technical improvements to the product or to the production process.

It can also be summarized as follows;

The conventional wisdom of international trade is challenged by Porter's Model. He argues that the factor endowment theories of Heckscher and Ohlin are too simplistic to determine a nation-state's competitive advantage. Comparative advantage can no longer be seen as 'divine inheritance'. Porter states that international success in a particular industry is determined by four broad mutually reinforcing factors which create an

environment which enables these firms to compete. The four include factor conditions, demand conditions, related and supporting industries and firm structure, strategy and rivalry. These determinants also being influenced by the nation's government and by chance events.

(O'Toole, 2006)

The idea of “divine inheritance” is perhaps of great importance to a country such as Scotland. It had previously been thought the England, and particularly that section that surrounds the metropolis of London, had a divine right to being more competitive than the rest of Britain, This was particularly the case with new innovation and industries regarding a sophisticated workforce. Potter suggests that England's dominance is not necessarily a given – Scotland both can and should be able to come to prominence if it concentrates on the correct activities. Porter's model offers hope to those countries that have not been previously associated with being centers of competitiveness: if they meet the correct criteria they will become centers, irrespective of their previously peripheral position.

Potter concentrates on the idea that competitiveness may in fact be a fluid characteristic that can flow throughout a society without particular reference to past performance. Again, past is not necessarily prologue to future, at least in economic terms. The fact of the matter is that most economic centers have remained centers through various economic changes, adapting to the times. While some, for example Manchester and Birmingham, have risen (and fallen) with the times, the massive centers, for example London, remain dominant

whether the economy is Elizabethan or Twenty-First Century. Potter provides opportunity for hope, but it is one that must be linked with reality.

The Diamond - Four Determinants of National Competitive Advantage

- Four attributes of a nation comprise Porter's "Diamond" of national advantage. They are:
 - a. factor conditions (i.e. the nation's position in factors of production, such as skilled labour and infrastructure),
 - b. demand conditions (i.e. sophisticated customers in home market),
 - c. related and supporting industries, and
 - d. firm strategy, structure and rivalry (i.e. conditions for organization of companies, and the nature of domestic rivalry).

a. *Factor Conditions*

- Factor conditions refers to inputs used as factors of production - such as labour, land, natural resources, capital and infrastructure. This sounds similar to standard economic theory, but Porter argues that the "key" factors of production (or specialized factors) are *created*, not inherited. Specialized factors of production are skilled labour, capital and infrastructure.

- "Non-key" factors or general use factors, such as unskilled labour and raw materials, can be obtained by any company and, hence, do not generate sustained competitive advantage. However, specialized factors involve heavy, sustained investment. They are more difficult to duplicate. This leads to a competitive advantage, because if other firms cannot easily duplicate these factors, they are valuable.
- Porter argues that a lack of resources often actually helps countries to become competitive (call it selected factor disadvantage). Abundance generates waste and scarcity generates an innovative mindset. Such countries are forced to innovate to overcome their problem of scarce resources. How true is this?
 - i. Switzerland was the first country to experience labour shortages. They abandoned labour-intensive watches and concentrated on innovative/high-end watches.
 - ii. Japan has high priced land and so its factory space is at a premium. This led to just-in-time inventory techniques (Japanese firms can't have a lot of stock taking up space, so to cope with the potential of not have goods around when they need it, they innovated traditional inventory techniques).
 - iii. Sweden has a short building season and high construction costs. These two things combined created a need for pre-fabricated houses.

There are several problems with this point of view. These stem from the fact that many countries that have scarce resources in fact do not innovate, while those with an abundance of resources are often the most innovative in nature. Into the latter category comes the United States, which enjoy perhaps the greatest abundance of natural, human and economic resources in the world, yet it is also the largest innovator. The fact that the computer industry was largely created by and then developed by the USA, and that development occurred in California, which possesses one of the richest economies in the world, puts the lie to the idea that innovation is necessarily linked to scarcity. Indeed, the very *abundance* of resources often seems to lead to a kind of catalytic effect in which the various resources rub off one another and spark new developments.

Conversely, many countries with very limited resources tend to stay underdeveloped because little economic innovation occurs. There are many examples of this in the developing and undeveloped world where often land-locked countries have few natural or human resources, They tend to ossify and perhaps even collapse under the economic and political pressure that poverty tends to produce. If anything, the countries listed by Porter are the exception rather than the rule. The growth in the post-WWII Japanese economy was a result of American investment, the development of a corporate culture with remarkable loyalty and energy demanded of its employees. The growth in the Japanese population, particularly in already densely populated cities such as Tokyo, did indeed lead to huge pressure on the land and a concomitant rise in land prices. This in turn encouraged the growth of just-in-time business practices,

but these were also linked to the wider economic and cultural conditions already mentioned.

All three of the countries that Porter used within his study – Japan, Switzerland and Sweden – have a common history of a highly educated population with an advanced, sophisticated culture that values long-standing success over short-term gain. Their lack of natural resources are more than overcome by their demographic resources. The same can be seen within the Scottish experience. Scotland now lacks natural resources because its production methods were now outdated. But it has abundant demographic resources in the form of one of the best education systems in the world and a highly developed economic and financial system that is ideally suited for adaptation to new industries.

In one sense the devastation that Japan experienced during World War Two may be compared to the dismantling of traditional Scottish industries during the 1980's: they were both terrible experiences for the populations that experienced them, but both also created a vacuum that could be filled in a positive way by new industries and businesses. Inertia from industries and businesses that might resist change does not occur because they have disappeared. The vacuum creates opportunity.

b. Demand Conditions

- Porter argues that a sophisticated domestic market is an important element to producing competitiveness. Firms that face a sophisticated domestic market are likely to sell superior products because the market demands high quality and a close proximity to such consumers enables the firm to better understand the needs and desires of the customers (this same argument can be used to explain the first stage of the IPLC theory when a product is just initially being developed and after it has been perfected, it doesn't have to be so close to the discriminating consumers).
- If the nation's discriminating values spread to other countries, then the local firms will be competitive in the global market.
- One example is the French wine industry. The French are sophisticated wine consumers. These consumers force and help French wineries to produce high quality wines.

