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Manufacturing in Scotland

Strathclyde Institute for Operations Management
Working Paper: January 2009

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Executive Summary

Set against the backdrop of current thinking that UK manufacturing needs to move into higher value, this report, commissioned on behalf of the Scottish Manufacturing Advisory Service (SMAS) Board, set out to:

- Give an account of the current status of manufacturing SME's in Scotland including current activities, aspirations, strategies and challenges facing them;
- Assess the progress Scotland has made towards high value manufacturing;
- Make recommendations as to the type of support needed to enable Scottish manufacturing SMEs invest in their long-term future.

The resulting report is based on findings of a survey that delivered responses from 435 Scottish manufacturing companies and in-depth interviews with directors of 45 companies. This research was carried out during the period April to September 2008.

Our research suggests that there have been significant shifts within manufacturing SMEs in Scotland. The most notable shifts include:

- **A shift in the basis of competition**. Our research suggests that the primary basis of competition for Scottish manufacturing SMEs is not price. Increasingly Scottish SMEs are adding value through quality and customer service.
- **A shift in the nature and scope of operations**. Whilst the primary business function of manufacturing companies remains production, there is evidence of increasing levels of design and service activity taking place. Companies reported they expected this trend to continue as the shift in the basis of competition away from price towards innovation and customer service gains pace.

These changes suggest a move towards high value manufacturing.

However there are major challenges facing Scottish SMEs if they are to compete on new value propositions. Of particular concern are:

- Lack of strategic vision and understanding of the capabilities and competencies needed to compete on the new value propositions.
- Whilst companies largely recognise the need to improve manufacturing efficiency, many have not embraced the need to develop and improve processes that deliver value to the customer (eg. Customer service processes, new product development processes etc). If customer service, innovation and quality are key differentiators and the way they add value, then companies need to ensure they have sustainable processes to deliver this value.
- Changes in operational activity have tended to be the result of evolution and opportunity rather than coherent operational strategy. Many companies need help in generating and enacting strategic change
- There is a lack of appreciation of the potential value of innovation in delivering value (and indeed the understanding of innovation in its many guises).
- Almost all companies interviewed reported some problems finding and retaining staff. Whilst in some cases labour shortages were due to specific skills and knowledge, there was also a general problem recruiting people with basic employability who had a desire to work in manufacturing. The poor image of manufacturing was a worry to the vast majority of interviewees.
- Many companies recognised the potential to exploit opportunities overseas. Some alluded to the fact that it might not be enough to market and export overseas, but that a manufacturing presence may be needed to fully exploit the opportunity.

In terms of the support needed, companies stated that they would be looking increasingly for help and support in the areas of manufacturing efficiency and sales and marketing. Supply chain was also an area where companies reported they would be looking for help and support. Companies also suggested that they would like to see improvements in terms of "community", with a number of interviewees looking for help in accessing not just help and support, but also introductions to other organisations. The research team believe that whilst not always recognised by the companies, support is also needed in the areas of strategy (and linked to this leadership) and in developing and improving processes that add value. Finally, the research suggests worryingly low levels of manufacturing entrepreneurship in Scotland, with only 3% of companies surveyed established within the past 5 years. This is worthy of further investigation.

Key findings and recommendations are expanded upon in Table 1. However the key recommendations can be summarised as:

- Manufacturing SMEs continue to require support in manufacturing efficiency, sales and marketing and supply chain
- As companies move away from price as the main basis for competition and towards alternative value propositions, they also need support in developing and enacting strategy
- Of particular urgency, companies need help in developing and improving the processes and capabilities that deliver value (beyond traditional manufacturing)
- Establishing processes that support innovation and product development will be central to the sustainability of many Scottish SMEs
- Further work needs to be done to investigate the apparent low levels of manufacturing start-ups
- Further work is needed to understand the areas where Scottish SMEs can actually compete on high volume /low complexity – often due to "localisation" factors
- Consideration should be given to supporting companies who wish to establish manufacturing overseas to exploit global opportunities
- A skills strategy must be created in line with the needs of manufacturing industry
- The poor image of manufacturing in Scotland needs to be addressed

Table 1. Summary of Findings

Theme	Finding	Effect	Ramification	Recommendation
Strategic	The primary basis of competition for Scottish manufacturing SMEs is no longer price.	Migration towards different value propositions such as lifecycle support and integrated solutions.	Companies must ensure they have sustainable and efficient processes that deliver value on all of the activities that comprise their value proposition.	Support must be provided to help companies develop and improve processes and capabilities that deliver value (beyond manufacturing).
	There is a lack of capability in generating and enacting strategy.	Restriction in the ability of companies both to develop a future direction for their business model and to move towards it. Lack of vision restricts both investment and confidence.	Growth is restricted as companies continue to focus on their historical core activities rather than invest in future capabilities and markets.	Support in strategic methods needs to be provided in the same way that there is currently support in operational methods.

There is a lack of understanding of the capabilities and competencies needed to support a new business model.	Activities in areas crucial to delivering customer value (eg. product development and customer service) are sub-optimised.	Expansion of the scope of company activity is carried out in a random and unplanned manner	Support in establishing design and service operations needs to be provided in the same way that there is currently support in manufacturing efficiency
The research suggests a worryingly low number of young (< 5 years old) manufacturing companies.	Intellectual property is exploited elsewhere.	The lack of new manufacturing enterprises may result in the long-term erosion of Scotland's manufacturing base. There is a concern that as traditional industries decline they are not replaced with new industries. Reliance for growth is then on more established companies who are growth limited by the aforementioned reasons. There are also implications in terms of developing a competitive environment.	Further work needs to be done to investigate the low level of manufacturing start-ups. More advice for entrepreneurs – not just in developing a business plan but on more practical aspects of building a sustainable business.

Operational	There is a shift in the nature and scope of operations, with evidence of increasing levels of design and service. However there is less evidence of design of processes to support design and service activity.	Increasing resource involved in areas allied to manufacturing and needed to support the value delivered to the customer. However there is a lack of efficient processes in these areas.	Early evidence suggests that whilst companies may feel increased servitization is imperative. Many servitized companies are less profitable and not sustainable long term (most likely because of lack of strategy and efficient processes to support new value propositions).	Continued support is needed in the area of manufacturing efficiency. However, support is also needed to help companies develop sustainable and efficient processes in other areas, particularly in the areas of product development, innovation and customer service.
	Companies are continuing to focus on improving manufacturing efficiency as it delivers more immediate returns and is within their comfort zone.	Whilst there are benefits to improving manufacturing efficiency, many companies are not spending the resource improving the processes that deliver value - including design processes, customer service, etc.	Restricts the amount of resource applied to expansion of scope of company activity.	

	Manufacturing activity exists on a continuum differentiated by complexity of product, repeatability of process and skill level. There are some sectors where manufacturing activity will continue to be viable regardless of complexity e.g. that based on proximity to markets or natural resources (localisation). Study suggests many companies saw significant potential to exploit opportunities overseas.	Manufacturing characterised by high complexity, high-skill operations can be efficiently carried out in Scotland. There is now less manufacturing characterised by low complexity and highly repeatable processes being done in Scotland. However it is still viable in some situations (eg. localisation) For many manufacturing SMEs exploiting opportunities overseas will mean a manufacturing presence in other countries.	The type of manufacturing and the location of manufacturing facility should be the result of a conscious decision-making process based on the stated contingencies and economics of the specific situation. In some cases off-shoring manufacturing activity may be the best option for both company and country.	A set of priorities is needed that identifies the types of manufacturing activity that can be competitively carried out in Scotland. Skills and investment strategies should be developed to support this identified type of activity. Further work is needed to understand this in terms of supply side and demand side localisation. Support should be available to companies that need to establish manufacturing facilities overseas.
	There is a lack of appreciation of the potential importance of innovation in delivering value as innovation tends to be understood in relation to technology and product development.	Innovative behaviours are limited to the design of products	Although there is an appreciation of the importance of support and service little creativity is applied in this area with enhancements resulting from experience rather than up-front creative thought	The scope of innovative practice needs to be applied to all areas of the product lifecycle.

Support	It is difficult to secure human resource with the skills and motivation to work in manufacturing	Companies are short of key resources to work in key high skill areas and also in more basic operations	Growth is limited due to lack of resource and lack of management confidence resulting in further concentration on historical core activities and current business needs	Skilling strategy must be created that is coherent with the needs of industry in all phases of the product lifecycle and matches the type of manufacturing activity that will be carried out in Scotland in the future. Media campaign required to re-energise enthusiasm in manufacturing illustrating the variety of 21st manufacturing activity
	Some variability in the operation and overall quality of the support services provided	Wasted time in accessing and navigating the support network.	Some companies lacked confidence in finding support (or had a perception that it would take too long) and so did not try to access support.	Simplification of support – a single entry system. Building a community of support.

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1. Introduction

1.1. Background to the research

It is a widely held belief that UK manufacturing "continues to evolve towards high-value, high-productivity, specialized solutions" (Technology Strategy Board 2008) however it is not clear if this is the case for manufacturing in Scotland or indeed if Scotland should be focusing its attention on high value manufacturing. If it should what then can be done to help and support small to medium sized manufacturers to make the transition to high value?

This study, commissioned by Dr Steve Graham, on behalf of the SMAS Board (Scottish Manufacturing Advisory Service), sets out to build a clearer picture of manufacturing in Scotland today. Specifically it aims to profile the activities, aspirations and strategies of small to medium sized enterprises (SMEs) involved in manufacturing. It also seeks to understand the changes taking place in these organisations – including changes in their markets, their activities and the basis upon which they compete. Overall, the study aims to understand the challenges faced by Scottish manufacturing SMEs and to build a picture of the current environment surrounding manufacturing in Scotland.

This research was conducted in quarters 2 and 3 of 2008.

The report itself will discuss the findings of the study, comment on the progress Scotland has made towards the high-value manufacturing agenda and make recommendations as to the type of support that should be provided to enable Scottish manufacturing SMEs to invest in their long term future.

1.2. The changing nature of manufacturing

It is clear that manufacturing, globally, is changing. Today manufacturing is about more than just production. Companies involved with a manufactured product add value in a number of ways such as robust design, strong brand image and customer service provision.

Globalisation and the fragmentation of the production process have given rise to an increase in outsourcing and off-shoring. Manufacturing employment in OECD countries is declining and this trend is likely to continue (OECD 2006). However there are classification issues which make this information difficult to interpret and the definition of what a manufacturing company is can sometimes be unclear. The distinction between manufacturing and services is becoming blurred and we are seeing manufacturing companies encompass many more people working in areas allied to production rather than directly in production. Across the OECD about 60% of all manufacturing workers can be considered "production" workers. In some OECD countries upwards of 50% of workers in the "manufacturing" sector are engaged in service-related occupations (e.g. management, science, accountancy, etc). The share of service related occupations is particularly high in the Netherlands and UK.

Governments around the world are seeking to assist their manufacturing industries to compete in the global marketplace. Many developed economies, particularly those with higher costs, see that the solution to the problems created by competition from low cost economies is to move into higher value manufacturing (Livesey, 2006) where the basis of competition is not reliant on price.

1.3. The UK response – New Challenges, New Opportunities

The UK is no exception to this and a report by Michael Porter, commissioned by the DTI, recommended that the UK manufacturing industry should shift its competitiveness agenda "from a location competing on relatively low costs of doing business to a location competing on unique value and innovation" (Porter and Ketels, 2003). More recently

(2008) a joint AIM/Technology Strategy Board publication "High Value Manufacturing: delivering on the promise" defines high value manufacturers as:

> "firms that do not compete primarily on cost. Instead they deliver value for one or more of their stakeholder groups by contracting for capability, delivering product/service innovation, establishing process excellence, achieving high brand recognition and/or contributing to a sustainable society".

In the intervening period there has been wide consultation in the UK on the future of manufacturing in the UK. This has culminated in the publication of the UK Government's new strategy for the manufacturing sector, "New Challenges, New Opportunities" (BERR Sept 2008).

In this strategy document, developed by the Department for Business (BERR) and the Department for Innovation, Universities and Skills (DIUS), the Government reaffirms its commitment to the manufacturing sector as a key part of a mixed and balanced UK economy. This refreshed strategy is intended to inform dynamic process and shape future policies and programs. It replaces the Government's manufacturing strategy of 2002, which was the first attempt to set down a strategy to a build successful, knowledge intensive, highly skilled manufacturing sector.

The refreshed strategy claims to bring together almost £150 million of medium term support for UK manufacturing, and sets out the Government's view of what the sector needs for success in the long term - including seizing the opportunities of the low carbon economy, supporting skills, realizing overseas opportunities, and improving the perceptions and understanding of manufacturing.

We are told "the vision is for a globally competitive manufacturing sector that leads the world in capturing higher value components of the global value chain, while consolidating areas of existing comparative advantage, including activities within high technology manufacturing" (BERR 2008)

This strategy document also reminds us that in the UK, manufacturing is "a real, but not always recognised, success story". By its narrowest definition, manufacturing within the UK accounts for around 13% of UK GDP and over 50% of exports, adds over £150bn to the economy (2006) and has increased its productivity by 50% since 2007 (BERR 2008). Manufacturing employs 3 million people directly and BERR considers the UK to be the world's 6th largest manufacturing country.

The latest figures from the Engineering Employers Federation (EEF) also paint a positive picture of UK manufacturing. The EEF review of Manufacturing Performance 2007/8 points out that although the economic environment is becoming more challenging manufacturing continues to perform strongly with a number of the indicators at their highest level for ten years. The report shows rising levels of output and new orders; high levels of investment intentions (the strongest since 1995); and the number of companies reporting improving profitability has risen from -4% in 2003 to 34% in 2007.

1.4. Manufacturing in Scotland

This report seeks to inform Scotland's response to the changing environment surrounding its manufacturing industry. The report will add to current understanding through conducting primary research with the manufacturers themselves through both surveys and more in-depth interviews. However, before moving to the primary research, the following paragraphs summarise existing knowledge about manufacturing in Scotland.

1.4.1 Size, spend and output

The success of the Scottish manufacturing sector is vital to the success of the Scottish economy, with an annual turnover of approximately £34 billion (Scottish Government, 2007). It is an industry that has seen its share of change and has gone through a number of transitions. Following a slump in output between 2001 and 2005 largely due

to loss of a number of big international companies (many from the electronics sector), output in Scotland's manufacturing sector has stabilised.

It should also be noted that Scottish manufacturers are estimated to spend over £6bn per annum on services from companies within Scotland (Scottish Executive, 2000). Most recent indicators point to a relative success story for Scottish manufacturing. A 1.5% growth in output was reported in the Q2 of 2008.

1.4.2 Employment

Employment in manufacturing represents approximately 9% of Scottish employment. This is slightly lower than the rest of the UK where the figure stands at 11%. However, care must be taken as different studies use different ways of calculating this figure. Whilst employment in the Scottish Manufacturing Sector grew in 2007, statistics for the first quarter of 2008 show a slight decrease (CBI Scottish Industrial Trends Survey, 2008).

1.4.3 Exports

Scotland's share of UK manufacturing exports is somewhat higher than its share of manufacturing employment. Part of the reason for this is the fact that Scotland has been successful in attracting export-oriented inward investment. The latest Quarterly Index of Manufactured Exports (2008) shows positive growth in the first quarter of 2008. Exports to locations out with the UK were up 2.3% from the previous quarter and up 3.2% when comparing the latest four quarters to the previous four quarters. Over the quarter the main industries contributing to the increase in manufactured export sales were electrical and instrument engineering, and mechanical engineering which grew by 6.6% and 19.3% respectively. However, significant drops were recorded in other sectors including food and tobacco (-14.8%), and transport equipment (-10.4%).

1.5. Key manufacturing sectors in Scotland

The following manufacturing related sectors have been identified as priority industries for Scotland by Scottish Enterprise.

1.5.1 Life Sciences

The Scottish Life Science Strategy 2008 sets out a vision that by 2020 Scotland will have "a globally focused, sustainable life sciences sector built on a fully connected national strategy that exploits strengths in scientific excellence, financial services and innovative business models, and that develops, retains and builds upon Scotland's talents". There are estimated to be over 600 organisations employing 39,000 people within this sector. A strong academic base and the NHS are seen as being crucial for growth of the sector in Scotland. Specific challenges identified for the sector include: a lack of critical mass; and limited availability of qualified senior managers with international commercial experience.

1.5.2 Energy

It is predicted that given the increases in global demand for energy, alternative energy sources present Scotland's energy related companies with opportunities. The strategy for energy in Scotland in the longer term is to: significantly grow Scotland's share of global energy markets; develop emerging renewable energy industries, including marine, offshore wind, fuel cells and hydrogen; and develop expertise in offshore and nuclear decommissioning by transferring skills, technology and experience from other sectors. It is estimated the energy sector in Scotland comprises over 2,000 organisations employing 100,000 people.

1.5.3 Food & Drink

With an estimated 1,200 companies, employing approximately 44,000 people, the food and drink sector provides employment for around 2% of the Scottish workforce and accounts for 17% of manufacturing employment and exports. Scotland Food and Drink is a leadership organisation that brings together stakeholders within the industry. Its ambitions for the industry are to increase turnover from £7.6bn to £10bn by 2017; continue to outperform GVA (gross value added rates) of Scottish manufacturing, the wider Scottish economy and the UK food and drink industry; and position Scotland in the top three of the world's producers of premium products. One of the key challenges for the sector is to improve its image and address shortages in staffing as migrant workers currently fill significant labour shortages in this sector.

1.5.4 Digital Markets and Enabling Technologies

The Scottish Government's Economic Strategy identifies creative industries (including digital content and technologies) as one of six key sectors where Scotland enjoys international competitive advantage and which possesses high-growth potential and the capacity to boost productivity. The strategy places equal importance on "technologies that contribute to the development of these key sectors". The digital markets and enabling technologies industry encompasses the following sub-sectors: social networking and mobile applications (encompassing creative video, broadcast and publishing); ICT markets; environmental applications; informatics and computing (including software); devices and systems; communications and networks; and advanced engineering. Work is ongoing to further profile this sector within Scottish Enterprise.