The prime example of this could also be seen as the Scottish whisky industry. One element that Porter does not consider in great depth of detail is the fact that such "discriminating values" may in fact be as much an invented element of an innovative advertising campaign as an actual reality. The "discrimination" may in fact be less to do with the actual quality of the product as with the claims that are associated with it.

One might sensibly ask what the difference is between a genuine discriminating value and one that is synthetically created? Again the Scottish whisky industry may be used as an example. The spread of scotch whisky

occurred not just because of an advertising campaign (the export actually started long before the word “advertising” had been invented) which does currently exist but because the real quality of Scotch whisky was undeniable. Thus the rest of the world agreed with Scottish discrimination without any need of being persuaded.

An example of a “discriminating value” that did not transfer to other countries because it was based upon a mixture of great advertising and a type of national self-deception was the transferal of Hyundai cars from Korea to other countries. The Korean car-maker had been insulated from other car makers (and the quality of their products) through trade bars to them entering the Korean market. The result was that Korean cars were in fact of terrible quality even though Koreans genuinely believed that they were “discriminating” in their choice of them. Hyundai cars became something of a joke in all the countries they were exported to until in about 2000 genuine discrimination (in the form of Japanese designers) was introduced to the firm and the joke became a fast growing success.

One other telling (and humorous) example of an attempt to export discriminatory values in the terms of a “discriminatory brand name (ie. one that will be successful) occurred when the car company Chevy (part of the massive GM) decided to sell its best-selling *Nova* in Mexico. A multi million dollar advertising campaign was developed and instituted, dealers received cars and . . . very few of them were sold. One aspect of the selling of the

Nova that Chevy had unfortunately neglected to consider was that “no va” in Spanish means “it does not go”. A car named “it does not go” might be somewhat of a novelty, but is unlikely to be a big seller. The Chevy *Nova*’s lack of success in Mexico shows that “discrimination” needs to be carefully transferred to other cultures.

It becomes clear that discriminating values that are associated with genuine, objective quality can indeed be an advantage in the export of a product from a domestic market. Without genuine quality it is likely to be a of limited success. Again, Porter seems to suffer from what is perhaps inevitable for a model – the effort to universalize various factors leads to simplification and thus the missing of various scenarios that actual exist in the business world. This simplification is as much a product of the essential nature of the model as any weakness within Porter’s thinking.

c. Related and Supporting Industries

- Porter also argues that a set of strong related and supporting industries is important to the competitiveness of firms. This includes suppliers and related industries. This usually occurs at a regional level as opposed to a national level. Examples include Silicon valley in the U.S., Detroit (for the auto industry) and Italy (leather-shoes-other leather goods industry).
- The phenomenon of competitors (and upstream and/or downstream industries) locating in the same area is known as clustering or

agglomeration. What are the advantages and disadvantages of locating within a cluster? Some advantages to locating close to your rivals may be

- i. potential technology knowledge spillovers,
 - ii. an association of a region on the part of consumers with a product and high quality and therefore some market power, or
 - iii. an association of a region on the part of applicable labour force.
- Some disadvantages to locating close to your rivals are
 - i. potential poaching of your employees by rival companies and
 - ii. obvious increase in competition possibly decreasing mark-ups.

It seems as though the advantages actually outweigh the possible disadvantages in much of the world. The existence of concentrated loci of activity, particularly associated with the technology industry, has occurred in many areas of the world. From Silicon Valley in California to the Research triangle in North Carolina to the concentration of the software industry in certain Scottish glens, it seems as though the geographical conglomeration of activity that occurred with traditional heavy industry within the industrial revolution continues in the new industries of the Twenty-First Century.

The idea that other companies will poach your employees seems somewhat unlikely, considering the fact that Company A is just as likely to poach employees from Company B as the reverse. Indeed, the need to keep employee conditions and wages high because of this potential rivalry helps the overall

economic climate. The competitive drive works with competition for workers as well as between products.

d. Firm Strategy, Structure and Rivalry

1. Strategy

(a) Capital Markets

- Domestic capital markets affect the strategy of firms. Some countries' capital markets have a long-run outlook, while others have a short-run outlook. Industries vary in how long the long-run is. Countries with a short-run outlook (like the U.S.) will tend to be more competitive in industries where investment is short-term (like the computer industry). Countries with a long run outlook (like Switzerland) will tend to be more competitive in industries where investment is long term (like the pharmaceutical industry).

(b) Individuals' Career Choices

- Individuals base their career decisions on opportunities and prestige. A country will be competitive in an industry whose key personnel hold positions that are considered prestigious.

- Does this appear to hold in the U.S. and Canada? What are the most prestigious occupations? What about Asia? What about developing countries?

The concept of “prestige” varies from country to country. In many Asian countries prestige is related to position within society and the degree of respect, or otherwise, that a profession holds. In many Western countries the concept of “prestige” is somewhat more amorphous and often, in a rather crude sense, related to the earnings associated with a particular job. If one is rich, one has prestige, if one doesn’t earn very much money, prestige is absent.

Within the UK there is a complex series of social, cultural and economic structures that make “prestige” very difficult to define, and this is doubly the case in Scotland. Money is a form of prestige, but there are also the vestiges of social classes that in many ways transcend class. Porter’ s suggestion that individuals will choose careers based upon the prestige associated with them is somewhat hampered by the lack of a clear definition for “prestige”.

2. Structure

- Porter argues that the best management styles vary among industries. Some countries may be oriented toward a particular style of management. Those countries will tend to be more competitive in industries for which that style of management is suited.

- For example, Germany tends to have hierarchical management structures composed of managers with strong technical backgrounds and Italy has smaller, family-run firms.

While there are differences between the management structures of various countries, one of the consequences of globalization is the diminishing of these differences. The move towards homogeneity as multi-national corporations become increasingly similar has decreased.

It is true that contrasting management styles perhaps fit better with different kinds of industry. Thus a more laissez-faire management style probably suits the computer industry, where lateral management and open-door policies have existed from Hewlett-Packard on. If a country naturally has those management styles then it may find development within that particular industry. Perhaps this may explain American dominance of the computer industry; Americans are traditionally on first-name terms with members of the same company from the first meeting on. This is the case even when the two employees are officially at very different levels within the hierarchy.

Countries that have a strict hierarchy, particularly those based upon respect for seniority and age, may have difficulty with developments within these industries. Thus it is difficult to imagine a company such as *Google*, which was started by two graduate students at Stanford, succeeding in the manner it has. As with Bill Gates at Microsoft, the founders of *Google* were billionaires before they were thirty, and essentially broke the sense of the slow gathering of wealth

and influence. But in order to succeed countries must adapt their natural proclivities to the management style best suited to the particular industry involved. Porter's model is useful in identifying the fact that different styles do exist, although national stereotyping is dangerous and liable to be simplistic: there are laissez-faire Japanese companies and authoritarian American ones.

3. Rivalry

- Porter argues that intense competition spurs innovation. Competition is particularly fierce in Japan, where many companies compete vigorously in most industries.
- International competition is not as intense and motivating. With international competition, there are enough differences between companies and their environments to provide handy excuses to managers who were outperformed by their competitors.

Porter's views on the fact that international companies do not suffer from the same competitiveness as domestic companies appears to fly in the face of reality. International companies do not vary so much that managers have a ready-made excuse for lack of performance. The idea that a manager can blame poor performance on the fact that another company has a different culture will beg the question of why the manager is not demanding similar practices within his company.

Companies now have more in common with one another than they have dissimilarities. Ideas such as *continuous improvement* and other management principles have spread throughout the business world, and the idea that clichés such as Germans like technical managers while Italians prefer the family touch should be regarded as viable parts of a sophisticated model seems rather strange. Multinational companies tend towards homogeneity rather than heterogeneity, and this tendency needs to be considered as part of the management structure.

Porter is on much safer ground in his suggestion that intense competition spurs innovation; it is after all the basis of the capitalist system. If competition did not spur innovation then Marx's forecast for the demise of Capitalism would have surely already occurred. It has not, and indeed, the system is now more ubiquitous than at any other time in history. This is due to the fact that competition does indeed lead to successful innovation and thus profitability.

C. The Diamond as a System

- The points on the diamond constitute a system and are self-reinforcing.
- Domestic rivalry for final goods stimulates the emergence of an industry that provides specialized intermediate goods. Keen domestic competition leads to more sophisticated consumers who come to expect upgrading and innovation. The diamond promotes clustering.
- Porter provides a somewhat detailed example to illustrate the system. The example is the ceramic tile industry in Italy.

- Porter emphasizes the role of chance in the model. Random events can either benefit or harm a firm's competitive position. These can be anything like major technological breakthroughs or inventions, acts of war and destruction, or dramatic shifts in exchange rates.
- One might wonder how agglomeration becomes self-reinforcing...
 1. When there is a large industry presence in an area, it will increase the supply of specific factors (ie: workers with industry-specific training) since they will tend to get higher returns and less risk of losing employment.
 2. At the same time, upstream firms (ie: those who supply intermediate inputs) will invest in the area. They will also wish to save on transport costs, tariffs, inter-firm communication costs, inventories, etc.
 3. At the same time, downstream firms (ie: those use our industry's product as an input) will also invest in the area. This causes additional savings of the type listed before.
 4. Finally, attracted by the good set of specific factors, upstream and downstream firms, producers in related industries (ie: those who use similar inputs or whose goods are purchased by the same set of customers) will also invest. This will trigger subsequent rounds of investment.

The role of chance within the model is perhaps one of its most powerful components. The fact that many elements of the business environment are not influenced by planning but in fact can be totally dominated by chance

events that are impossible to predict, let alone alleviate against, is something that many business planners are reluctant to consider.

For example, the bursting of the Internet bubble in 2000, with the related collapse of the telecommunications industry, could not be predicted. It influenced the Scottish computer industry, which was forced to react to the situation rather than, as is preferable within business, to proactively manage events. Unpredictable events such as the terrorist attacks of 9/11/2001 will effect the business environment more than a host of more predictable, but less influential occurrences. The truly competitive country is able to adapt to these events well, even though it could not predict them. The diversification of the Scottish computer industry after the implosion of the Internet bubble is an example of such a reaction.

The fact that the diamond is said to be “self-reinforcing” leads to the question of what will happen when one of the elements is not present. Will the structure of the diamond inevitably collapse. This does not in fact appear to be the case; and thus the various elements may in fact be more independent than reinforcing. Thus a country that does not have any particular government policy or action designed to support national competitiveness may actually become competitive despite this lack. Indeed, economies that are more controlled than would perhaps be wanted by most corporations (for example French employment and labor laws) can in fact become competitive in certain areas in spite of the government policies.

Perhaps the other elements become more self-reinforcing if one of the other factors is weaker or not present at all. The energy from the missing piece is transferred to the remaining elements or perhaps the structure reinvigorates itself with different energies.

D. Implications for Governments

- The government plays an important role in Porter's diamond model. Like everybody else, Porter argues that there are some things that governments do that they shouldn't, and other things that they do not do but should. He says, "Government's proper role is as a catalyst and challenger; it is to encourage - or even push - companies to raise their aspirations and move to higher levels of competitive performance ..."
- Governments can influence all four of Porter's determinants through a variety of actions such as
 - a. Subsidies to firms, either directly (money) or indirectly (through infrastructure).
 - b. Tax codes applicable to corporation, business or property ownership.
 - c. Educational policies that affect the skill level of workers.
 - d. They should focus on specialized factor creation. (How can they do this?)
 - e. They should enforce tough standards. (This prescription may seem counterintuitive. What is his rationale? Maybe to establish high

technical and product standards including environmental regulations.)

- The problem, of course, is through these actions, it becomes clear which industries they are choosing to help innovate. What methods do they use to choose? What happens if they pick the wrong industries?