Whilst the above have been identified as priority sectors, there are other industries which are very important for Scotland. These "regional priority industries" include: aerospace; shipbuilding and marine; textiles; chemicals; construction; and forest industries.

1.5.5 Regional Priority Industries

In Scotland there are over 180 companies operating in the aerospace, defence and marine sector and its immediate supply chain. These companies employ more than 16,200 people with over 500 apprentices. The creation of the Society of British Aerospace Companies (SBAC) Scotland has enabled the companies to come together in a formally recognised manner for the first time. SBAC estimates that: sector sales are worth over £2.28 billion; orders are worth £2.31 billion; four per cent of sales are invested in research and development; and exports are worth £1.3 billion. The strategy for advancing aerospace and defence in Scotland includes 5 key pillars: research and development; collaborative projects; supplier development; process excellence and global market development.

The Scottish Textiles Survey (2007) suggests there are a move away from high volume, low variety and a move towards high value areas. The textiles strategy for Scotland is based on three key elements: building the industry's profile; encouraging innovation; and strengthening people and business. This is a sector that has witnessed a decline in number of companies and is characterised by SMEs with 55% of textile companies employing less than 10 people.

Scotland's chemical sector comprises of 3 streams: basic chemicals, pharmaceuticals and speciality chemicals, making it Scotland's biggest export earner generating approx £1.3 billion. Accounting for 10.5% of Scottish manufacturing turnover, the future for the chemicals sector in Scotland is foreseen to grow by 4.2% in the next year.

The construction sector in Scotland has witnessed a change in the organisations that comprise it, with more and more employees in the sector becoming self employed, a rise of 38% between 2006 and 2007. The GDP for Scotland's construction industry has outgrown that of the UK, growing 5.4% in 2006 – 2007 in Scotland and only 1.8% in the UK.

The forest industries sector in Scotland imports 90% of its paper and 80% of its lumber, providing potential for opportunity to substitute imports with indigenous supply. It is foreseen that imports reduced by one fifth, would create 3000 additional jobs and generate a turnover of £1.5billion. New growth potential is also taking place due to the generation of new markets in biomass power generation.

1.6.   Objectives of this study

Based on primary research, this study set out to;

- give an account of the current status of manufacturing SME's in Scotland including current activities, aspirations, strategies and the challenges facing them

- assess the progress Scotland has made towards the high value manufacturing agenda

- make recommendations to the SMAS Board as to the type of support that should be provided to enable Scottish manufacturing SMEs to invest in their long term future.

1.7.   Methodology

The study comprised of two main research components: a postal survey and semi-structured interviews.

1.7.1 The Postal Survey

A questionnaire was designed and developed to fulfil the objectives outlined in section 1.6. (see appendix 5.3). An accompanying letter was also sent to the organisations, introducing the investigation (see appendix 5.4).

Numerous databases holding listings for manufacturing based organisations were considered for the sample frame. After evaluating each of these, it was identified that a database of approx 9000 Scottish based manufacturing SMEs held by the Scottish Manufacturing Advisory Service was the most robust. The number of companies in this listing was filtered to list only organisations in the 10 to 200 employee band, providing a sample frame of 2921 organisations for the questionnaire. This resulting sample frame provided a target population of Scottish based manufacturing organisations, by industry sector and geographical location.

A total of 95 questionnaires were returned as unknown, 27 were rejected as they were not filled in correctly, resulting in a total of 435 valid responses. All correspondents were targeted to the owner/ proprietor.

The data from all responses was collated and analysed using the statistical software package Minitab15. A variety of statistical tests were conducted to determine the significance level of the data received.

1.7.2 Semi-structured interviews

In order to obtain a 'richer' picture, the team also conducted in-depth interviews with senior managers within Manufacturing SMEs.

All organisations that the Scottish Manufacturing Advisory Service had advised (to Jan 2008), totalling 387, were contacted via email to introduce the research project and engage their willingness to participate in an interview with the research team. Typically SMAS liaise with the Managing Directors and Operations Directors, therefore this was the point of contact. 39 companies who had experience of SMAS were visited. A further 6 companies who had no prior experience of SMAS were also interviewed. In total 45 face to face semi structured interviews were conducted with representatives from

Scottish based manufacturing SMEs. The interviews were designed to research the objectives outlined in 1.6 in greater depth. Semi-structured interviews were conducted at the location of the organisation, to allow convenience for the company representative, lasting between 45 and 80 minutes. All interviews were recorded, transcribed and analysed using the data management software package Nvivo15. A research protocol for the interviews was established outlining the procedure for the semi-structured interview (see appendix 5.5).

In addition the research team conducted interviews with a number of experts in the field and ran a number of industry round table events to build a more complete picture.

1.8. Report Structure

Section 2 of this report summarises the findings of the research under 5 headings;

- Basis of competition
- Knowledge, skills and competencies
- Changing nature of operational activity
- Market opportunity and growth aspiration
- Support Networks

Under each heading the findings are summarised and discussed. Conclusions are drawn on what the major issues are and recommendations provided on how companies can be helped to overcome these.

Section 3 of this report discusses the findings at a higher level in an attempt to understand what this research means in the national context both in relation to the objectives set by the government and in comparison to other equivalent nations.

It is important to note that the information contained in the summary of findings sections is based on the perceptions of the researched companies of the current situation.

2.   Findings and Conclusions

2.1.   Basis of Competition

2.1.1 Summary

The research suggests that overall companies are confident that they understand their present markets and what is required to be successful in them.

A clear message is that the majority of Scottish manufacturing SMEs across all industry sectors are not competing on the basis of price, indeed price is seen as one of the least important elements in their competitive positioning. SME's predict that this situation will continue for the foreseeable future.

Most SMEs claim high quality and aspects of customer service such as flexibility and responsiveness as their main basis for competition. While high quality is seen as important in all sectors there is some variation in the perceived importance of customer service with industries such as defence and construction rating it as most significant.

The survey did not indicate that branding is important however when this was further investigated during the interviews it was clear that while the majority of companies value their brand they do not see it as a major competitive differentiator.

The importance of innovation varies across industry sectors with those that are more heavily technology dependant regarding it as more important.

A large number of Scottish companies are somewhat "protected" because of their geography. For some companies this protection comes from being a recognised player in a relatively niche local market - e.g. local food production serving a local area. For others the protection comes from being associated with a particular location and its associated resources or expertise e.g. Scotch whisky and highland water etc.

Overall there is the perception that the basis of competition across all sectors will largely remain the same in future with the exception of customer service which will increase in importance.

In summary:

- High Quality v's Low Price - the majority of Scottish Manufacturing SMEs are currently competing on the basis of high quality and are not competing on the basis of low price.

- Customer Service - customer service and its dimensions such as responsiveness and flexibility of service are currently important and are predicted to increase in importance.

- Innovation - the importance placed on innovation whether in technology, product or process is mixed, sectors that are technology dependant seeing innovation as more critical and other more traditional sectors such as food and drink seeing innovation as less critical.

- Branding – this is not seen as an important differentiator either now or in future.

- Localisation – there are some benefits in evidence due to localisation of market and localisation of supply

2.1.2 Discussion

Price & Cost

When asked about the basis of competition in our survey, only 11% of survey respondents ranked low price as being the most important factor in their competitive position, while 40% stated that low price was the least important factor in their

competitive position (see appendix 5.1.9.). The interview results concur with those of the survey with companies adding that while price is always a consideration it is not generally the main reason why customers buy from them (see appendix 5.2.6). This suggests that the majority of Scottish manufacturing SMEs no longer see low price as being their main basis of competition.

The research suggests that in general SMEs recognise that competing in global markets on a low price basis is not sustainable due to the impact of increasing manufacturing capability in low-cost economies. However while there is little emphasis on price as a differentiator it must be noted that there is still a large emphasis on efficiency of operation as 35% of companies indicated that they are seeking help in this area and the majority of companies interviewed stated that efficiency is important to them (see appendix 5.1.12). These companies therefore consider a highly efficient operation which results in a low cost base as critical to business success.

This suggests that cost, while less of a consideration to customers, is still of great concern to businesses and efficiency as an objective will now have to co-exist with other objectives such as increased quality or customer service.

Quality and Customer Service

This survey indicates the most important basis for competition appears to be high quality with 49% of companies ranking it as most important and a further 22% ranking it second most important (see appendix 5.1.9). In addition, 73% of the companies interviewed talked about quality as being a differentiator demonstrating that quality is the most commonly mentioned factor for manufacturing organisations in this study (see appendix 5.2.6). However, it is also evident that SME's are aware that the quality of the products manufactured in low-cost economies is improving and could provide a future threat.

Further there is no evidence to suggest that manufacturing in Scotland can maintain a quality advantage when quality is defined narrowly as that associated with the conformance to requirement of the manufactured product.

SME's indicated that there were two responses to this; 1) differentiating the product in terms of the support offered to the customer; and 2) differentiating the product in terms of design quality - defined here as level of functionality and fitness for purpose.

Expanding on this first point both the survey results and interview data show a growing emphasis on improving the quality of customer service. This indicates a change in perception of the scope of quality. Where previously quality related only to aspects of the product increasingly it is now applied to all aspects of operational activity. There were two suggested areas where quality improvements could be made; firstly, in the provision of more integrated solutions that would better meet customer needs; and secondly, in more comprehensive after-sales support and through-life services. The ability to provide a quality customer-service package is based on enablers such as flexibility and responsiveness and the SMEs interviewed recognised that these aspects were becoming synonymous with the provision of a quality service. Over half the companies interviewed (53%) talked about responsiveness as being key to their value proposition and SMEs were of the opinion that customers are generally willing to pay a higher price to do business with manufacturers that have the ability to quickly and effectively respond to their needs.

Expanding on the second point while the process of manufacture of even the most complex product is replicable the process of design that created the product is less so. Therefore the ability to design a product that is functionally better than its competitors or that fills a niche where no competitor exists can lead to competitive advantage.

Focus on quality improvement but manufacturing improvement rather than product ie not design process

Innovation

Considering these points it is surprising that innovation is not so highly ranked in the survey however during the interview phase 58% of interviewees talked about the importance of product innovation in their current success and future sustainability (see

appendix 5.2.6). The research team suggest that the differences in response between survey and interview might be due to differing interpretations of the meaning of the term innovation. Those companies involved in industry sectors which have a technology-driven product recognise the need to behave innovatively mainly in relation to their technology. The term innovation was therefore more associated with technology and product design than the wider aspects of the business such as innovation in customer service.

The interviews provided an opportunity to discuss in more detail aspects of innovation that manufacturers are pursuing. Here it is clear that creating ideas and doing things 'differently' - rather than just quicker or cheaper - is seen as being very important. It is therefore evident that innovation in its widest sense is certainly an important factor for the competitiveness of Scottish manufacturers.

Branding

The findings of the study suggest that branding is not perceived by SMEs as a significant factor in how they compete (see appendix 5.1.9). The general perception amongst SMEs is that an increase in brand-value will come as a direct result of improving the factors previously discussed. There is however variation across industry sectors. Several manufacturers interviewed claim to be focusing on a brand leadership strategy. These were generally companies who directly serve consumer markets. Those that did place importance on their brand tended to understand what the brand meant to their customers. Many companies interviewed talked about the importance of reputation but did not specifically talk about brand, these tended to be companies that served a single, large customer (or a small number of larger customers) where a relationship is more important than a brand. This tends to be the case with SMEs in sectors such as construction and defence that do not directly serve consumer markets.

Localisation

The research suggests that many of the Scottish SMEs serve a relatively local market, with 31% of survey respondents reporting that between 75 and 100% of their sales are Scottish based (see appendix 5.1.4). Sectors reporting the greatest levels of Scottish based sales are forestry (67%), agriculture (60%), construction (53%) and food and drink (42%). Factors such as high cost of transportation, shelf-life and local brand strength serve to maintain these markets. For those companies that enjoy the benefits of a local market proximity could be considered as their main competitive edge. Anecdotal evidence gained in interviews suggested that there is an element of complacency here with the majority of companies expecting this 'protection' to continue. It is interesting to note that the dominance of a local market was not linked with the brand of the company although in consumer markets such as food and drink the name of the company is certainly well known within the geographical area.

The Future

When asked about their future basis of competition the survey indicated that the majority of respondents considered their current and future differentiators to be similar. However, under further investigation the interviews revealed that many companies were in fact aware of the changing competitive landscape and were considering how they might change their competitive differentiators but were unclear on what changes to make. Many recognised that current critical factors discussed such as the quality, innovation and specialist offerings, integrated solutions and dimensions of customer service will be come increasingly important but few were clear on how to strategically exploit these areas.

2.1.3 Conclusions drawn

- The efficiency agenda will continue to be important and this will need to be extended beyond purely the manufacturing process to include design and customer service operations.

- The basis of competition tends to be on something other than cost.

- Customer service is becoming increasingly important especially in sectors where the supply chain is dominated by a small number of powerful customers resulting in the need to build longer-term and closer relationships.

- Branding is important mainly to companies that operate in sectors characterised by a large number of less powerful customers such as the consumer market, these companies tended to understand the nature of their brand.

- Innovation tends to be associated with the process of design of the product however there is a realisation that SMEs need to be doing things differently in all aspects of their business.

- Localised markets are very important to some sectors.

- SMEs in general understand their markets and how they currently compete however they are less certain about how their markets and the basis on which they will compete will change in the future.

2.1.4 What can companies do to improve their situation?

It became clear that in the majority of cases SMEs are aware of their current market and what made them competitive within it. There is also general awareness of the changing nature of markets with no SME demonstrating complacency about their current position. However the changes required to compete in future markets are less clear and limited to general statements about proximity to customer or changing the nature of operations.

This research recommends the following areas that companies should address to improve their competitive position.

Making and Enacting Strategy

While companies showed some strategic awareness in their overall understanding of their markets and how they were evolving they showed less understanding of both what they needed to do to maintain a successful position and how it could be done. This was apparent in the interviews where discussions about strategy were carried out at a very basic level with few companies demonstrating the ability to consider strategy at a detailed level. There are two issues here; firstly the lack of capability to generate a strategic plan to take them in the direction which they see the market moving in, and secondly the lack of skills to strategically manage their organisations in-line with the strategic plan.

Reposition in the supply chain

Part of understanding strategic positioning is in understanding the optimum position to inhabit in the supply chain.

SMEs generally understood their position in the supply chain in terms of who supplies them and who they supply to, however many are not aware of the subtleties at play within their supply chain. Those companies that supply directly to consumer markets are generally clearer because the customer relationship is generally governed by the laws of supply and demand. However those companies that operate in more complex markets characterised by integrated supply chains often dominated by a single, large customer are less clear. SMEs talked of moving closer to their customer perceiving that this will in some way secure their position however there is little consideration of other factors such as how much closer, how they can move closer and how their operational capabilities may apply in the new relationship.

SMEs need to alter their perception of the supply chain and need to better understand their position within it. In many cases moving closer to the customer may mean a transformation in their operation or generation of new core competencies, for example a move to a more managerial role where co-ordination of products from other companies becomes the dominant activity. This also hints at a more strategic approach to customer management where skills in key account management are required to facilitate a greater

degree of customer intimacy based on the trust generated by provision of quality in both product and service.

Delivering Value

Many SMEs still consider themselves as manufacturers rather than solutions providers but our research shows that they are not primarily competing on cost but delivering value in many ways including customer service and design quality, they therefore need to ensure they have sustainable processes that will deliver on these value promises.

For those SMEs with large dominant customers more consideration should be given to the lifecycle of their products and how to build competencies in both downstream activities, such as designing the products, and upstream activities such as supporting their products. SMEs are aware that the way to add value in future is in design and customer service with manufacturing (even the most complex or efficient) relegated to the role of hygiene factor. There needs to be a realisation that the physical product is only part of a larger service that is provided to the customer.

This change begins with a greater understanding of the customer's business and continues with a process that more effectively captures customer requirements while adding value by contributing intelligence to the product definition phase. Consideration of the lifecycle nature of the product must be emphasised with the design of the customer service package undertaken concurrently with the design of the product.

This will contribute greater control throughout the product lifecycle and move the provision of customer service to a more proactive model shifting the mode of operation from generic responsiveness and flexibility to an understanding of what an integrated customer solution package is.

2.1.5 How can companies be helped

The support environment should help SMEs to:

- Make and enact strategy. It is clear that SMEs don't need to be told about their market state but do need to be helped in making strategy to exploit the market in future. Increased capability is required in all aspects of making strategy and strategic change management.

- Manage their supply chain. From a strategic point of view SMEs need to be helped to understand the nature of their supply chain and particularly where value can be added. They need to understand who the dominant organisations are, what they need and how they can position themselves in relation to them. In tandem with this SMEs need to be helped to understand what competencies they have and how they can be developed to plug the perceived value gaps in the supply chain.

- Increase their scope of activity. Provision of support is required in three areas: firstly in the setup and management of flexible 'design and development' based customer relationships; secondly, in the effective management of the process of design; and thirdly, in the understanding of the lifecycle approach to operational control. This includes understanding of the process of innovation and its application at all phases of the lifecycle.

2.2. Knowledge, Skills and Competencies

2.2.1 Summary

Within the interview phase of the research over 50% of companies stated that one of their major challenges was shortage of specific skills while a further 33% added that more general labour shortages were impacting on their ability to perform. These shortages were impacting both the execution of current business and the ability to grow further business. These issues were apparent to some degree across all business sectors although sectors with specific skill requirements such as engineering felt it most acutely.

In summary there are two issues here:

- Shortage of labour with specific sets of skills and knowledge that are required to carry out high complexity and specialised work

- Shortage of labour (regardless of skill levels) to work in the manufacturing industry in general.