The issue of government intervention in the form of government programs and subsidies to encourage particular industry will be of great importance within the discussion of Scottish manufacturing industry. This is the case because the government within Scotland – or rather the UK government out of London, is perceived as having destroyed much of the traditional Scottish manufacturing industry in the first place.

The closure of the traditional heavy industries such as shipbuilding, steel and other concerns was laid at the door of the monetarist policies of the Thatcher government which came to power in 1979. The selling of nationalized industries that could be profitable (virtually none in Scotland) was partnered with the rapid destruction of those industries that could not be profitable. The rights and wrongs of this situation are perhaps irrelevant – the fact exists that government is perhaps indelibly associated with closure, a depressed economy and permanent unemployment for some men.

Within a capitalist society the government traditionally has a limited role in controlling the economy. It can effectively sway the trend of events through

the existence of National banks which control interest rates and other monetary instruments. The degree to which such controls actually influence the economy versus the fact that they may be “following” economic trends that are already occurring will be perhaps be a perennial argument within scholarship.

Porter relies upon reasonably ‘safe’ areas such as education policy which undeniably effect the quality of the workforce and thus the profitability of the businesses. Taxation is also an important element, even though increasing numbers of corporations pay no taxes at all through various manipulations, legal or otherwise.

E. Criticisms

Although Porter theory is renowned, it has a number of critics.

1. Porter developed this paper based on case studies and these tend to only apply to developed economies.
2. Porter argues that only outward-FDI is valuable in creating competitive advantage, and inbound-FDI does not increase domestic competition significantly because the domestic firms lack the capability to defend their

own markets and face a process of market-share erosion and decline.

However, there seems to be little empirical evidence to support that claim.

3. The Porter model does not adequately address the role of MNCs. There seems to be ample evidence that the diamond is influenced by factors outside the home country.

<http://pacific.commerce.ubc.ca/ruckman/competitiveadvofnations.htm>

The fact that case studies tend to be, by definition, very “case specific”, thus concentrating on some factors and perhaps ignoring others, is a major weakness. This is particular importance within the attempt to apply the principles found within those studies to the generalized assertions needed by a model. Porter suggests an applicability within his model, by stating his ideas in general terms, that may not actually exist. Thus the unique circumstances of Japan may well not actually apply to other countries, even if they appear superficially similar.

The fact that inbound FDI may well effect domestic competition seems self-evident, and can be illustrated by examples within Britain. Thus the British car industry had great competition from Japanese rivals when they arrived within the market. Competition *between* domestic car manufacturers was subsequently difficult to quantify, but as both domestic and imported products were basically in competition with one another it seems sensible to consider that it increased. On this matter Porter is simply weak, both theoretically and empirically.

Porter’s neglect of MNCs may be due to the fact that they were not the huge and controversial influence that they are now when he first started

formulating his ideas. The fact that MNCs essentially negate the importance of national borders makes many of Porter's ideas moot because the differentiation between internal and external market forces is rendered obsolete.

Research Methods

The methodology to be used for this study will be the *case-study* approach. The case-study approach offers several advantages. These include (but are not limited to) the discovery of hidden forms of behavior, the exploration of causal mechanisms linking phenomena, the revelation of a critical case and the explanation of variations (Leedy & Omrod, 2005). The case-study approach also provides a way of studying human events and actions in their natural surroundings (Babbie, 2003). The nature of manufacturing industry is by nature

complex and thus may actually be revealed in the “forms” of what people do, forms that are best evaluated within the natural surroundings of the actual world rather than within the more cohesive, but perhaps less proximate to reality world of the model or theory.

Perhaps most importantly, case studies tend to be selective, concentrating on one or two issues that *are fundamental to the system being studied*. There are also profound differences between the *qualitative* and *quantitative* approaches to research:

Qualitative researchers:

- reject the idea that social sciences (such as education and training) can be studied with the same methods as the natural or physical sciences;
- feel that human behavior is always bound to the context in which it occurs; therefore, behavior must be studied holistically, in context, rather than being manipulated;
- employ an "insider's" perspective; this makes qualitative research an intensely personal and subjective style of research.

Quantitative researcher:

- argues that both the natural and social sciences strive for testable and confirmable theories that explain phenomena by showing how they are derived from theoretical assumptions;
- reduces social reality to variables in the same manner as physical reality;

- attempt to tightly control the variable in question to see how other variables are influenced.

(San Diego State University, 2006)

Of course any analysis deals with a combination of these two approaches. A purely qualitative approach will lack the hard statistics and figures to support its more generalized assertions. In turn, purely quantitative research lacks the subtlety to view the unique characteristics of a particular situation. Thus Scottish manufacturing has particular statistics associated with it, but also unique, qualitative aspects that require a concomitant approach.

Much of the research has been done through the Internet. While the Internet has a number of weaknesses inherent within it, such as the difficulty of verifying information and the lack of “gate-keepers” for scholarship, neither of these factors really appear within this actual study. Figures and policies for Scottish manufacturing are clearly and comprehensively available at a number of central sites, including that of the Scottish Executive. The statistics gained from these websites are official government publications and so are no more (or less) accurate than those that would have gained through traditional library research in the past.

In fact, as they are often updated on a near daily basis, they may well be more accurate than traditional sources. Thus a book is only as current as its publication date, but websites, with their fluid, endlessly mutable nature with updates can provide day-accurate information.

Results

The history of Scottish manufacturing over the last 50 years is greatly influenced by the 150 years that preceded it. The Industrial Revolution led to the growth of Scottish industry, but also led to the depletion of resources that has occurred in the last few decades. Thus while coal was (until the discovery of North Sea oil) Scotland's chief mineral resource, the Lanark coalfields (which once dominated) are now virtually exhausted.

Peak coal production was reached in 1913 with 43,000,000 tons, but this has drastically decreased over the last five decades with the closure of many uneconomic pits and the concentration on a few large, mechanized pits in the Lothian, Fife and Strathclyde. Much of the heavy manufacturing industry such as steel, ship building and engineering, relied on this coal production. But after WWII foreign competition and changing patterns of demand led to the closure of many of these plants.