2.2.2 Discussion

Almost all companies reported some problems in finding staff with the correct skills and knowledge, no company interviewed stated that they could easily find the labour that they required (see appendix 5.1.12 and 5.2.8). In some cases it was specific skills that were difficult to find but interestingly in the majority of cases companies reported it was "just very difficult" to get people who wanted to work in the sector and who would be reliable and committed.

In this research it was suggested by some interviewees that the education system failed to promote careers in manufacturing in two ways. First, manufacturing is seen as the poor relation to other career paths, and second the scope of manufacturing is not fully explained and therefore potential employees are not aware of the breadth of opportunities that exist.

This shortage in labour was particularly acute in some locations such as Aberdeen where migrant workers were used extensively. It is also worth noting that migrant workers were frequently associated with having a better work ethic than Scottish workers. Should the economic climate change this supply of workers may no longer be available and many companies would suffer.

The severity of the overall labour supply problem was illustrated in a number of cases, where companies stated that insufficient labour was limiting the growth of their business. It is likely that this problem will be of increasing concern in the future, with companies reporting that the current labour-force, particularly those in skilled work, is aging so exacerbating the existing shortages. This has been acknowledged by previous research, including the EEF report on Manufacturing Performance 2007, which highlights the aging workforce as a key challenge for manufacturers. This demonstrates the demand for attention in this area, where the younger generation must be encouraged to enter the manufacturing sector.

The skills level of employees is also a concern in a number of sectors. 24% of respondents to the survey said they would like help with basic workforce skills. And a further 19% said they were looking for specific technical skills (see appendix 5.1.12). The lack of a sufficient skills level has been acknowledged in a number of previous studies. According to Futureskills Scotland in (2006) 18% of manufacturing companies had at least one skills gap.

Our research demonstrates that the lack of appropriate training and qualifications is in part responsible for this, with the success of past training bodies such as City and Guilds frequently mentioned. For skills to develop in the manufacturing sector industry must voice their skill requirements to ensure that there is a qualified workforce for the future, as this "lack of skills in the UK workforce is hindering the development of manufacturing" (The House of Commons Trade and Industry Committee 2007)

2.2.3 Conclusions drawn

Labour shortages can be categorised in 4 areas:

- Indigenous workers with basic employability attributes such as literacy, reliability, work ethic and the desire to work within manufacturing.

- Skilled craft workers with a combination of both manual skills and technical knowledge in their discipline e.g. in areas such as welding and engineering

- Workers educated to degree level in certain areas such as science and pharmaceuticals that are willing to work in manufacturing

- Workers with specialist and context specific knowledge (over and above their training and education) gained through experience.

2.2.4 What do companies need to do to improve their situation

Of all the issues identified this challenge is probably the one in which the companies have least control however there are still actions that can be taken.

- Companies within the manufacturing industry should undertake work to increase the profile of their businesses so reaching sections of the workforce - mainly school and university leavers - that may not currently consider manufacturing as a viable career option. The progressive and varied nature of manufacturing needs to be more assertively advertised with more 'glamorous' activities (as opposed to basic assembly work) highlighted as characteristic of manufacturing work.

- It is important that companies embrace the principles of good job design and, where possible, create satisfying jobs with some degree of variety and progression attached. It is clear that many Scottish workers at the lower end of the skills spectrum still have a higher expectation of jobs (in terms of remuneration and fulfilment) than those jobs that are available can provide and that they are qualified to do.

- In-company training provision is generally lacking within SME's and, while it is acknowledged that resources tend to be limited in companies of this size, increased priority must be placed on nurturing the human resource.

- More engagement must take place with training providers to ensure education is available of the correct type to secure the supply of appropriately skilled labour in the future.

2.2.5 How can companies be helped

The support environment has much influence here as the raw material of human resource is produced outside the employing company.

- Those sectors of the workforce that would occupy basic level jobs must be encouraged to work. A financial imperative must be created for people where it is always better to work than to exist on government benefit.

- Education and training provision must be aligned more with the needs of the manufacturing sector and re-stratified to produce relevant and useful qualifications at all levels both in terms of scope and variety of offering. Relevant and useful qualifications must be offered at all levels as opposed to the recent dogma that has prioritised the achievement of an Honours level academic degree qualification regardless of its fit with the job market. Technical and vocational skills-based qualifications such as HND must be re-evaluated and prioritised as something other than an access qualification to a degree course.

- Training and education providers must be incentivised to engage more proactively with industry to determine what knowledge and skills are required and how these should be taught.

As a general point it is felt by SMEs that the position of manufacturing as a vital part of the ongoing Scottish economy must be emphasised because for too long it has taken second place to the more current growth businesses. The story of Scottish manufacturing as perceived by the public and to some extent driven by the media is one of decline: this perception must be reversed - emphasis in Manufacturing as a vital part of the future is needed. In addition the workforce should be educated to appreciate the scope of manufacturing in its widest sense to remove the perception that manufacturing is purely about assembly of products sometimes in very poor working conditions. This image is perpetuated by the media primarily in their documentary portrayal of manufacturing as part of Scotland's successful historical legacy rather than as a viable

and thriving part of its present. This is further endorsed in the trickle of current news stories highlighting the ongoing closure of Scottish manufacturing firms. Here is an example of the news-room influencing reality as public perception of a dying industry has discouraged fresh blood from entering and revitalising it. It must be stated however in the interests of equity that in the current economic downturn the news services are extending this 'disservice' to all sectors of industry. The media must be encouraged to accept that they have a role to play in shaping public opinion and as such provide a more balanced view on the future of manufacturing in Scotland so stimulating interest in a manufacturing career.

2.3. Changing Nature of Operational Activity

2.3.1 Summary

The research demonstrated that while the primary business function of manufacturing companies remains production, there is evidence of increasing levels of design and service activity taking place. The research indicated that this increase is still relatively low within the SME community however it is clear that while the actual increase is low, the aspiration to increase further is very much in evidence

As mentioned in Section 2.1 the increase in manufacturing activity carried out in low cost economies and its impact on price and product availability has been recognised and this is forcing manufacturers in Scotland to rethink how they compete. Those companies that are not protected by a localised market or a strong brand are increasingly looking for: 1) ways to increase activity that can be economically undertaken within Scotland and 2) ways to focus on activities that are not subject to the pressure from low cost economies. This situation is manifesting in the form of increases in the activities that were once considered to be peripheral to, or done in support, of manufacturing. In summary:

- Design and service activity is increasing though production remains the primary focus

- Design and service activity will continue to increase in the future as the shift in the basis of competition away from price to innovation and customer service continues. While currently the shift to design is one of degree in future it maybe that this becomes a complete change in emphasis with design activity replacing manufacturing as the primary focus.

2.3.2 Discussion

Design

The survey indicates that over the past five years there has been an increase in design with 40% of companies reporting that they do more design-related activities (see appendix 5.1.7). This is unsurprising given the message that companies are increasingly competing on the basis of product differentiation. Following the Cox review, which looked at how best to enhance UK business productivity by drawing on creative capabilities, the UK Government has recognised that design has a central role to play in building competitive advantage in the face of international competition. Research by the Design Council (2006) shows that over a ten-year period, UK quoted companies identified as effective users of design out-performed the FTSE 100 by 200 per cent. The latest UK Manufacturing strategy refers to design and product-development as important "intangibles" to aid competitive advantage and points to Government's role in developing mechanisms to encourage SMEs to invest in design and product development.

During the interview phase of the research, an increase in design activity was widely acknowledged (see appendix 5.2.4). SMEs reported that increasing product complexity, customisation and variety were all drivers for increasing design activity. Companies also cited regulation, legislation and social pressure as drivers for increased innovation for example more sustainable packaging used in the food industry, cleaner technology used in energy industry. The reasons for this are as follows:

- Due to growing product complexity time spent on developing products is increasing

- Shortening windows of opportunity mean that more products are required to be developed in shorter lead-times

- Market demands are leading to increasing customisation of many products which further increases the design required

- Increasing legislative requirements imposes the requirement for more comprehensive and thorough design activity.

Manufacturing

It should also be highlighted that a number of companies studied (58% from survey and 44% from interviews) reported an increase in manufacturing (see appendix 5.1.7 and 5.2.4 respectively). This demonstrates that manufacturing activity is still growing for many organisations. There were a number of reasons stated for this, the most common were:

- Focusing production in Scotland to serve a local market

- The importance of retaining control of the manufacturing process in relation to IPR, quality and control of finance

- Avoidance of issues associated with supply chain management such as the inability in some cases to source reliable suppliers or to manage complex sub-contracts

- Requirement for in-house manufacturing capability to enable support and service activity.

Service

Here 34% of survey respondents reported an increase in service activity in the past 5 years (see appendix 5.1.7) Mainly this represented a move away from 'fire and forget' modes of business operation to the provision of packages of through-life support where efficient maintenance and servicing of products in the field is important. In certain sectors companies were moving towards product installation and ultimately systems integration activity where they would act as the prime-contractor, coordinating and providing all of the end-user's needs.

Summary

These trends in design, manufacturing and service, when taken as a whole, indicate a move by some companies towards a lifecycle approach where involvement in all phases of the product lifecycle creates synergies with the competencies developed in each stage enabling more efficient and effective operation in the others. For example activity in the design and manufacturing phases supplies the skills and expertise to more effectively support the product in the field. In addition remanufacturing and repair activities can help to smooth capacity in lightly loaded manufacturing units. A further benefit is that a more 'complete' approach allows companies to get closer to the end-user/customer so gaining greater influence in their supply chain.

This research does therefore suggest that the transition towards higher value manufacturing, in the form of increased design and service activity, is indeed taking place in Scotland. However, the research also suggests that there is still a long way to go for many companies.

2.3.3 Conclusions drawn

- SMEs in general wish to retain a manufacturing base in some form within Scotland

- For many companies low-complexity, volume-based production will continue to become unsustainable in Scotland

- Many manufacturing will need to refocus on products of high complexity that are not easy to productionise

- Activity in manufacturing companies will need to shift their balance of activity from manufacturing to service or design.

2.3.4 What can companies do to improve their situation?

Many SMEs still consider themselves as manufacturers rather than companies that provide solutions to their markets. For those SMEs with large dominant customers more consideration should be given to the lifecycle of their products and how to build competencies in both downstream activities, such as designing the products, and upstream activities such as supporting their products. There needs to be a greater realisation among SMEs that the way to add value in future is in design and customer service with manufacturing (even the most complex or efficient) relegated to the role of hygiene factor as the physical product is only part of a larger service that is provided to the customer.

This shift in emphasis translates into the requirement for a greater design capability. This begins with a greater understanding of the customer's business and continues with a process that more effectively captures customer requirements while adding value by contributing intelligence to the product definition phase. Consideration of the lifecycle nature of the product must be emphasised with the design of the customer service package undertaken concurrently with the design of the product.

In order for companies to introduce these processes successfully into their organization, processes must be optimally integrated and aligned with current production processes. This will allow the business to be complete in its offerings to the market.

2.3.5 How can companies be helped?

The following support may be useful to SMEs:

- Changes in operational activity have tended to be the result of evolution rather than a coherent operational strategy - SMEs need help in generating and enacting strategic changes to their capability

- There is considerable support available to help SME's make their production processes more efficient similar support is required in the areas of design and service efficiency.

2.4. Market Opportunity and Growth Aspiration

2.4.1 Summary

The research revealed that the aspiration of the majority of companies in the Scottish manufacturing sector is growth with an increase in turnover cited as the key growth objective. Looking forward however only 29% of companies in the survey and 18% from the interviews commented that they would be undertaking product diversification activities within the next five years and 18% of organisations in the survey reported that they will enter new markets (sector and location) in the next five years (see appendix 5.1.10). These companies see this as necessary due to a combination of the maturation of their current markets and perceived abundance of market opportunities.

Overall it is interesting to note that only 3% of the companies that responded to the postal survey were younger than five years old (see appendix 5.1.2). This indicates that the industry is characterised by more established manufacturing companies. The majority of companies that responded to the questionnaire have been operating for a number of years within the Scottish manufacturing sector with 66% of the companies having existed for over 20 years. This evidence further indicates that growth among smaller SMEs is limited.

Few companies reported growth constraints due to a lack of a perceived market, most companies indicated that they are limited by manufacturing capacity and capability

rather than potential for further orders. Markets appear to exist for the majority of companies though work is required in grasping such markets.

It was also clear that fire-fighting modes of operation are still very prevalent in a large number of SMEs so limiting the time that management can spend on planning the future and acquiring new business.

In summary:

- The majority of manufacturing SMEs want to grow

- In general there is no shortage of opportunities in their markets

- There is a lack of companies making the jump from start-up to larger and more sustainable company

- There is a lack of new manufacturing entrepreneurs.

2.4.2 Discussion

Defining Growth

When participants were asked, during the interviews, to outline their future intentions for the organisation "growth" was frequently mentioned with financial growth being the most cited aspiration. Frequently as the discussions progressed it became apparent that organisations were not clear by what means they were going to achieve growth in a planned way (see appendix 5.2.7). It was interesting to note that even companies that are SE account managed exhibited short-termism and lack of strategic vision. This may be a result of the focus of the account manager on the day-to-day business improvement activities rather than the long-term strategic perspective.

The research suggests that companies have generally failed to strategically plan their development with current levels of growth achieved mainly through either opportunism or evolution of current business. It is clear that many companies do not have a clear view of how they are going to achieve future growth in a planned and coherent manner and there was little evidence to suggest that companies have embarked on proactive growth strategies engaging in activities such as product diversification or the pursuit of new markets.

Despite the general aspiration to do better strategic awareness is limited, only 17% of survey respondents recognised their weakness in strategic thinking and indicated they would like assistance in this area (see appendix 5.1.12)

This would suggest that many SMEs do not have the capability to develop and implement strategies a deficiency that could seriously affect their future competitiveness. It is important to remember however that strategy at SME level tends to be more emergent, opportunistic and informal than traditional strategy theory may recommend. The strategy for SMEs is often in the minds of the company leaders rather than in formal company documents and their day-to-day activities drive the implementation of these strategies. However, as companies grow it does become important to formalise, communicate and monitor strategy.

Manufacturing entrepreneurship

The research found very few young manufacturing businesses (under 5 years old). Whilst it wasn't an objective of this research to look at manufacturing entrepreneurship this finding indicates that this may be an issue worthy of further investigation. There is evidence from the interviews that whilst there is help and support for companies that are developing ideas there was little support on offer to help establish the operations needed to manufacture. This gap can result in the Intellectual Property (IP) that is created within Scotland being sold abroad. Anecdotal evidence also suggests that would-be entrepreneurs don't know where to seek help to establish manufacturing facilities. And instead pursue the "easier" route of selling their IP.

Market Diversification and Product Diversification

When asked how they were going to grow 18% of companies stated that they were going to undertake product diversification activities and 9% of organisations reported that they would be diversifying into new markets. These findings were corroborated by the interviews as when participants were asked to explain how they plan to develop over the next few years (31% of the companies indicated that they are seeking to enter new markets both within and outside Scotland and 29% are looking to expand their product range (see appendix 5.1.10). This is primarily due to market saturation and technological advancement.

The opportunity for indigenous companies to develop overseas markets provides opportunities that must be exploited. The UK Manufacturing Strategy (2008) recognises the untapped opportunity for UK companies to exploit potential overseas markets and points to the role of Government in helping businesses, especially SMEs to participate in global markets. This is seen as "an important policy issue". This is also recognised in the Economic Review of Scotland (April 2008) which observes that "Scottish companies appear to be less exposed to global markets than other UK regions which may be hindering competitiveness and productivity growth".

A number of companies interviewed discussed the potential to exploit opportunities overseas. Some alluded to the fact it might not be enough to market and export overseas, but that a presence may be needed to fully exploit the opportunity. Therefore companies may not only need help with sales and marketing (where there is support available), but also help in expanding operations overseas to be closer to their market.

Diversifying into new products requires significant levels of investment and SMEs very often do not have the time or the resources to complete research or feasibility studies. This deficiency is exacerbated as processes for carrying out these activities tend to be informal and ad-hoc meaning efficient completion of these studies is beyond the capability of many organisations. The process of identifying the gap in the market for a new product is very risky as much may be invested for no return.

2.4.3 Conclusions drawn

- There are two stages at which growth can falter; 1) initially as start-up companies attempt to grow into a sustainable operation and 2) as larger companies attempt to grow beyond their core product, competence or market.

- Many organisations are unclear what activities to undertake to change their aspiration for financial growth into an actuality

- Overall growth is limited by shortage of skill in generating and enacting strategy and too much time spent on reactive-mode current business

- There is a deep-seated manufacturing culture where any extra effort available is channelled into the pursuit of efficiency rather than new business.

2.4.4 What can companies do to improve their situation?

It is clear that current operational activity is perceived to be a priority before attention is given to activities that will grow the business. This takes two forms; 1) Reactive mode operations and 2) activity in pursuit of manufacturing efficiency. Emphasis needs to change to planning the future so releasing the required management time and effort.

This released management time needs to be used productively therefore companies need to invest in gaining the strategic competence within their management teams that will result in a strategy being generated.

2.4.5 How can companies be helped?

There are two issues here, the first in relation to start-up companies and their transformation into sustainable businesses and the second in relation to expanding the scope of larger companies out with their original product or market.

In relation to start-ups it is clear that the generation of ideas in Scotland is less of a problem than the retention and exploitation of these ideas. Therefore a more attractive environment must be created where it is easier to build a business. Issues to be dealt with are lack of availability of funding, difficulty in gaining funding, complicated legislative framework, bureaucracy and shortage of labour. The perception among companies is that funding available is focused on the creative side of business development such as ideas generation and early start-up while little seems to be available to set-up manufacturing facilities and grow the business.

In relation to the expansion of larger companies these organisations need help in all aspects of strategy making.

In addition further research needs to be undertaken into the low levels of manufacturing entrepreneurship to understand the reasons that this is not more prevalent.

2.5. Support Networks

2.5.1 Summary

It must be highlighted that this subject is made complex because of the diversity in the support that companies require due to their widely differing areas of activity. The research revealed that most companies want to access support of some sort - no company stated that it had no need to access external support. The support companies indicated that they require broadly falls into two areas; 1) Public Sector support including government and education providers and 2) support from the wider business community including trade bodies and other companies.

 The reasons companies need this support are to:

- Gain access to information
- Engage in knowledge exchange
- Find suppliers and customers
- Secure finance.

It is also worth noting that more companies highlighted the need for advice and expertise than the need for financial support.

2.5.2 Discussion

The majority of businesses interviewed reported that they had a managed account with Scottish Enterprise and all companies felt that this relationship was beneficial to their business particularly as it provided someone as a point of contact for navigating the Scottish Enterprise network (see section 5.2.11). However there are a number of concerns. Firstly, to some companies it was unclear what sources of support were available and how each fitted with the overall government structure: indeed some companies received conflicting information about what support agency they should use.

Secondly, since the recent restructuring of Scottish Enterprise a number of companies felt that they had less support from account managers and hoped this situation was only short-term until the transition period was over.

Thirdly, it is worth recognizing there was a variation in operation and quality of the schemes regionally. In some locations there appeared to be a greater support than in others.

Lastly, the overall perception of the support services was also confused with some companies saying there were too many specific initiatives whereas other companies had the perception that Scottish Enterprise seem to promote the one size fits all approach.

Lack of funding was not the main limiting factor on the growth of businesses. However those companies that have sought government funding support see it as a challenge. They either find that there is no funding available which meets their requirements (9% of companies), they do not know where to seek it (7% of companies) or are put off by the

bureaucracy associated with obtaining it (18% of companies) (see appendix 5.2.8.). This was felt most acutely in smaller companies that do not have the time or resources to allocate to navigating the funding process. There were also examples of companies that invested a large amount of time and effort in seeking funding only to have their application rejected at a late stage in the process - in one case after having been given assurance that they would receive funding.

Many companies interviewed mentioned the value of inter-company co-operation - a number talked about having learned from visiting other companies. Cross-business contact is beneficial in two ways; firstly in the exchange of best practice processes and expertise and secondly in accessing suppliers and customers. However the following barriers were identified. Firstly very small companies especially those attempting to put their first product into the market do not have the time to do the detective work to search out the business network. This is especially problematic if there is no trade body available as a mechanism to gain access to the required community. Secondly, companies that operate in unusual markets may not have the critical mass of equivalent companies in Scotland to sustain a local community. This situation leaves them isolated.

In relation to accessing information and knowledge, support from the academic institutions was mentioned however universities were perceived as difficult to gain access to, with structures that are varied and complex making it difficult to identify where the knowledge base can be found. In addition companies can find few formal processes for engaging with academia. The effective use of a university seems to be contingent on being part of an existing network within which the university is represented and/or the establishment and maintenance of personal relationships with university staff.

2.5.3 Conclusions drawn

Overall companies found it more difficult than they would have liked to find and use the support they require due to the following issues:

- For the very small companies there is a lack of time and resource to apply to building links with the external community.

- For companies operating in more specialist markets there is a lack of critical mass to sustain an effective network.

- There is no lack of public sector support provision however this is compromised by a perceived lack of integration within the government network and prevalence of bureaucracy within the system.

- Trade bodies are useful however these are not always available and those that are can be inconsistent in scope of operation and activity.

2.5.4 What can companies do to improve their situation?

In relation to accessing support the onus is clearly with companies to devote the resource however it is also clear that some companies are not sure what their support needs are or what is available. Better understanding of both these things would make the process of gaining support much more efficient. Greater emphasis on forward business planning and the identification of support requirements in advance would ease this process.

2.5.5 How can companies be helped?

- Support needs analysis: Currently advice is provided on specific areas of improvement e.g. SMAS provides support on issues of manufacturing efficiency There is place for a needs analysis service where advice is provided on what support would help a company at each stage in its growth and what support is available at these stages. This could take the form of a 'signposting' service matching the support need with the agency that can provide it.

- Integration of Public Sector support: There needs to be increased integration between all government bodies facilitated by single point of access and single

point of contact. The role of this contact should initially be to help the company to navigate the support network.

- Strategy for trade bodies: There is a role for government to play creating links within the industrial communities enabling the exchange of ideas and knowledge. A centralised strategy could be developed to ensure that each priority area was supported by a trade body so providing a mechanism for companies to share information, experiences and business opportunities.

- Academic Engagement: Currently Universities have few incentives to engage with industry other than those that lead to a direct financial gain for the university. Other ways of motivating universities should be implemented that encourage industry collaborations that result in benefits to the partner company.

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3. Critical Discussion

Section 2 of the report outlined the key findings and conclusions of the study. This section contains a critical discussion or, in other words, a "state of the nation" with respect to manufacturing. Specifically this section sets out to discuss Scotland's manufacturing performance and aspirations relative to other "comparative" nations and more importantly, its performance relative to the objectives set down by the Scottish Government. The discussion will highlight some of the potential barriers to productivity growth identified by our study – barriers that may prevent Scotland achieving it objectives. The recommendations put forward in the previous section will also be discussed in terms of their potential to remove/lower these barriers, and thus help Scotland to achieve its strategic goals.

3.1. Scotland's Strategic Objectives

In 2007 The Scottish Government published its Economic Strategy its purpose being "to focus the Government and public services on creating a more successful country, with opportunities for all of Scotland to flourish, through increasing sustainable economic growth". Of particular interest to the manufacturing community are some of the challenging targets laid down in this strategy, including:

- Raise Scotland's GDP growth rate to the UK level by 2011

- Match GDP growth rate for small EU countries by 2017

- Be in the top quartile for productivity amongst trading partners by 2017.

Obviously in recent weeks there has been much discussion on whether these objectives are realistic given the current economic climate. But this aside, still central to Scotland's ambitions are the challenges of growth and raising productivity and manufacturing clearly has a significant role to play in meeting these objectives.

3.2. Scotland's Growth & Productivity Challenges

There is much concern that Scotland's economic growth has underperformed relative to both the UK, and other small European countries in recent decades. A much quoted statistic indicates that during the period 1975 to 2005, Scotland's annual average growth in Gross Domestic Product[1] (GDP) was 1.8% - a figure which is significantly lower than the UK average of 2.3% and well below that of comparable small European countries (see Fig 3b). Another commonly quoted statistic is that Scotland's growth has lagged that of the UK, in nine out of the ten years from 1996 to 2006 whereas growth in Ireland has been three times higher over the same period, with Norway performing at twice the level of Scotland. A more up to date comparative analysis of nations is expected in Spring 2009 based on the latest ABI data.

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[1] Gross Domestic Product (GDP) is a measure of the value added to materials and other inputs in the production of goods and services by resident organisations; before allowing for depreciation or capital consumption. Net receipts from interest, profits and dividends abroad are excluded.
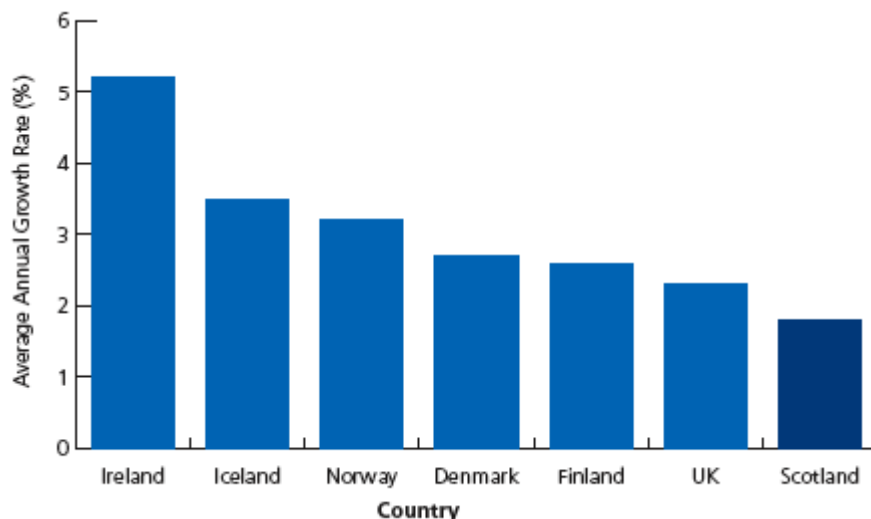
*Figure 3a: **Scotland's GDP growth** performance 1975-2005 (Source: OEDC, ONS)*

Whilst we do not have more recent comparative data for other countries, the latest UK statistics (published on 22 October 2008 and covering the period up to the 2nd quarter of 2008) show that GDP rose in Scotland by 1.8% against the previous year (Scottish Gov 2008). The UK figures show that UK GDP rose by 2.5% in the year to end-June 2008 (see Fig 3a). GDP is growing at a steady rate (see Fig 3c) – but not as fast as other countries with whom we compare ourselves.
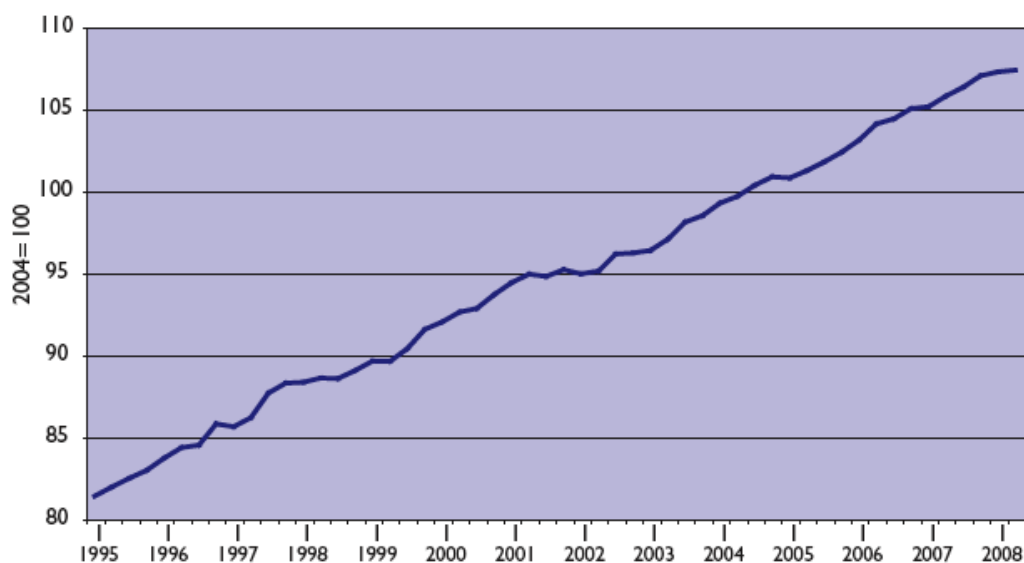
Figure 3b: Scottish GDP index 1995 Q1 - 2008 Q2 (Scottish Gov, 2008)

Whilst Scotland has seen growth in GDP, the biggest increases have largely come from the service sector (see fig 3b), with the "production sector" experiencing negative annual growth for the most part (Scottish Gov, 2008). The service sector now accounts for 73.8% of Scotland GDP, while production accounts for 17.8%, with construction and agriculture and forestry and fishing contributing 6.8% and 1.8% respectively.

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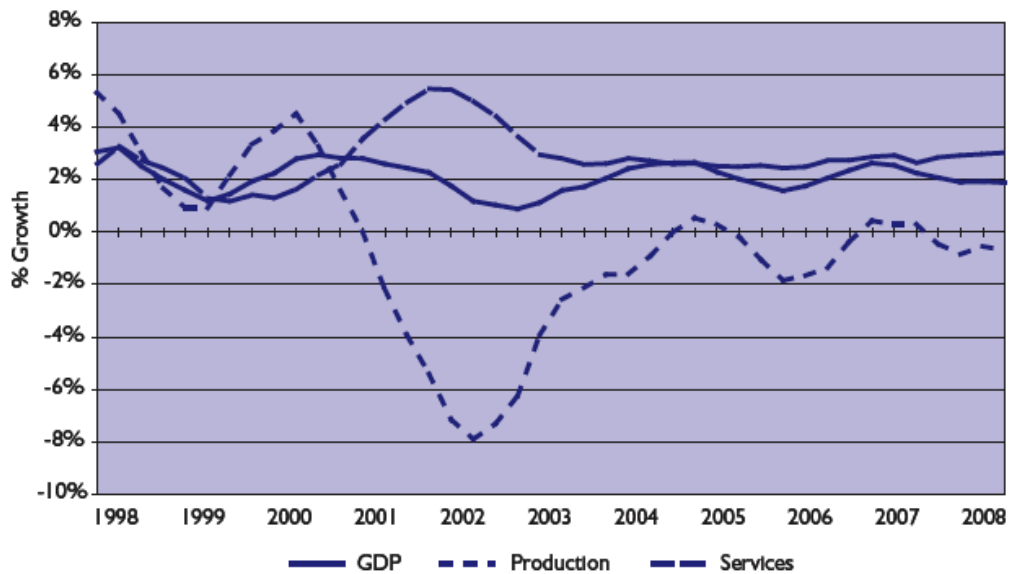
Figure 3c: Year on year GDP growth, 1998 Q1 to 2008 Q2 (Scottish Gov, 2008)

Productivity is another area where Scotland is disappointed with its performance relative to countries we would benchmark ourselves against. Again referring back to the 2006 comparative statistics, Scotland's productivity was ranked 15th against the countries of the OECD (i.e. bottom of the 2nd quartile). Based on this comparative data, productivity in Scotland was estimated to be around 83% of that in the United States and 87.5% of the levels in Germany (the country ranked at the bottom of the first quartile).

The latest figures suggest that labour productivity in the UK is some 2.8% higher than in Scotland. If this is broken down by region (fig 3d), then Scotland sits 6th place out of the 12 regions of the UK (ONS, 2006).
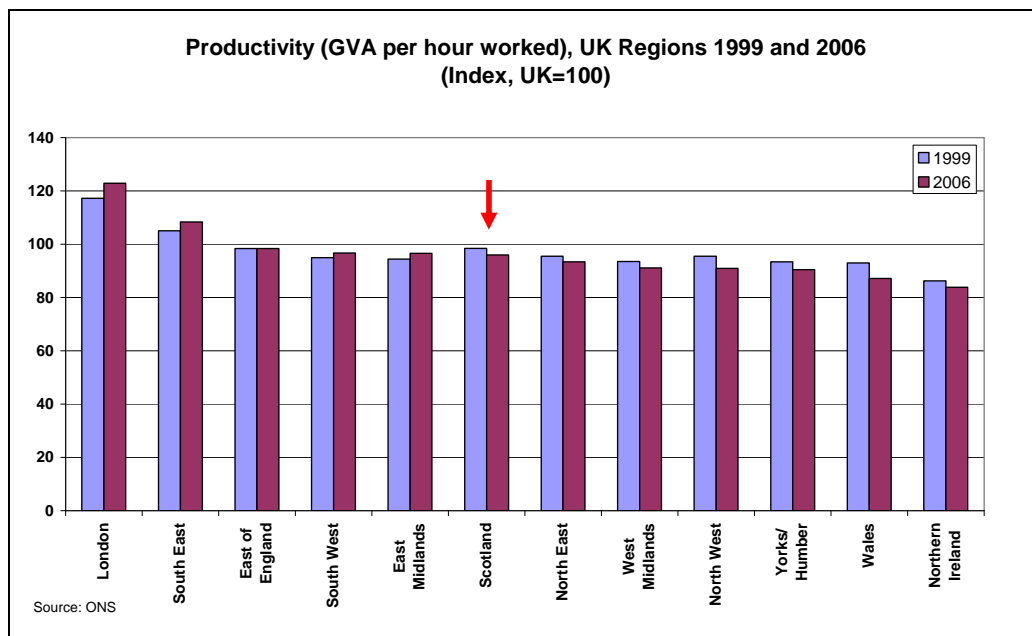
Fig 3d: Productivity (GVA per hour worked), UK Regions 1999 and 2006 (source ONS)

Before looking in detail at the drivers for productivity, a few key issues about productivity in Scotland should be highlighted. The first point relates to the fact that Scotland has

seen considerable structural changes over the last decade, the most notable being the relative growth in services and decline in manufacturing as a percentage of GDP. Another point to note is that Scotland has a large number of people working in the public sector. These two factors have significant effects on overall productivity in Scotland. It is generally recognised that the public sector and services are less productive. Scotland has a large public sector (with public spending on services 2% higher than the UK as a whole) and a large service sector. The manufacturing sector has demonstrated better productivity where we continue to see output steadying off, with employment falling. Using GVA per employee as a measure of productivity, in 2006 the figure for manufacturing was £60,700 per employee - nearly twice as high as that in services sector at £30,900 (Scottish Government 2008).

So whilst there maybe a negative perception about the performance of manufacturing in Scotland, when we look closer at the figures, we see that while it is declining relative to services in terms of the contribution to GDP, in terms of productivity manufacturing can be considered a success story.

3.3. Manufacturing's Challenges

The Scottish Government has established a target to be ranked in the top quartile for productivity amongst our key trading partners in the OECD by 2017 and it has identified a number of strategic levers that will help drive productivity, including:

- Investment,
- Skills,
- Innovation,
- Enterprise & Entrepreneurship,
- Competition.