Overall, there has been a move from massive heavy industry concerns to a more diversified economy based upon a wide range of activities. Many of these are specifically manufacturing in nature. Thus since the appearance of computers in the early 1970's, and the growth of the computer industry since the early 1980's there has been a remarkable expansion in the technology industries.

Previously depressed regions, especially within and around Glasgow, have benefited from the expansion into them of companies such as IBM and Hewlett-Packard (Corbett, 1995).

As stated earlier, it has been a mixture of private enterprise, together with government policy that has provided both the strategic planning and the monetary encouragement for development, that has led to the diversification of the Scottish economy. Some of the older manufacturing sector has managed to survive. Thus the textile industry in the Borders, carpet making in Glasgow and the jute industry in Dundee have managed to adapt and flourish in the last few decades. Adapting to a niche industry type of role has succeeded for these industries. Part of this success is in the successful creation of an 'image' that Scotland is the ideal place for niche industries. Thus the eccentricity and uniqueness that is positively celebrated rather than seen as a source of suspicion can create the ideal environment for a niche industry. The method of production may be not as efficient as others, but this is part of the attraction that customers are prepared to pay a premium for.

Printing and brewing are also still established in Edinburgh and Glasgow. Dominating all these traditional industries is the scotch whisky industry in the Highlands. Despite massive taxation within Britain, the whisky industry has continued to flourish and grow through the huge export market. As a recent report suggested ". . . jobs in Scotland's Whisky industry are being saved by strong exports, according to half-year figures released by the Scottish Whisky Association. Global Scotch Whisky exports for the first half of 2005 exceeded 1bn

[pounds sterling] for the first time in eight years, with value up 3% to 1.01bn pounds..." (Goliath, 2005). The development in Scotch Whisky is an example of the Scottish Development International (part of the Scottish Executive) at work. The Executive has actively promoted scotch, among other products, to an international marketplace that seems eager to import this specifically "Scottish" product. As the BBC recently reported, the Scotch Whisky Association (SWA) head Gavin Hewitt has suggested that "Scotch whisky is an ambassador for our country in new emerging markets such as China, where we continue to see an exciting growth in exports" (BBC, 2005).

A dynamic equilibrium can be seen at work here. The Scottish Executive uses its position to promote Scottish products and the manufacturers of those products (or their representatives such as the SWA) in turn promote an active and positive view of "Scotland". Image is as important as substance within the modern day business world, and when both are combined together, as it is with whisky, then a powerful manufacturing opportunity results. This fits in within Porter's vision of government action as having a positive effect on manufacturing industry; although the reservations regarding the intrinsically Scottish view of government intervention after Thatcherism need to be taken into account. However, industries in the Highlands such as the scotch industry production were not effected by the closing of traditional heavy industries. The anti English sentiment that spread with the closures did influence these communities, although that was more easily forgotten as the tourist and whisky industry

actually flourished as the upper and middle classes became richer with tax cuts and greater general prosperity.

The downturn in the fortunes of traditional heavy manufacturing in Scotland left a vacuum that was eventually filled by high technology. The advent of the so-called “Silicon Glen” seems to have been a take on the famous “Silicon Valley” in California, although within Scotland the spread of the high-tech industry was not limited to a single “glen” or valley. IBM was one of the first “high-tech” manufacturers to locate in Scotland when it started a manufacturing base in Greenock in 1951. IBM was typical of the early companies, which tended to manufacture electronics for foreign companies that would subsequently be exported. IBM, and soon other computer companies, took advantage of the friendly tax situations, and the highly educated workforce to enable the growth of their industry. The existence of a highly developed and longstanding financial industry provided an ideal environment for the growth of technology and software that would support it.

This is an example of Porter’s agglomeration of competitors within a specific geographical area. While many of the companies that have located within the so-called Silicon Glen are in fact foreign-owned, the domestic computer industry has also grown. Here the fact that Porter does not consider the influence of multi-nationals, together with his claim that domestic companies cannot compete with the outside, is placed within a critical context. Silicon Glen shows that, within this most modern of industries at least, it is largely irrelevant whether a company is foreign or domestic owned. The cross fertilization of ideas and

people occurs and seems to perpetuate itself. Workers may well move from one company to another :- a weakness within Porter's view – and yet the number of people coming into the economy easily outnumber those who may leave a particular company. The locus of competitive activity attracts more highly educated and skilled workers, who in turn improve the competitiveness of the industry. Silicon Glen shows that it is the positive rather than the negative effects of agglomeration within Porter's model that are most at work. The tendency of workers to move from one company to another is natural within a world in which independent contractors are the norm rather than the exception. Programmers may work for several different companies, and often at remote locations that are not influenced by geography. A centralized company is not necessarily needed within the computer industry – cross-fertilization of ideas can occur at a distance of thousands of miles through broadband internet connections.

As the computer industry took off during the 1980's and then exploded exponentially with the PC market during the 1990's, Scotland took full advantage of the new opportunities. Sun Microsystems located in Linlithgow, Digital Equipment Corporation developed what was at the time a pioneering 64-bit Alpha processor at Queensferry. The existence of a highly-educated workforce within Scotland made the country attractive for high-tech companies. Also, a series of government subsidies and incentives made the area even more inviting.

It is estimated that the Scottish high-tech manufacturing sector produces the following percentages of products:

Table 4: Scottish High Tech Market Share

HIGH TECH PRODUCT	% OF EUROPEAN TOTAL PRODUCED IN SCOTLAND
PERSONAL COMPUTERS	30
WORKSTATIONS	80
ATMs	65

(Figures from Scotland, 2006)

The current population of the European Union is about 440,000,000 people (europa, 2006), while that of Scotland is about 5,000,000 (census, 2001). **Thus Scotland, with about 1% of the population of Europe, produces a majority of its high-technology manufactured goods.** It is not hyperbole when the Scottish Executive claims that Scotland is the high technology capital of Europe. The statistics back it up.