Figure 3e: Barriers to increasing productivity in manufacturing
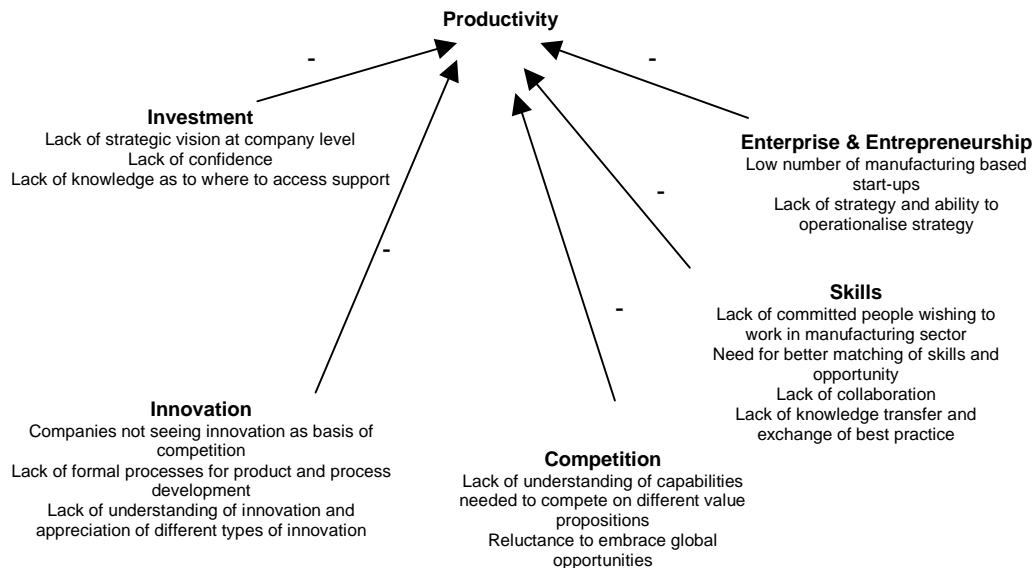
These drivers of productivity were identified based on a number of recent academic and government studies looking at factors influencing productivity (including the Office of the Deputy Prime Minister (ODPM, 2005), the Department for Trade and Industry (2003, 2006) and HM Treasury (2000, 2001a, 2001b, 2003, 2004, 2006).

Drawing on the findings of the study, and on a wide range of secondary data, this section of the report will critically discuss the state of Scottish manufacturing and its role in helping Scotland to achieve these economic objectives. Along the way there will be consideration of how Scotland compares to other nations in terms of manufacturing and manufacturing-related drivers of productivity[2]. The discussion will highlight the practical barriers identified by this research to increasing investment, skills, innovation, enterprise/entrepreneurship and competition within the manufacturing sector in Scotland.

Specifically the discussion will focus around potential barriers to Scotland maximising productivity improvements within the SMEs contained in this study and how the recommendations made in the previous section might contribute to removing or lowering these barriers.

3.3.1 Investment

Facts & Benchmarks

In the case of investment there is a lack of direct comparative data but we know that the UK lags nearly all other OECD countries across a range of indicators (including capital stock, business investment and government investment). And the suggestion is that Scotland's investment performance lags the UK by a slight margin (Scottish Enterprise, Dec 2007).

What is Scotland trying to do to improve the situation?

Scotland recognises the need to encourage manufacturing companies to make investments in their future. And at the same time Scotland is making investments in infrastructure to support to business environment. One of the biggest challenges is encouraging investment in physical capital stock. Obviously taxation and interest rate decisions have a crucial role here. But there are clearly many mechanisms used by Scotland to encourage investment within manufacturing companies and during our investigations we did hear praise for some of them, including Regional Selective Assistance (RSA Grants), and innovation support through schemes such as SPUR and SMART. In recent months we have seen significant investments made in Scotland by large organisations (e.g. Rolls-Royce investing in a manufacturing centre) and by the public sector (e.g. Investments in the ITIs, Capital Grants from the National Food Processing, Marketing and Co-operation Scheme, investment in wind farms, etc).

Scotland is also addressing investments to encourage better resource efficiency, including greater energy efficiency and improved waste management (for example investment in SMAS) and investment to encourage better use of ICT.

What are the barriers to success and what can be done to remove/lower them?

Although this research was not specifically tasked to investigate investment by manufacturing SMEs the findings give us some insights into issues surrounding investment by SMEs. Of particular relevance here was the finding that the vast majority of manufacturing SMEs in Scotland lack strategic vision (see section 2.4.2). There are indications that many companies do not have a clear view of the future and what will differentiate them in future markets. Against this backdrop it is difficult for SMEs to make

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[2] The Scottish Government Economic Strategy (2007) identified 5 small EU countries as broad benchmarks for Scotland. These countries: Denmark, Finland, Ireland, Norway and Iceland have commonly been referred to as the "arc of prosperity" countries. In recent months the suitability of these countries as benchmarks has been called into question. Some would argue we should be benchmarking more with the people we trade with. It is clearly beyond the remit of this report to be making recommendations on such matters. However this discussion will use what benchmarking information is available from both arc of prosperity countries and trading partners to help discuss the state of the nation with respect to manufacturing.

strategic investment decisions. This is a major barrier to increasing investment. Anecdotal evidence would lead us to believe that companies with a clear strategic direction are going to have more confidence in investment. So helping Scottish manufacturing SMEs with developing and enacting strategy, should help encourage investment, which in turn may have an impact on Scotland's productivity (see recommendation 2.1.4).

Another issue that came out of the study is that of investment. The implications are the low level of manufacturing entrepreneurship in Scotland (see also section 2.4.2). If we encourage more manufacturing start-ups by helping them create manufacturing facilities then this will increase capital investment in manufacturing.

Lack of confidence would also be another barrier to investment, the interviews suggested that many of the organisations who had used SMAS had been given additional confidence that encouraged them to make additional investments. The news that considerable additional investment is being made in the Scottish Manufacturing Advisory Service (SMAS), with the aim of doubling the size and capability of SMAS is therefore welcome.

Another barrier to investment was the perceived complexity in finding and using support through grants and loans. The research suggests that many manufacturing SMEs do not know how to access support (both finance and advice). Providing support to increase network building within the manufacturing sector would also help reduce this barrier. It would also have an impact on increasing confidence within manufacturing SMEs by giving them access to positive role models.

3.3.2 Skills

Facts & Benchmarks

Scotland tends to perform relatively strongly in international benchmarking exercises on skills and qualification levels. Many indicators show that Scotland's labour quality is within the top tier of comparator countries (Scottish Government 2008). Figures would suggest that Scotland has tended to spend more (proportionally) on education and training than England and has a more qualified workforce. It is argued from some quarters that we are not short of qualifications but there is a gap in matching skills with opportunities. Other countries have also recognised that up-skilling alone will not have the desired positive effect on productivity. Wales, Australia and a number of Scandinavian countries have all recognised the importance of addressing the issues of work design and organisation. Recent research has highlighted that despite rising skill levels over the past twenty years, there has not been an accompanying rise in the level of influence that employee's report they can exercise over their jobs. This is in contrast to the reported findings of similar surveys in Germany, Sweden, and Finland.

What is Scotland trying to do to improve the situation?

This area is in some ways more complex than the others in that there are already a whole host of mechanisms addressing skills in Scotland and some recognition that Scotland is 'getting it right'. Scotland recognises that skills alone do not result in increased productivity. The Scottish Skills Strategy has three key elements: improving skills supply; boosting demand for skills; improving the use of skills once created. It addresses the issues of matching skills and opportunities. It also tackles gaps around core skills such as enterprise, creativity, collaboration, risk and research skills. Scotland is also striving to create an environment for talented people to live, work and remain in Scotland through a whole host of mechanisms (out with the scope of this report). But part of this includes pursuing population growth and encouraging migrants in shortage occupations. Therefore it would seem that all the right things are being done however there is a mismatch in the amount of effort being applied by the Government and the positive effect that is seen within the researched companies. To put this differently this area is seeing the most effort applied by government while receiving the most criticism from industry.

What are the barriers to success and what can be done to remove/lower them?

It is proposed the barriers to success do not lie in deficiencies in the current provision of education and training but firstly, in the motivation of people to work in manufacturing and secondly, in the matching of the training provision to existing industry need.

In relation to the first point this research found that there is a pronounced shortage of labour (regardless of skill levels) that wanted to work in the manufacturing sector and who were committed and reliable. Back in 2000 the "Created in Scotland" report stated "Scottish manufacturers believe that the image of manufacturing industry throughout communities is Scotland is negative, inaccurate and damaging to the industry itself". This position would appear to be very real. It was suggested by some interviewees that the education system failed to promote careers in manufacturing in two ways. Firstly manufacturing is seen as the poor relation to other career paths, and secondly the scope of manufacturing is not fully explained and therefore potential employees are not aware of the breadth of opportunities that exist.

It is therefore concluded that lack of workers motivated to work in manufacturing is the main barrier as this prevents people embarking on courses of education and training that lead to a manufacturing job. Therefore regardless of the supply (provision of education and training) the demand (willing participants) will remain low.

At the moment the labour shortage issue looks like it can only get worse, with projections (e.g. EEF 2006) of decreasing manufacturing labour availability due to an aging workforce and migrant workers returning home. If Scotland is looking for a balanced economy, as the economic strategy suggests, then we need to address this gap. The younger generation must be encouraged to enter the manufacturing sector.

The skills level of employees is also a concern in a number of sectors. 24% of respondents to the survey said they would like help with basic workforce skills. And a further 19% said they were looking for specific technical skills. The lack of a sufficient skills level has been acknowledged in a number of previous studies. According to Futureskills Scotland in (2006) 18% of manufacturing companies had at least one skills gap. Our research demonstrates that the lack of appropriate training and qualifications is in part responsible for this with the success of past training bodies such as City and Guilds frequently mentioned. For skills in the manufacturing sector to develop, industry must voice their skill requirements, to ensure that there is a qualified workforce for the future, as this "lack of skills in the UK workforce is hindering the development of manufacturing" (The House of Commons Trade and Industry Committee 2006).

In line with the view that Scotland needs to match skills to opportunities, companies need to embrace the principles of good job design (see recommendation 2.2.4) and engage in more employee development (our recommendations around building community and transfer of best practice go some way to addressing this).

Lastly, the number of migrant workers that are employed within industry in jobs of varying levels of skill requirement indicates that there is less an employment problem (i.e. lack of jobs) but more an employability problem where the indigenous population are unwilling to work in certain types of job preferring to find other 'methods' of subsistence.

3.3.3 Innovation

Facts & Benchmarks

Again there are issues with measuring innovation in a comparative manner. But it is in the area of innovation in manufacturing SMEs where the research team have some real concerns. Scotland has a strong history of invention and a strong academic base. There is a general perception in Scotland that we are an innovative nation and we are able to lay claim to many important inventions. The Scottish Enterprise Business Plan 2008-2011 starts out by saying "Scotland has some real strengths that should give it competitive advantage in the global economy, including: capability; creativity; natural resources" (p3).

But evidence of innovation activity in small to medium sized manufacturing companies, paints a different picture. Scottish innovation levels are low compared to a significant number of EU countries. There is particularly low investment in business R&D, which at

around 0.6% of GDP is less than a quarter of the value invested by some competitor countries (Scottish Government, 2008)

Figure 3f: Total gross expenditure on R&D relative to GDP (OECD 2006)

Fig 3g:Regional analysis of R&D expenditure relative to GDP

The Community Innovation Survey 2002-2004 also suggests that a significant percentage of Scottish businesses are not involved in innovation activity. And the picture is even gloomier for manufacturing – with the CIS survey suggesting most innovation occurs outside manufacturing. According to CIS Scottish manufacturing has relatively low levels of process innovation and only 22% of businesses are likely to be product innovations (and a large percentage of this product innovation is heavily influenced by the financial services sector). But on a more positive note, those businesses in Scotland who are product innovators are more likely to be introducing novel products that are new to market and industry (when compared to UK average) (BERR 2007).

"A significant proportion of Scottish businesses with 10+ employees (potentially up to 23%) do not see the need to carry out any form of innovation, including R&D, training or buying equipment linked to innovation, changing business and organisation structures etc." (Scottish Enterprise, 2007).
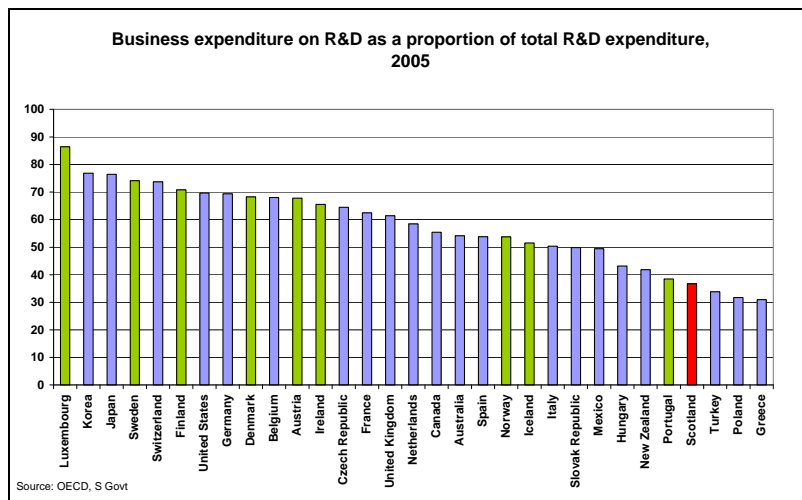
Fig 3h: Business expenditure on R&D
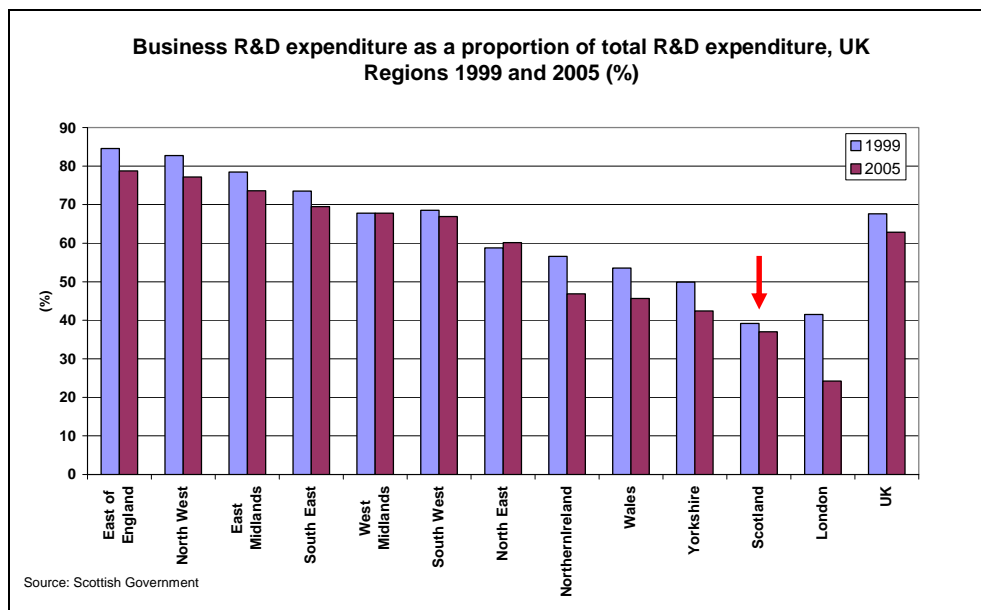
Fig 3i: Business R&D as a proportion of total R&D by region

What is Scotland trying to do to improve the situation?

The Government Economic Strategy places a great emphasis on Scotland's key sectors to boost productivity and improve Scotland's position in the global economy. These key sectors are: energy, financial and business services, food and drink, life sciences, tourism and creative industries. Scotland already has some major competitive advantages within these industry sectors which, as well as being able to boost growth in the shorter term, offer the greatest opportunities for long term sustainable economic growth in the future. Scotland has other important industries such as aerospace, chemicals, construction, forest industries, marine and defense, and textiles that will also help shape what we deliver as well as supporting the enabling technologies which can be applied across multiple markets and industries e.g. advanced engineering and informatics.

The Scottish Enterprise business plan sees increasing the level of research & development (R&D) activity and knowledge transfer between the research community and industry as a central plank of its strategy. Innovation is clearly high on the Scottish agenda and SE is addressing market failure by providing information (e.g. increasing awareness among SMEs of the benefits of innovation and increasing awareness of sources of finance and help with accessing skills); reducing barriers to entry (e.g. encouraging collaboration, and access to shared resources, and help with accessing international markets) and addressing externalities or spill-overs (e.g. encouraging movement of staff, sharing of knowledge, IP assistance). There are numerous specific initiatives aimed at addressing innovation including Proof of Concept; Enterprise fellowships, R&D Plus, etc.

The research team would make a couple of observations here with respect to how Scotland is addressing and measuring innovation in manufacturing SMEs. Firstly there appears to be more of a focus on technological innovation (big R) and also more attention on large-scale innovation and perhaps also larger companies. For example Scottish Enterprise measure their success in terms of innovation largely through measuring: investment in R&D by supported businesses and major high growth start-ups with potential to reach £5m in 3 years. But this does not address the softer innovation. We need to be encouraging growth of existing firms and investment in product, process and business model. Take for example the many small to medium sized food manufacturers in Scotland. They may not be investing large sums in technological research, but by innovating in terms of developing extensions of existing products for new markets, changing their packaging etc. they can reap the benefits of innovation and the economy may see significant benefits in terms of productivity.

What are the barriers to success and what can be done to remove/lower them?

This research suggests that there is significant potential to help manufacturing SMEs with respect to product, process and business model innovation.

The team were disappointed to find low recognition of the importance of innovation as a competitive weapon coming through in our survey – but the secondary sources of information also support this lack of recognition within manufacturing SMEs. However 58% of interviewees talked about the importance of product innovation in their current success and future sustainability. The research team suggest that the differences in response between survey and interview might be due to differing perspectives on, and interpretation of, the meaning of the term innovation. Those companies involved in industry sectors which have a technology-driven product recognise the need to behave innovatively mainly in relation to their technology. The term innovation was therefore more associated with technology and product design than the wider aspects of the business such as innovating in customer service.

The interviews provided an opportunity to discuss in more detail aspects of innovation that manufacturers are pursuing. Here it is clear that creating ideas and doing things 'differently' - rather than just quicker or cheaper - is seen as being very important. It is therefore evident that innovation in its widest sense is certainly an important factor for the competitiveness of Scottish manufacturers.

A significant barrier to effective innovation in manufacturing SMEs is the lack of formal processes for product development. In the majority of organisations visited product development was something that happened in a relatively unstructured manner, often in response to an opportunity or indeed a threat. Very few companies had actually designed a product development process and thought about optimising product development processes. Hunt (2008) suggests there is a need for a new product innovation team in Scotland to assist companies both with product development but also to help companies to establish effective and efficient new product development processes. There is design and operations expertise within SMAS and beyond (including SIOM) that could be used to help companies to establish efficient and effective processes for product development and process improvement.

Two related barriers also need to be highlighted. Firstly it was noted that many technology led companies who were investing in R&D were not making the most of new

technologies – they weren't thinking about how to develop new ranges of products from the new technology platform (but instead focused on the one product). And another problem at the other end of the spectrum were the less technology driven companies who were not using "science" driven innovation – but who could/should be developing new product offering based on softer aspects eg. design, packaging, branding etc.

And this leads us to another issue that may be a barrier to Scotland achieving its objectives in relation to innovation. And that's the issue of the performance measures used by the Government and development agencies. The research team noted that much focus is on the big hits (often benefiting the big companies, and big R, and with increased attention on invention rather than commercialisation). It maybe beneficial to encourage and measure the smaller scale innovation in the same way. Schemes such as KTP have been utilised successfully in Scotland to help smaller companies to innovate.

3.3.4 Enterprise & Entrepreneurship

Facts & Benchmarks

"Enterprise can be defined as the seizing of new business opportunities and as the creation of growth of firms" (Scottish Enterprise, 2008). A number of studies show positive links between high levels of entrepreneurship and more rapid economic growth (GEM Global Report, 2007). Enterprise is thought to drive productivity in 3 main ways:

- Good performers drive out poor performers/ more productive firms replace less productive firms (often referred to as "productivity churn")
- Increased competition encourages existing firms to raise their game
- Introducing new products, ideas, technologies, knowledge into the economy – and this has benefits for others.

On a positive note, the UK and Scotland score well in terms of the ease of starting a business. A recent World Bank analysis (World Bank, 2008) rated the UK 6th out of 30 countries). We have a broadly supportive environment and low barriers to entrepreneurship in terms of regulation, administration etc. But Scotland is failing to convert this into entrepreneurial activity. Based on the information available (VAT registrations, business bank accounts, Household survey of entrepreneurship, self employment) Scotland has lower levels of entrepreneurship than the average UK level. Indeed figures suggest that if Scotland had the same number of businesses relative to the UK, then GVA could be in the region of 30% higher. The Global Entrepreneurship Monitor's (GEM) Total Early-Stage Entrepreneurial Activity (TEA) Index [14] allows for international comparisons of entrepreneurial activity. In 2006, TEA in Scotland was 4.2 per cent of the working age population. This is below the rates found in the Arc of Prosperity countries. Norway and Iceland had particularly high rates at 9.1 per cent and 11.3 per cent, respectively

Business expenditure on R&D as a proportion of total R&D expenditure, 2005

Source: OECD, S Govt
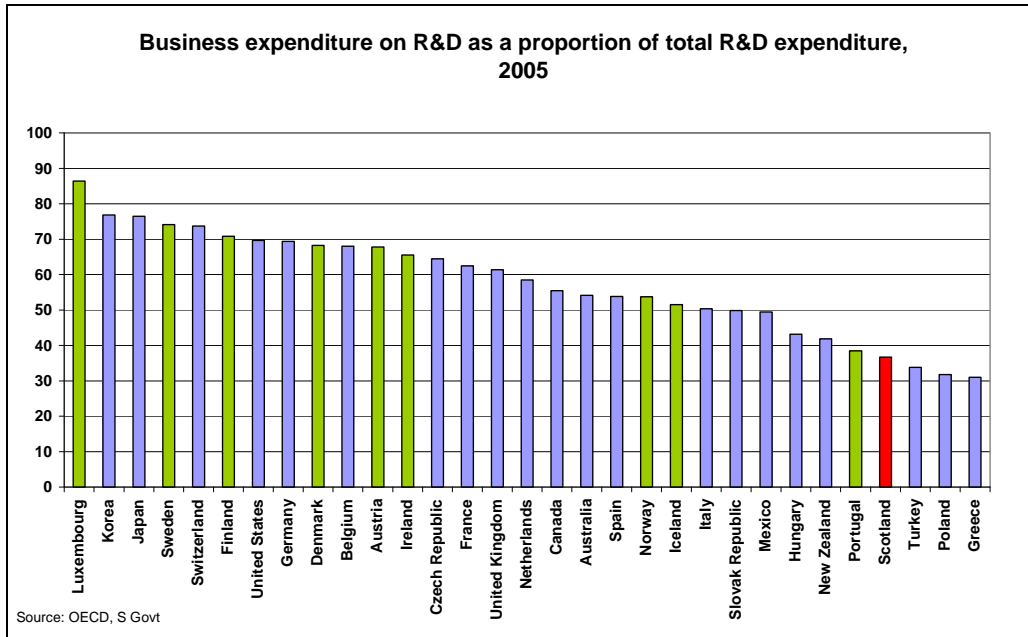
Fig 3j: Business Expenditure of R&D as proportion of total R&D Expenditure 2005 (source OEDC, Scottish Gov)

And then there is the issue that less entrepreneurship means less competitive pressure and less incentive to innovate (especially domestically traded goods and services). And this in turn is going to have an effect on Scotland's relatively poor productivity performance. And its not just new business birth that is the issue. Growth of established firms is also a problem in Scotland. The data on which to make comparisons is not perfect – but the Interdepartmental Business Register suggests that out of 110,000 registered businesses in Scotland (for which there is data available 2004-2007) only 2.9% grew their turnover by £800k or more, and a further 2.6% grew their turnover between £400-800K over a 3 year period.

VAT Registrations per 10,000 adults, UK Regions
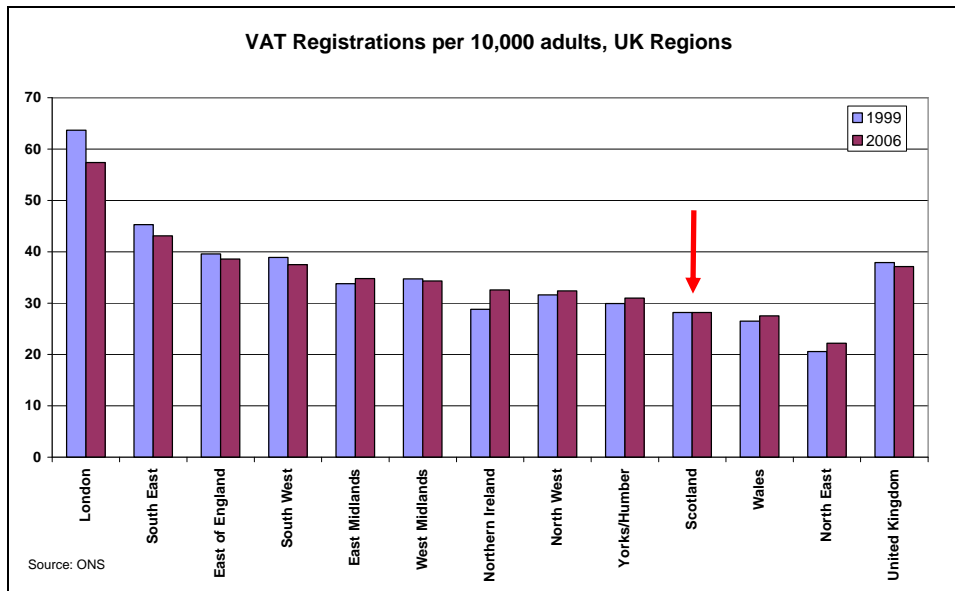
Source: ONS

Fig 3k: VAT registrations per 10,000 adults by region (Source: ONS)

The annual survey of Small Businesses (2005) suggests that 37% of businesses reported they aimed to grow over the next 2-3years (but no specific definition of growth was used)

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What is Scotland trying to do to improve the situation?

Address the information deficiency. At the moment schemes like Business Gateway, PBYST, High Growth, Seed fund, venture fund. Key action account management – support those with the potential to grow.

What are the barriers to success and what can be done to remove/lower them?

This research uncovered a very small number of manufacturing companies that had been established 5 years or less and this was worrying The majority of companies that responded to the questionnaire have been established for a number of years within the Scottish manufacturing sector, with 66% of the companies having existed for over 20 years. Further, only 3% of the companies that responded are younger than five years. This indicates that the industry is characterised by more established manufacturing companies.

There needs to be further investigation of the real number of start-ups with products at their core. This is particularly an issue if we want to have a balanced economy. Hunt (2008) report also notes the need to increase technical entrepreneurship and points to a concern that "one of the biggest challenges facing start up companies is transitioning the design into manufacture".

3.3.5 Competition

Facts & Benchmarks

Competition drives productivity as it forces companies to ensure that they are using resources efficiently and it also encourages companies to look for new markets and to be more innovative. It also has the result of forcing inefficient companies out of the market.

Scottish companies are facing competition from both home and abroad. Lord Sainsbury's Review (Sainsbury, 2007) argues that "in 1980 less than one-tenth of manufacturing exports came from the developing world. Today it is almost one third and in 20 years' time it is likely to be one-half". Clearly this growing international manufacturing capacity has significant consequences for manufacturers in Scotland as in any other developed country. If 50% of manufacturing exports will be delivered by firms based in developing countries within 20 years, then firms in developed economies need to decide how they will respond. Both the Department for Business Enterprise and Regulatory Reform and the Department for Innovation Universities and Skills, as well as many other commentators, believe that the answer lies in innovation. The core argument is that innovation can lead to the design and development of high value products and services, as well as instigating change that enables organisations to do that which they already do better (DTI, 2003).

The Experian Economic Review of Scotland (April 2008) suggests that Scottish companies appear to be less exposed to global markets in terms of exports than many other UK areas. And in turn this may well be hindering competitiveness and productivity growth. Indeed data from the DTI (DTI 2005) suggests that Scottish exports fell between 2004-2006. This is partly due to the fall in electronic goods being manufactured in Scotland. When we look at export growth by region (Fig 3i) in the UK there is a marked difference in Scotland's performance.

Annual average export growth, 2004-2006 (%, current prices)
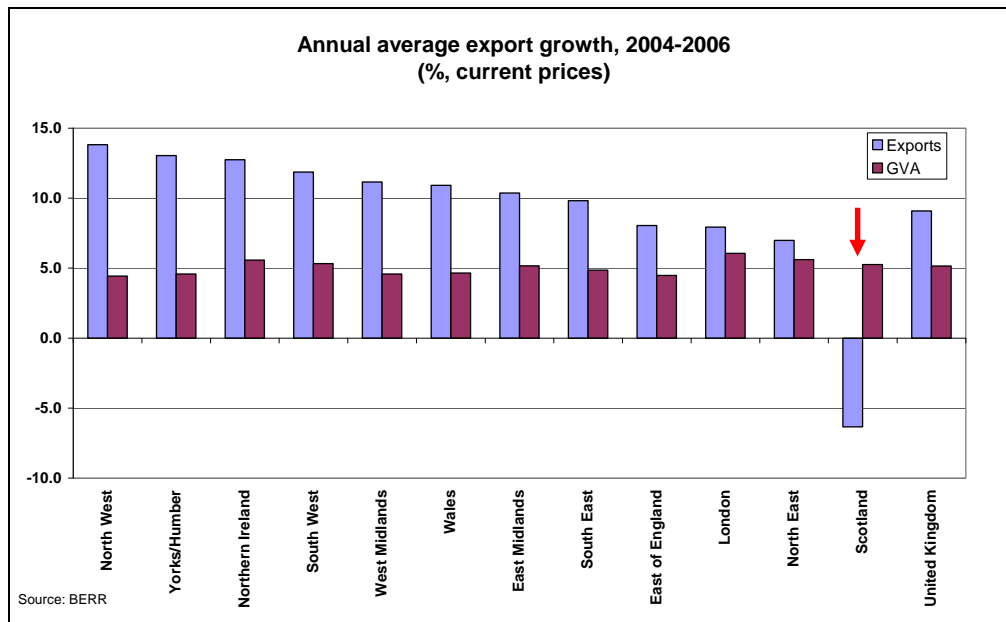
Source: BERR

Fig 3l: Average export growth by region 2004-2006 (source BERR)

What is Scotland trying to do to improve the situation?

Scottish Trade International is charged with helping internationalise Scottish businesses. The top 5 markets for exports from Scottish firms in 2006 were: USA (£1,800m), France (£1,610m), Germany (£1,475m), Netherlands (£1,305m) and EIRE (£1,090m). Together this accounts for about 1/3 of Scottish foreign sales. But with turbulent economies across the world Scotland needs to be looking to the future and looking at which markets will be hardest hit and look at potential new markets.

What are the barriers to success and what can be done to remove/lower them?

The key findings in relation to competition were the reluctance of Scottish manufacturing SMEs to embrace global opportunities. The second was that many reported they were seeing a change in the basis of competition. There is a major challenge here in helping companies to recognise their value propositions and align their capabilities to that value proposition. Many companies were telling us that their basis of competition had changed – yet seemed to be doing little to design processes and capabilities to suit the new value proposition. Most notable was the number of companies who reported that in the next few years their focus was going to be in manufacturing efficiency – and yet they were also telling us that they were moving away from price as the basis of competition – and instead were competing on design or service - and yet they appeared to be focus their energies on cost savings and not the things that would be their competitive weapon. Clearly that is not to say that generating efficiencies is not important – but they should also be addressing areas allied to where they see their competitive advantage.

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4.   References

AIM and TSB (2008). High Value Manufacturing: Delivering on the Promise.
Advanced Institute of Management: London.

BERR (2007). The Community Innovation Survey 2004 – 2006. Department for Business, Enterprise and Regulatory Reform: London.
Available   at: http://www.berr.gov.uk/dius/innovation/innovation-statistics/cis/page10957.html

BERR (2008). BERR Manufacturing Advisory Service Activity Report 2007-08. Department for Business, Enterprise and Regulatory Reform: London.
Available at: http://www.mas.berr.gov.uk/media/media/activity_report2007-2008.pdf

BERR (2008). Manufacturing: New Challenges, New Opportunities, The Governments Manufacturing Strategy Review 2008. Department for Business, Enterprise and Regulatory Reform: London.
 Available at: http://www.berr.gov.uk/files/file47660.pdf

CBI (April 2008). Quarterly Industrial Trends Survey. Confederation of British Industry: London.

Design Council (2006). Design in Britain, 2005 – 2006. Design Council: London.

DTI (2003). UK Productivity and Competitiveness Indicators 2003. DTI Economics Paper No.6. Department of Trade and Industry: London

DTI (2005). R&D Intensive Businesses in the UK. DTI Economics Paper No. 11. Department of Trade and Industry. London

DTI (2006). UK Productivity and Competitiveness Indicators 2006. DTI Economics Paper No.17. Department of Trade and Industry: London

DTI (2002). The Governments Manufacturing Strategy. Department of Trade and Industry: London.
Available at: http://www.berr.gov.uk/files/file25266.pdf

DTI (2004). Review of The Governments Manufacturing Strategy, Competing in the Global Economy – The Manufacturing Strategy, Two years on. Department of Trade and Industry: London.
Available at: http://www.berr.gov.uk/files/file18188.pdf

EEF (2007). High Value – How UK manufacturing has changed. Engineering Employers Federation: London.

Available at: http://www.eef.org.uk/UK/publications/policy/public/High_value_-_How_UK_manufacturing_has_changed.htm

EEF (2007). Manufacturing Performance 2006-07. Engineering Employers Federation: London.

EEF, (2008). In partnership with Deloitte: Delivering the Low Carbon Economy – Business Opportunities for UK Manufacturers. Engineering Employers Federation: London.

EEF (2008). Manufacturing Performance 2007-8. Engineering Employers Federation: London.

Futureskills Scotland (2006). Skills in Scotland 2006. Futureskills Scotland:Glasgow. Available at: http://www.futureskillsscotland.org.uk/web/site/home/Reports/WhatEmployersThink/Report_Skills_in_Scotland_2006.asp

GEM (2007). Global Report. Global Entrepreneurship Monitor: London.

HM Treasury (2000). Productivity in the UK: the evidence and the Government's approach. HM Treasury: London

HM Treasury (2001a). Productivity in the UK: progress towards a productive economy. HM Treasury: London

HM Treasury (2001b). Productivity in the UK: 3 – the regional dimension. HM Treasury: London

HM Treasury (2003). Productivity in the UK: 4 – the local dimension. HM Treasury: London

HM Treasury (2004). Productivity in the UK 5: Benchmarking UK Productivity Performance. HM Treasury: London

HM Treasury (2005). The Cox Review of Creativity in Business. HM Treasury: London.

HM Treasury (2006). Productivity in the UK 6: Progress and New Evidence. HM Treasury: London

HM Treasury (2006). Stern Review on the Economics of Climate Change,

Availableat:http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_Report.cfm

House of Commons Trade and Industry Committee (2006-07). Better Skills for Manufacturing, Fifth report of session. Available at: http://www.publications.parliament.uk/pa/cm200607/cmselect/cmtrdind/493/493i.pdf

Hunt, I. (2008). Technology Innovation, Product Development and Commercialisation. Feasibility Study: Partnership Between Academia and Commercial Innovation. Napier University: Edinburgh.

Livesey, F. (2006). Defining High Value Manufacturing. University of Cambridge Institute for Manufacturing: Cambridge.

ODPM (2005). Realising the Potential of All Our Regions: the story so far. Office of the Deputy Prime Minister: London.

OECD (1998). Fostering Entrepreneurship. Organisation for Economic Co-Operation and Development: Paris.

OECD (2001) The Well-Being of Nations. The Role of Human and Social Capital. Centre for Educational Research and Innovation. Organisation for Economic Co-operation and Development: Paris

OECD (2005). Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data. Organisation for Economic Co-Operation and Development and Statistical Office of the European Communities: Paris.