Again, it is the agglomeration of industry, together with another of Porter's facets – a sophisticated domestic market – that is also encouraging this growth. Scotland has always been a center of both education and financial services out of proportion with their population. The software industry supplies many complex and costly systems to the financial industry. The financial industry improves its competitiveness, profitability and subsequently needs more high-tech equipment

and services. Thus the cycle of economic development continues and both industries spiral upwards.

Being a leader within a particular manufacturing sector is double-edged sword however: while all is well with that sector great rewards accrue, but if it stutters then the effects may be magnified. This is what occurred in 2000 when the high-tech economy was devastated by the bursting of the Internet Bubble and the much slower than previously predicted development of the telecommunications industry. The Foreign Direct Investment (FDI) that had occurred for several decades suddenly showed its other face: companies with few real ties to Scotland beyond economic opportunism reversed course. In 2000 and 2001 Viasystems, National Semiconductor, Motorola and Chunghwa laid off many workers or closed their manufacturing plants completely. In a move with as much symbolic as practical resonance, Digital sold the groundbreaking Alpha facility to Motorola, who quickly closed it down. NEC closed its Livingston plant while Motorola also shut down their Bathgate factory.

The reaction to this serious weakening of the high-tech industry has been promising. The stress is now on diversification of activity across a more balanced range of the industry. The Scottish Executive is now encouraging more Call Centers, together with more development within the software industry, which is less susceptible to the ups and downs of the rest of the computer industry. The computer game industry is growing rapidly within Scotland. Thus Rockstar North, the company responsible for the controversial but highly profitable "Grand Theft Auto" games has located in Scotland. Electronics research and development is

also a growing field, with links between universities and *Scottish* companies such as Wiofson, Linn, Nallatech and Axeon.

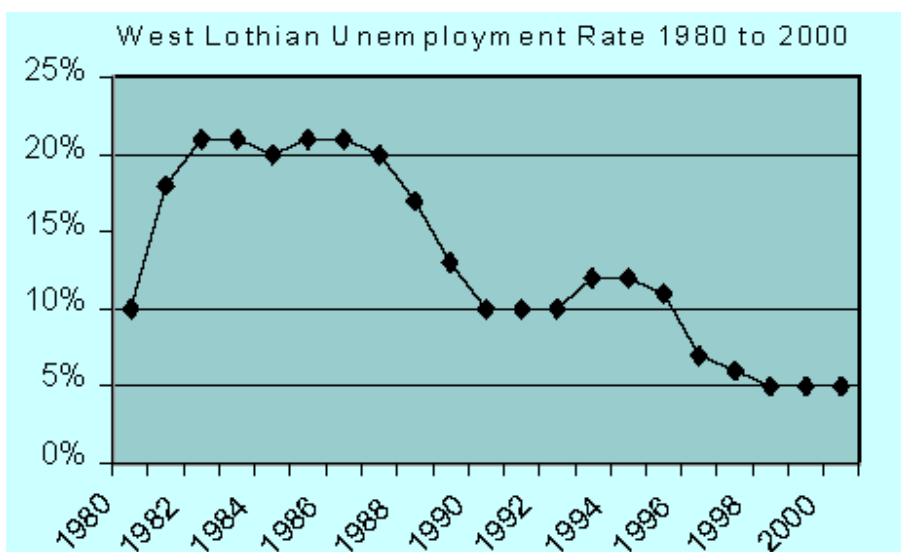
FDI is still occurring with Amazon.com, one of the few profitable internet companies outside of the porn industry, has located its first non-USA software development centre in Edinburgh. It seems clear that such expansion is needed with the imminent end of the “Regional Selective Assistance” (RSA) programme. The RSA is “a national grant scheme . . . aimed at encouraging investment and job creation in areas of Scotland designated for regional aid under European Community law” (rsa, 2006). By March 2006, 800 businesses had accepted offers of RSA that total more than 280,000,000 pounds.

The RSA programme has concentrated on a diverse range of industries within Scotland. Part of its overall action has been the “green jobs strategy” that has been formulated by the Scottish Executive. Thus the RSA offered 1.2 million to Argent Energy “to establish a leading edge facility to produce biodeisel from animal fats/used cooking oils” (rsa, 2006). Indeed, a concentration of energy efficiency and waste management is required for a company to receive a grant of more than 1 million pounds.

One element of the RSA is the tackling of the problem of workforce development planning. Individuals within Scotland need to have the skills and education needed to take advantage of the new manufacturing opportunities. If companies are to be attracted to the country, then an educated and skilled workforce needs to be present. At present, grants over 250K are subject to the development of such programmes.

Discussion

Consider once again the unemployment figures for the West Lothian region which were given at the beginning of this analysis:



It is perhaps seductively easy to pass over such statistics by stating that unemployment is now at a low level (5%), and probably represents a group of people who might be difficult to employ under any circumstances.

However, the crippling unemployment of the 1980's cannot be ignored, because it has had an effect upon the psychology and attitude of workers within Scotland. Mistrust of government programmes goes hand-in-hand with these figures because it was centrally based government policies in London that are blamed (rightly or wrongly) for the despair that followed. However, many of the men who lost their jobs in the 1980's culling are now approaching retirement age

or have already left the workforce. The economic ghosts of those times still linger within the Scottish psyche however.

The change from traditional heavy industry to a more broad-based, twenty-first century outlook has occurred with a good deal of difficulty along the way. Scotland is not different from many other industrialized countries however. In the whole of Western Europe and the USA, the centers of original industrial development, traditional industries have been increasingly challenged by developing countries. Far lower labour costs in these countries, together with an abundance of raw materials, led to a need to subsidize similar industries in areas such as Scotland. The growing gap between what those industries were capable of producing and the resources needed to subsidize them eventually led to the monetary policies of the early 1980s.

It is difficult to morally defend policies that led to the despair of 20%+ unemployment, if, that is, an ethical slant is given to economics in the first place. But at times the ethical and the profitable can go hand in hand. For example, the Scottish Executive has made 2010 the target year for 18% of Scotland's energy needs to come from Renewable energy resources. By 2020, the Executive aims for 40%. Currently onshore wind generators account for a majority of the renewable energy created in Scotland. As this is essentially a limitless source of power, so long as the investment in infrastructure and manpower exists, then the future for this type of energy production is rosy. Currently several thousand people are employed within the wind energy sector.

The Executive plans to build the world's biggest windfarms at Barvas Moor in the Hebrides. In the sea just off Islay, the LIMPET (Land Installed Marine Power Energy Transformer) is being installed, which will become the first ever commercial scale wave-energy device. Much of this energy creation occurs in areas that are supposedly remote and isolated, mainly because of the inhospitable environment. Ironically, it is the very nature of that environment: many powerful storms per year, largely deserted and treeless land, that makes it so ideal for renewable energy creation.

Such renewable energy resources will create jobs in and of themselves, and also provide more stable (and eventually more economical) sources of power for other industries, including manufacturing. This may well fit within Porter's view that a lack of resources actually helps a country to become competitive. Thus the fact that Scotland has largely run out of the resources, such as coal, that made it an industrial center in the first place, leads to a competitive edge. Yet it is not only the lack of natural resources that leads to the competitive edge, it is the fact that Scotland has an abundance of other resources, including the human element and also a climate that provides for wave and wind possibilities that would not exist in a more equitable climate. So a direct causal relationship between the death of resources and new competitiveness would be misleading; the actual situation is more complex with multiple factors contributing to the growth of new industries. Indeed, as Porter would probably be the first to admit, economics rarely involves simple correlation between variables, but rather multiple variables that all have an influence upon one another.

How do renewable energy industries fit within Porter's model? If Scotland succeeds in producing an agglomeration of the industry within the country then it will have the advantage of being both a foundation and innovative player within this new industry. The various types of renewable energy industries are diverse – thus wind and wave power have very different technologies and related industries – and so the Scottish economy will not necessarily suffer from the risks involved with over-specialization. If Scotland can be a world leader in renewable energies it will essentially be creating a set of discriminating values that can then act as a competitive advantage when the industry is exported abroad.

The fact that abundance generates waste may well account for the non-competitive and unrealistically labour intensive industries that developed in Scotland while it enjoyed large supplies of coal. Now these have disappeared and Scotland has created an innovative mindset. It is unlikely that the renewable resources would have been explored and developed, let alone put into practice, if coal were still available. There is a time within any country when an uneasy “interim” exists in which the workers who were secure within the former industry are essentially set adrift, and those who will staff the new industries have yet to finish their educations or move to the area. This is painful time when a generation is essentially lost; men who had provided for their families all their lives find themselves unemployed and, perhaps more important, unemployable in their forties and fifties. Economics rarely considers the human aspect of the various theories that are used to explain trends: macro-economics in particular has this tendency. It presents a clinical, perhaps dehumanized view of the world in which

the employees are indeed just units of capital that can be used, misused and cast aside as the situation dictates.

The Scottish whisky industry, perhaps the most successful in the world, is an example of the “sophisticated domestic market” that Porter speaks of. Thus the fact that whisky has been drunk for centuries in Scotland has led to the development of numerous fine distilleries that produce superb products because they have to compete with another distillery maybe just a few miles away. Thus Scotland developed this excellent product long before it became a worldwide export.

In the twentieth century, and especially since WWII, Scotland has managed to export its discriminating values regarding scotch whisky to the rest of the world. Other countries produce very similar products that cost much less to produce and thus can be marketed at a cheaper price, but they do not reach the same quality as whisky. Of course this sense of the superiority of whisky is essentially subjective in nature:- it is a luxury product, and its quality cannot be measured in the same way that, for example, a computer's processing speed can be – and this subjectivity has been used by Scottish marketers to produce an almost unchallenged sense of the unrivalled quality of whisky. This sense of quality is now virtually undisputed throughout the world. The fact that it is subjective rather than objective in nature is seldom even mentioned.

Turning to the other important sector of the Scottish industry – computers – it can be seen that Porter's ideas of related and supporting industries have come into play. The process of clustering/agglomeration now occurs as computer

industries have located within Scotland, often in the same geographical areas. This provides a market-driven and intellectual energy that enables the firms to feed off one another. Employees may transfer easily from one company to another, thus forcing the companies to provide better wages and conditions. In turn, this encourages more talented and educated workers into the region, thus continuing the cycle of success. This is also an example of the technology knowledge spillover that may often occur within these industries.

It is the intense competition between companies that can produce economic development. However, while Porter suggests that international competition is not as fierce and thus catalytic as local competition, in the 21st century this is clearly not the case. The computer industry essentially negates national borders and international competition is as important as national. The Scottish computer industry has become a center for the whole of Europe's production of computers. If the European market can be regarded as a "domestic" market because of the economic ties between the various countries and the fact that it calls itself a Union, then Porter's model can be more accurately applied. Scotland has won the domestic market battle in this case, despite being geographically remote from the centers of population that one might suggest would be natural environments for the computer industry to grow.

One of the reasons for this may be the fact that the financial services industry in Scotland is so strong. Financial services are now completely dominated by technology, and the market that they present provides a catalyst for growth within the technology and computer industries. Scotland has been a

center for finance for centuries, and this much newer industry has essentially been effected by the self-reinforcing nature of Porter's diamond. Each industry catalyzes the other and both grow within a kind of mutually beneficial dynamic equilibrium. Such is the complex relationship between industries in the 21st century.

Conclusions and Recommendations

Manufacturing industry in Scotland has gone through a period of shrinkage associated with the collapse of traditional industry, followed by a renaissance in

the form of high tech industry. The current state of the high technology industry is quite remarkable, but the manufacturing industry needs to diversify in order to offset the natural boom-and-bust business cycles involved with individual sectors.

The following recommendations will be divided into two major sections. First, recommendations for the non-technology manufacturing industry, and secondly those for the high-technology industry. It should be noted that the word *manufacturing* is being used in the most comprehensive sense, to include the creation of knowledge, services and other non-physical products.