OECD (2006). The Changing Nature of Manufacturing in OECD Economies. . Organisation for Economic Co-Operation and Development: Paris.

OECD (2007) Moving Up the Value Chain: Staying Competitive in the Global Economy. Organisation for Economic Co-Operation and Development: Paris.

 Available at: http://www.oecd.org/dataoecd/24/35/38558080.pdf

Porter, M.E. and Ketels, C.H.M. (2003). DTI Economics Paper No.3 UK Competitiveness: moving to the next stage. Department of Trade and Industry: London.

Sainsbury (2007). The Sainsbury Review of Science and Innovation: The Race to the Top. HM Treasury: London.

Scottish Enterprise (2006). Electronics Market Research, Aerospace and Defence Sector. Scottish Enterprise: Glasgow.

Scottish Enterprise (2007). Scottish Textiles Industry Survey. Scottish Enterprise: Glasgow.

Scottish Enterprise (2007). "Investment and Economic Growth"). Scottish Enterprise: Glasgow.

Scottish Enterprise (2007). Research & Development and Innovation in Scottish Businesses. Scottish Enterprise: Glasgow.

Scottish Enterprise (2008). Economic Review of Scotland, April. Scottish Enterprise: Glasgow.

Scottish Enterprise (2008). Business Plan 2008 – 2011. Scottish Enterprise: Glasgow. Available at: http://www.scottish-enterprise.com/se-operating-plans-current

Scottish Enterprise (2008). Enterprise and Economic Growth. Scottish Enterprise: Glasgow.

Available at: http://www.scottish-enterprise.com/economicresearch

Scottish Executive (2000). Created In Scotland: The Way Forward for Scottish

Manufacturing in the 21st Century. Scottish Executive: Edinburgh.

Available at: http://cci.scot.nhs.uk/Resource/Doc/158160/0042798.pdf

Scottish Government (2005). Scottish Life Sciences Strategy – Achieving Critical Mass. Scottish Government: Glasgow.

Scottish Government (2006). Global Connections Survey 2006. Scottish Government: Glasgow.

Available at: http://www.scotland.gov.uk/Publications/2007/12/18084109/0

Scottish Government (2006). Scottish Economic Report. Scottish Government: Glasgow.

 Available at: http://openscotland.gov.uk/Publications/2006/12/19143801/15

Scottish Government (2007). The Government Economic Strategy. Scottish Government: Glasgow.

Available at: http://www.scotland.gov.uk/Publications/2007/11/12115041/0

Scottish Government (2008). Annual Survey of Small Business Opinions 2006: Scotland. Scottish Government, Glasgow.

Available at: http://www.scotland.gov.uk/Publications/2008/05/22155951/9

Scottish Government (2008). Skills for Scotland: A Lifelong Skills Strategy. Scottish Government: Glasgow.

Available at: http://www.scotland.gov.uk/Publications/2007/09/06091114/0

Scottish Government (2008). Business Enterprise Research and Development Scotland 2006. Scottish Government: Glasgow.

Available at: http://www.scotland.gov.uk/Publications/2008/01/BERD06

World Bank (2008) Doing Business. International Finance Corporation, World Bank Group: Washington.

5.   Appendices

5.1.   Survey Findings

5.1.1 Profile of Questionnaire Respondents

Figure 5.1.1A - Respondents by sector
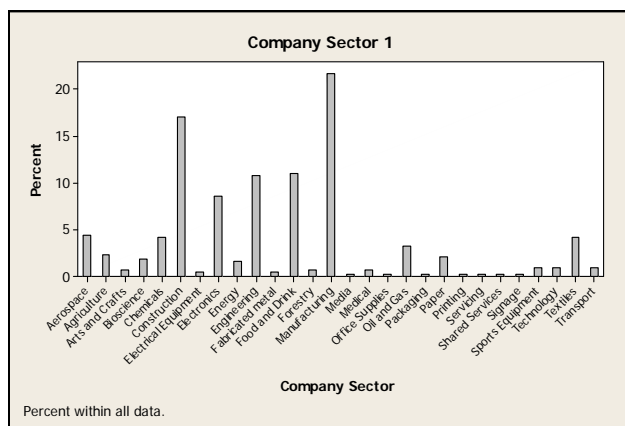
Figure 5.1.1A displays the distribution of respondents by industry sector. The graph shows a spread of companies with each of the sector types represented, the most numerous responses were in the sectors of engineering, construction and manufacturing.

Figure 5.1.1B - Respondents by Location
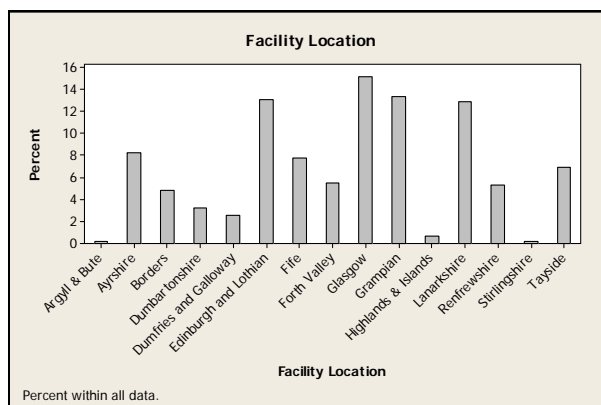
Figure 5.1.1B depicts the geographical distribution of the questionnaire respondents. It can be seen that responses have been obtained from across Scotland, with the three most prominent regions being Glasgow (15%), Edinburgh & Lothian (13%) and Grampian (13%). This response rate reflects the greater concentration of relevant companies in these areas.

Figure 5.1.1C - Respondents by Employee Band
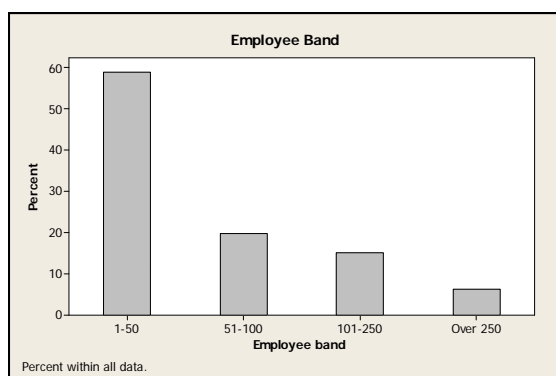
Figure 5.1.1C displays the respondents sorted by number of employees. The most common number of employees in the sample is between 1 and 50 (59%) and least common is over 250 (20%).

5.1.2 Age of companies

The majority of companies that responded to the questionnaire have been established for a number of years within the Scottish manufacturing sector, with 66% of the companies having existed for over 20 years. Further, only 3% of the companies that responded are younger than five years. This indicates that the industry is characterised by more established manufacturing companies.

5.1.3 Ownership and governance

65% of the companies in this sample reported that they did not have a parent company, demonstrating the level of Scottish-owned manufacturing businesses that exist.

When asked what decision making authority :

- 86% of companies in this sample reported that they had the authority to make their own strategic decisions

- 86% of companies reported that they had the authority to make financial decisions

- 96% of companies reported that they make the operational decisions at their facility.

Of the 35% that reported they had a parent company, 30% stated that the headquarters were located outside of Scotland. In terms of decision making authority of this group:

- 68% of companies reported that they had the authority to make their own strategic decisions

- 71% of companies reported that they had the authority to make financial decisions

- 95% of companies reported that they make the operational decisions at their facility.

This indicates that a high level of autonomy exists within Scottish manufacturing firms regardless of their corporate structure.

5.1.4 Market Context

Figure 5.1.D - Percentage of Business in Scotland

Scottish Sale Levels
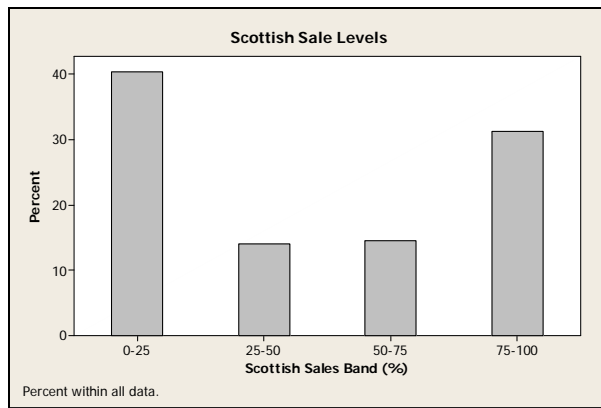
Figure 5.1.D depicts the Scottish based sales levels of manufacturing companies in the sample. 40% of companies indicated that less than 25% of their sales are Scottish-based. Whilst 31% of companies have Scottish based sales levels of over 75%. Sectors reporting the greatest levels of Scottish based sales are forestry (67%), agriculture (60%) and construction (53%).

5.1.5 Off-shoring and In-shoring

Table 5.1 - Work Transfer by Sector

Sector	% Off-shored	% In-shored
Aerospace	15	9
Construction	28	21
Engineering	8	13
Food and Drink	22	18
Manufacturing	37	32
Energy	57	43

77% of companies in the sample reported that no off-shoring had occurred within their organisation, leaving only 23% who stated off-shoring had occurred.

Whilst 82% reported that no in-shoring had occurred, with 18% stating that work had been transferred to Scotland which had previously been located elsewhere.

This demonstrates that a large percentage of companies within the sample retain all activity within Scotland.

Table 2.3 displays off-shoring and in-shoring activity in the largest sectors within the sample. It can be seen that 37% of companies in the manufacturing sector have off-shored activity to a location outside of Scotland, and yet 32% report that work has been moved into Scotland in the same sector.

Figure 5.1.E - Activity off-shored by Scottish Manufacturing Companies
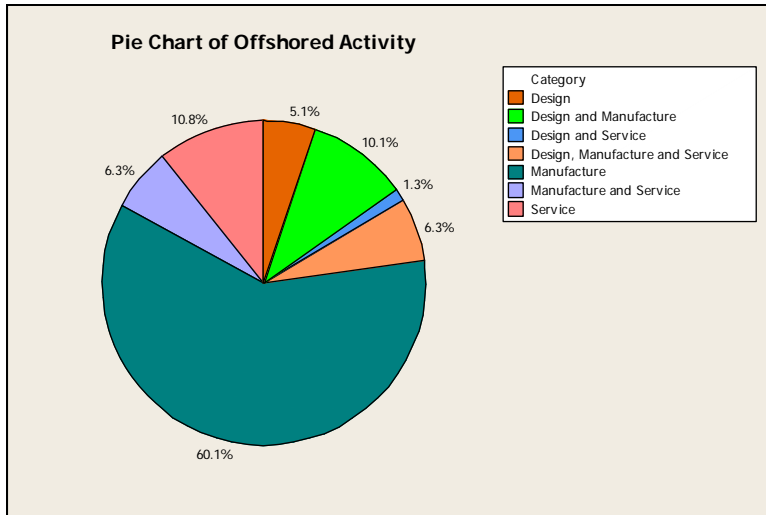
Figure 5.1.F - Activity in-shored by Scottish Manufacturing Companies
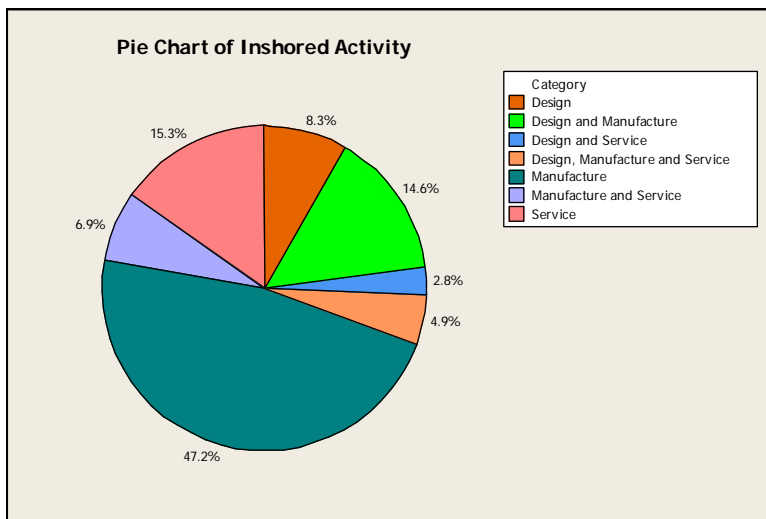
Figure's 5.1.E and 5.1.F depict the type of activity off-shored and in-shored by companies within the sample. It can be seen that the activity that has the highest incidence of off-shoring is manufacturing (60%), yet in contrast manufacturing is also the most common type of activity that has been moved to Scotland (47%). It is also interesting to note the level of service activity that has been moved to Scotland (13%) which is almost double the level of service activity that has been moved out (7%).

5.1.6 Current Business Activities

Figure 5.1.G - Principle Business Function
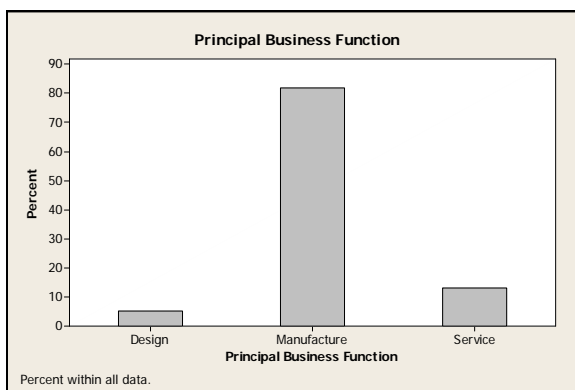
From figure 5.1.G we can see that the principal business function of the companies sampled is manufacturing (82%), this is followed by service (13%) and design (5%).

5.1.7 Business Activity Changes

Figure 5.1.H- Changing Design Activity
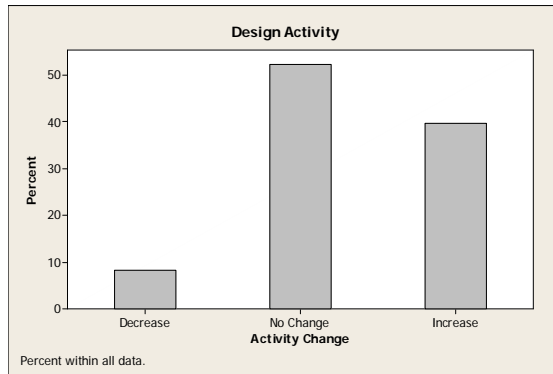
Figure 5.1.I - Changing Manufacturing Activity
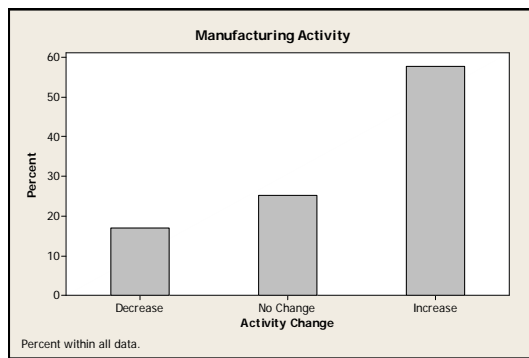
Figure 5.1.J - Changing Service Activity
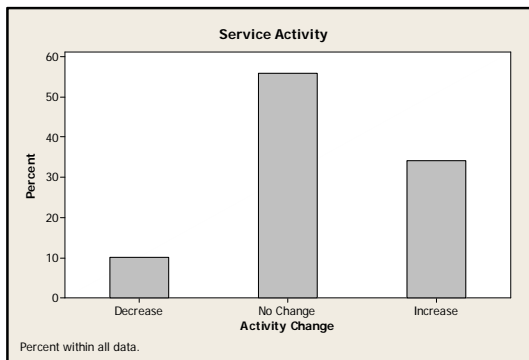
Figures 5.1.H, I and J display the changing business activity of companies in the sample over the last five years. Of the companies in the sample:

- 40% reported an increase in Design activity while a further 52% reported no change in the level of design activity

- 58% reported an increase in Manufacturing activity while 17% reported a decrease in manufacturing activity

- 34% reported an increase in Service activity while 56% of companies reported no change.

It can therefore be seen that the prevalence of all 3 activity types has changed extensively within the Scottish manufacturing sector.

The sectors that reported increases were:

- Design activity – textile, engineering (62%) and energy (57%)

- Manufacturing activity - food and drink (71%), engineering and bioscience (63%)

- Service activity – agriculture (80%),oil and gas (57%) and electronics (46%).

5.1.8 Company Changes

Figure 5.1.K - Changes in employee number

Chart of Employee Number
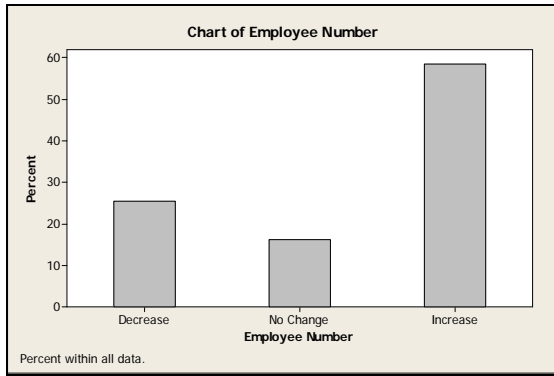
From figure 5.1.K we can see that 58% of companies in this sample have reported an increase in the number of employees within their organisation. However, 25% of companies reported a decrease in the number of employees.

The sectors containing the greatest number of companies that increased their number of employees are bioscience (89%), energy (86%) and oil and gas (78%).

Sectors containing the greatest number of companies that decreased their number of employees are predominantly paper (67%), textiles (56%) and chemicals (44%).