Recommendations for non-technology manufacturing

- Emphasis on the production of high-quality, specifically “Scottish” products. For example, the Scottish woolen industry has had continued success through branding itself as producing particular quality
- Use of the scotch-whisky industry as both a model for other industries and also as a catalyst for their growth.
- Encouragement of future programs along the lines of the RSA.
- Expansion of education programmes to retrain those workers who lose jobs in traditional industries and also to provide the skills necessary for young people newly entering the job market.
- Expand the creation of renewable energy resource plants, especially in those areas of Scotland that are normally isolated from economic development.

Recommendations for high-technology manufacturing

- Continuance of Scottish Executive programmes to encourage FDI.
- Realization that domestic, ie. Scottish owned, companies may provide more stable economic conditions within the industry. Thus together with FDI, encourage Scottish companies within the high-tech industry.
- Encourage the diversification of the industry: set up a programme that will provide tax-breaks etc. for new types of high-tech manufacturing. For example, the video game industry is one of the most rapidly growing and successful parts of the computer software industry. The highly educated Scottish workforce should be able to provide an attractive workforce for both existing and startup game software companies.
- Linked to this diversification, expand links between the high-tech industry and universities. Scotland has some of the best universities in the world, and links between the industry and these institutions should provide economic energy to both.
- Expand the geographical range of the high tech industry. Thus development in those areas of Scotland that have not thus far enjoyed this new type of manufacturing industry. *Spatial* diversification is necessary.

Beyond manufacturing, a number of other recommendations can be made that would improve the overall state of Scotland's economy:

- Develop infrastructure in the densely populated part of the country in the lowlands.
- Plan and build the high speed MAGLEV rail system that has been proposed. This will decrease travel time between the major cities of Glasgow and Edinburgh by more than 30 minutes.
- Diversify the tourism industry: develop environmentally friendly “ecotourism”, especially in the more untouched and unspoiled areas in the Highlands.

This move into the entertainment and gaming software industries makes it an ideal fit with the Scottish business environment. The Scottish high-tech industry has needed to diversify in order to survive and so that it can avoid the kind of specialization that leads to vulnerability if the area of specialization should become less attractive or, in a worst case scenario, actually crash.

The attracting of companies such as AT&T., Amazo.com and Microsoft might seem to be aiming very high for the Scottish high tech manufacturing industry, but an objective analysis shows that the country would have much to offer these world leaders. Diversification and concentration on what the Scottish do best should be the course to a bright future for Scotland. The dark days of massive unemployment for men who were simply not trained to do anything outside of the industries that had been shut down are now receding, and a new generation of Scots are moving into the workforce who should be less suspicious of outside influence and more accepting of a diverse, perhaps foreign makeup of

corporations moving into their country. This outside investment should be embraced.

Development of Renewable Energy

- Using Porter's ideas of cross-fertilization, Scotland can use its tourist image as a pristine, supposedly untouched environment with its renewable energy resources.
 - Thus renewable energy is seen as "clean", as clean perhaps as the Scottish Highlands or the waves coming in off the North Sea.
 - Tourism and renewable energy might be literally linked within eco-tourism programs that will enable tourists to take an active part in the development of renewable energy sources.
-

Bibliography

Annual Report for the Strategy for the Financial Services Industry in Scotland.

<http://www.soctland.gov.uk/Publications/Recent>

“AT&T to Provide Managed Hosting Services to Microsoft Game Studios” *PR Newswire*, Nov 1st, 2005.

Babbie, Earl. *The Basics of Social Research*. Wadsworth, New York: 2003

Byrne, John. “Strategic Planning Back in Business Thought”.

www.htstrategy.com/articles

www.Valwriting.com

Carter, Louis et al. *Best Practices in Leadership Development and Organization Change: How the Best Companies Ensure Meaningful Change and Sustainable Leadership*. Wiley, San Francisco: 2005.

Corbett, Gavin. *Building Scotland's Future Housing and the Scottish Economy*. Shelter Scotland, Edinburgh: 1995.

Coyle, Diane. *New Wealth for Old Nations: Scotland's Economic Prospects*. Princeton, UP, London: 2005.

Drucker, Peter. *On the Profession of Management*. Harvard Business Review, 1994.

Gall, Gregor. *The Political Economy of Scotland: Red Scotland? Radical Scotland?*. University of Wales Press, Cardiff: 2005.

<http://europa.eu/abc/history/index>

www.Valwriting.com

<http://finance.yahoo>

<https://www.scotland.gov.uk/library3/enterprise/agcs-05.asp>

http://news.bbc.co.uk/2/hi/uk_news/scotland/4822888.stm

<http://pacific.commerce.ubc.ca/ruckman/competitiveadvofnations.htm>

Jamieson, *The Illustrated Guide to the Scottish Economy*. Duckworth, London: 2003.

Leedy, P. D. & Ormrod, J. E. *Practical research planning and design, 8th edition*.: Pearson Education. Upper Saddle River, NJ: 2005

Lipton, Mark. "Demystifying the Development of an Organizational Vision". *Sloan Management Review*. 37, no. 4 (Summer 1996): 83-92.

Lythe, Charlotte. Majmudar, Madhavi. *The Renaissance of the Scottish Economy?*. Unwin Hyman, London: 1982.

Mahjan, Sanjiv. "The UK Economy – Analyses at a glance, 1992-2004" *United Kingdom Input-Output Analyses, 2006 Edition*.

Miller, Brian. *Keeping Employees Accountable for Results*. Amacom Books, New York: 2005.

O'Toole, Barbara. "Potter's Diamond and its Relevance to Irish Trade"
<http://www.tcd.ie/Economics/SER/archive/1996/BTOOLE.HTM>

Scotland Act, 1998

www.Valwriting.com

Scotland Executive Publications, <http://www.scotland.gov.uk/Publications/Recent>

United Kingdom Census, 2001.

www.businessplans.org

www.marketingteacher.com

www.rsascotland.gov.uk/rsa

www.seattletimes.com/archives

“Whisky Exports Soar” (October 29, 2005) www.goliath.com

www.Valwriting.com

www.statistics.gov.uk

www.workingmother.com