Figure 5.1.L - Turnover Change
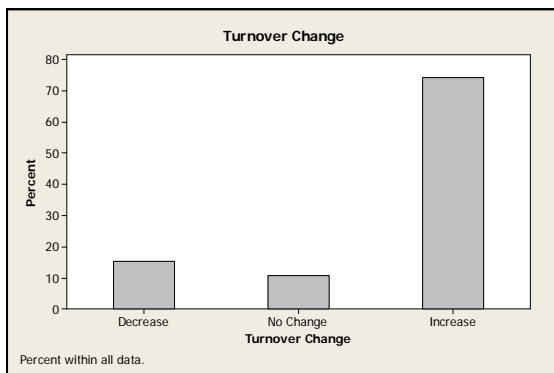
Figure 5.1.L displays the changes in turnover, 75% of companies reported an increase in turnover and 15% reported a decrease.

88% of bioscience, 86% of energy and 87% of oil and gas companies reported an increase in turnover, these being the highest reported sectors.

Sectors reporting a decrease in turnover were predominantly paper (44%), textiles (28%) and manufacturing (23%).

Table 5B - Expenditure Changes

	Decrease	No Change	Increase
Labour	12	7	81
Materials	7	8	85
Infrastructure	8	24	68

Table 5B displays the percentage of companies reporting changes in expenditure in the three areas of labour, materials and infrastructure. It can be seen that the majority of companies report an increase in expenditure in all three areas.

5.1.9 Basis of Competition

Figure 5.1.M - Average Rankings for Current Differentiators
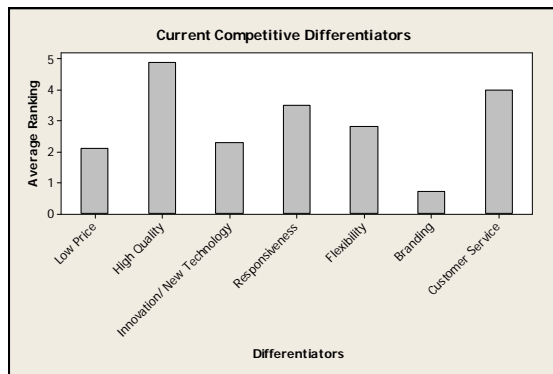
Figure 5.1.M displays the ranking of competitive differentiators currently exhibited by companies in the sample. High quality has the highest ranked average, followed by customer service. The lowest ranked differentiators are branding and low price.

Figure 5.1.N - Average Rankings for Future Differentiators
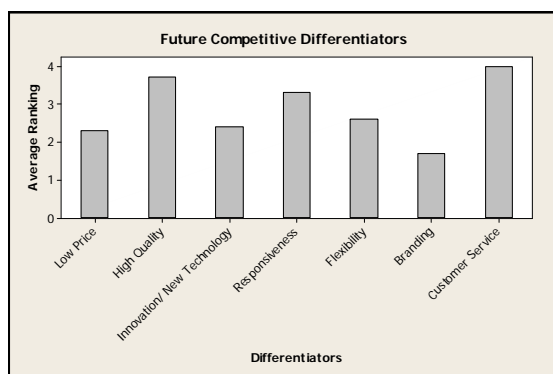
Figure 5.1.N displays the rankings of competitive differentiators that companies predict will be significant in future. Quality is ranked as the most important followed by customer service and responsiveness. The lowest ranked propositions are branding and low price.

Table 5C – Comparison of Current and Future Differentiators

	Current	Future

Sector	Highest	Lowest	Highest	Lowest
Aerospace	High Quality	Branding	Responsiveness	Branding
Construction	High Quality	Branding	Customer Service	Branding
Engineering	High Quality	Branding	High Quality	Branding
Food and Drink	High Quality	Innovation	High Quality	Low Price
Manufacturing	High Quality	Branding	High Quality	Branding
Energy	High Quality	Branding	High Quality	Branding

Table 5C depicts the major sectors within the sample displaying the highest and lowest average ranked differentiators within each of these sectors. It can be seen that all of the major sectors currently compete on high quality, and the majority rate branding as the least important method of competition.

Further by comparing present and future rankings it can be seen that the differentiators are perceived to remain unchanged in coming years.

5.1.10 Company Aspirations

Figure 5.1.O - Future Aspirations
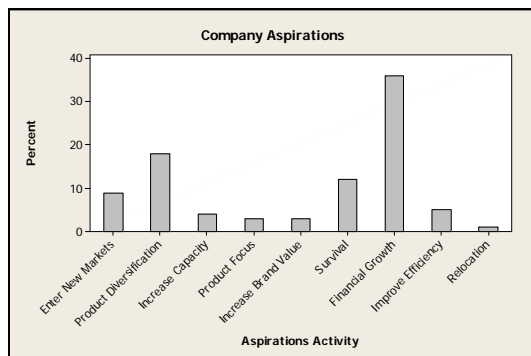
Figure 5.1.O displays the future aspirations of the companies in the sample over a 5-year period. Financial growth was reported to be the main focus by 36% of the companies, whilst 18% commented that they were going to undertake product diversification activities and 1% of organisations reported that they will be relocating.

5.1.11 Support Service Used

Figure 5.1.P - Support Service Used
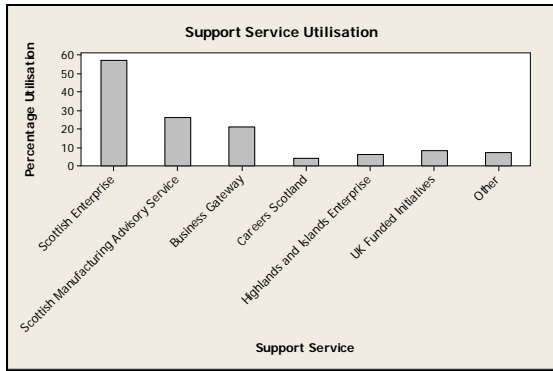
Figure 5.1.P displays the support bodies used by companies within the sample. The most commonly used body is Scottish Enterprise used by 59% of companies followed by 26% who used the Scottish Manufacturing Advisory Service.

Other services used refer to trade associations, government and local government, which totalled 5%.

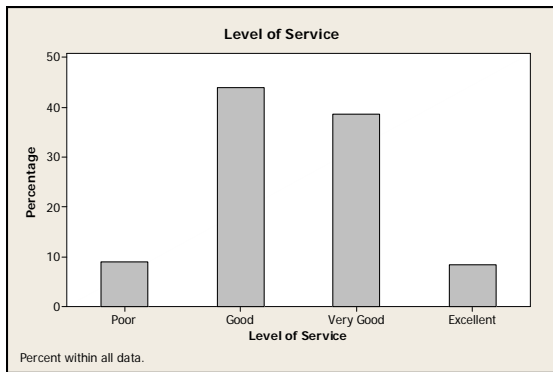Figure 5.1.Q - Level of Service Used

Figure 5.1.Q displays the level of service rated by those companies that had used support bodies within the sample.

Of the companies that reported using support bodies, 8% reported that service they received was excellent. 44% rated the service as very good and 9% reported that the service they received was poor.

Figure 5.1.R - Reason why Support Services are not used
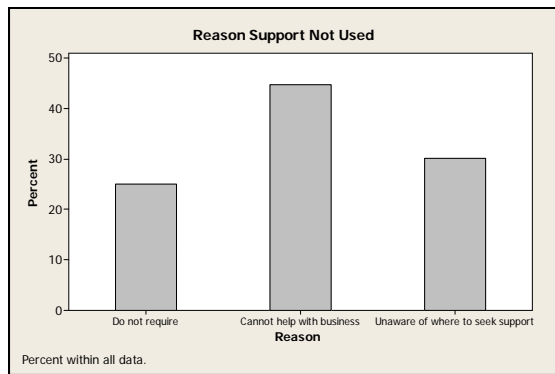
Figure 5.1.R depicts the reasons why companies have not used support bodies. The most common reason given by 45% of companies for not using support services was: "do not think they can help with my business requirements"

In addition 30% of companies report that they "do not know where to seek support".

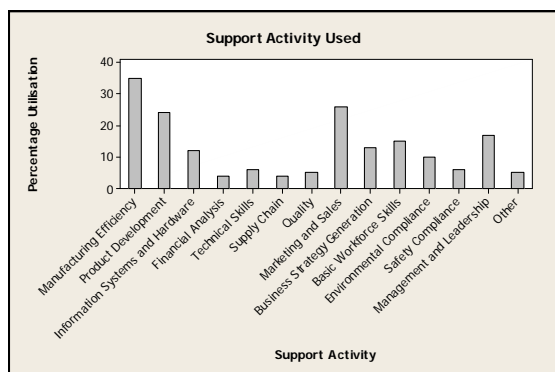## 5.1.12 Areas of Support Required

Figure 5.1.S - Support used

Figure 5.1.S shows the areas of expertise used by the companies in the sample. Manufacturing efficiency was reported as the most commonly used (35%), followed by marketing and sales (26%). Financial analysis and supply chain were used least (4%).

Figure 5.1.T - Support Required
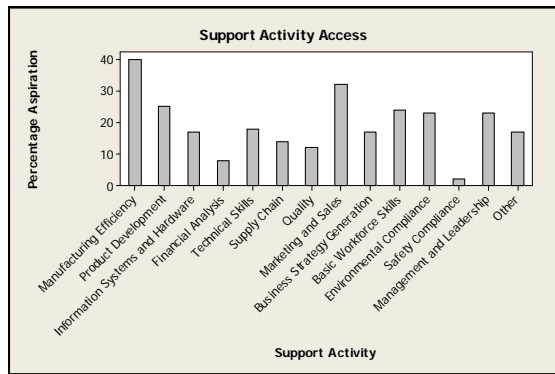
Figure 5.1.T displays the support services that manufacturing companies within the sample would like to have access to. The most commonly requested service was manufacturing efficiency (40%) and marketing and sales (32%).

The least requested services were safety compliance (2%) and financial analysis (8%).

5.2. Findings from Interviews

This section of the report outlines the findings from face-to-face interviews (see section 1.8.2). The analysis is based on interviews with senior managers from 45 different manufacturing SMEs. Whilst the research team used a clustering technique to patterns in the interviews (using NVivo software), it should also be noted that the Research Team also used the interviews to gain a much richer picture of the environment surrounding manufacturing companies in Scotland.

5.2.1 Profile of Interviewees

Companies interviewed were from a number of sectors: Bioscience (2%), Chemicals (4%), Construction (11%), Electronics (11%), Engineering (29%), Forestry (2%), Medical (4%), Paper (2%) and Textiles (11%).

Of the companies interviewed, 71% were classified as independent SMEs and 13% were classified as being part of a larger group.

5.2.2 Market Context

Figure 5.2.A - Market Locations
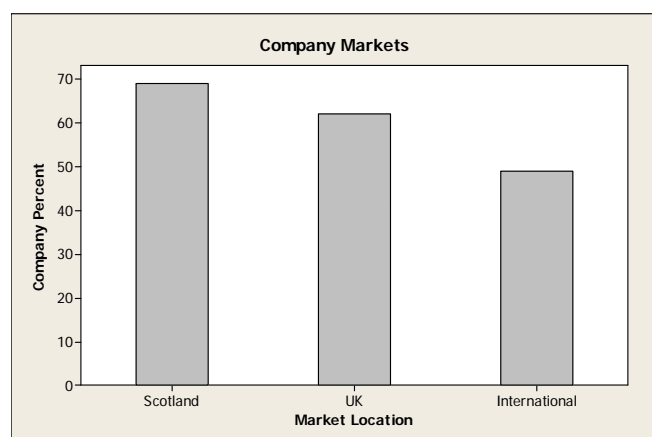
The market was split into Scotland, UK and International. Of those interviewed, 67% (30) companies talked about selling to the Scottish market, 62% (28) to the UK market and 48% (22) to the International market. 15% (7) companies reported their main market was Scotland, 29% (13) the UK and 9% (4) overseas.

5.2.3 Off-shoring and In-shoring

22% (10) of companies talked about having moved activities out of Scotland. 4%, (2) to elsewhere in the UK, and 18% (8) having moved activities outside the UK. The most common reasons behind the decision were closeness to markets and cost. While 15 companies stated they retained activity within Scotland due to one or a combination of the following reasons; the expertise, loyalty and reliability of employees; protection of intellectual capital; controllability of operation; prohibitive cost of moving production overseas.

Company 23:

> "I'm sure in the next year or so much of the products …will move out to the Far East to serve our Asian customers because that's the right thing to do."

Company 40:

"I tried different ways to make it work and I couldn't find a cheaper way of basically getting the product into Scotland, cheaper than making it here."

5.2.4 Current Business Activity

Figure 5.2.B - Principle Business Function
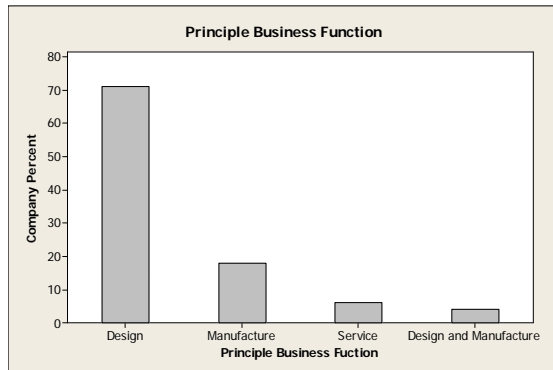
Principal business function

Of the 45 companies interviewed, 71% (32) said their principal business function is manufacturing, 18% (7) companies said service, 6% (3) design and 4% (2) companies had both design and manufacturing as their principal business function. Company 21 is an example of a company that has moved some production to Asia to be close to their biggest customer, but continue to carry out design work in Scotland. Company 12 also said that their function was split 50/50 between design and manufacturing.

Design

Design as a function was discussed by 73% (33) companies, where 40% (18) of companies have a specific department within the organisation and 33% (15) of companies invest directly into design throughout the organisation.

Manufacture

The scope of manufacture included the type of product, the process which is used and the skill levels of the employees. 18% (8) of companies assemble products on their site, 36% (16) produce a tangible product while 11% companies provide a service to other manufacturers. The manufacturing process itself was found to be automated for 11% (5) of companies, manual for 22% (10) of companies and a mixture of both manual and automated for 27% (12) of companies. It was found that 47% (21) of companies required skilled workers, 31% (14) of companies needed semi-skilled workers, 13% (6) looked for low skilled and 7% (3) of companies required more specialised knowledge-based workers for their organisations.

Service

The service that organisations provide for their customers is split into two categories. These are product aftercare and wider customer related support. It should be noted that not every company saw themselves as service providers but of those that that did 24% (11) focussed on providing an aftercare service to their customers, 17% (8) of companies felt that they offered a one-stop shop for customers and 24% (11) of companies viewed their business as a wider service provider for their customers.

5.2.5 Process Changes

The changes in processes relate to companies who have either increased or decreased the amount of design, manufacturing or service in recent years. Of the companies who responded 2% (1) of companies indicated a decrease in their design activity, 13% (6) of companies indicated a decrease in their manufacturing activity and no companies indicated a decrease in their service activity. In terms of process increases, 40% (18) of

companies have increased their design activity at, 44% (20) companies have increased their manufacturing activity and 31% (14) have increased their service activity.

Company 17:

> "We have our own product development facility here on site which has just been expanded last year."

Company 43:

> "Our levels of manufacturing have increased quite significantly I would say over the past 10 years."

Company 5:

> "It's all about increasing our service to customers. It's survey work. The company we've got in England now does all stuff like installation and maintenance. It's really sort of looking after the customer from sort of cradle to grave."

5.2.6 Basis of Competition

Figure 5.2.C - Current Competitive Differentiators
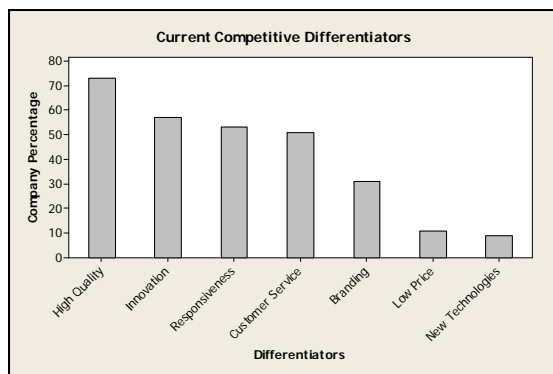
High Quality

73% (33) of the companies interviewed viewed quality as a differentiator for their business. Indeed, many of these companies opt for quality over price and operate at the premium end of the market where the price differentials give them the ability to focus on maintaining the product quality, reliability and performance.

Company 37:

> "…you compete not so much on cost but on 'premiumisation', what's unique about the product, what the quality is."

Company 18:

> "If you talk to… the customers (they will say) …it's the highest quality, they'll say you pay for it but it's the best."

Innovation

Innovation is regarded as a core differentiator for 58% (26) of companies where they compete in the market place through continual improvement of existing products, development of entirely new products or by expanding their range of activities to offer a more complete service to the customer.

Company 11:

"We are trying to be a bit innovative in the way we're developing our product in looking at options and just trying to create that (product) that people want, going that wee bit further."

Company 14:

"Just anything really that's new on the market I tried to introduce it to the business, because if it's new, people want it."

Questionnaire

Company 5:

> "We're looking to up the innovation to make sure we can bring new products to the market."

Responsiveness

A major advantage for companies located in Scotland is their proximity to the customers. This allows for a more efficient response time and reduces the need for economies of scale in terms of transportation costs. Of the companies interviewed, over 53% (24) found responsiveness to be a key differentiator as they could meet tight delivery schedules while providing a more customer specific level of service.

Company 24:

> "If you have a problem, you send it to us freepost and we'll turn it around in 24 hours giving you a new product or repair the old one."

Company 20:

> "The other thing for us is the ability to react. We're in direct competition with … manufacturers in Turkey. Our response is we can produce far quicker and turn stuff around far faster than someone in Turkey could."

Customer service

The value of providing a high level of customer service in competitive markets is appreciated by Scottish manufacturers with half of those interviewed offering greater levels of customer service during the business transaction. The manufacturers offering an aftercare service were predominantly from the engineering sector, although Company 35 provided a service to one of their large customers where they repaired faults found on the customer's imported Chinese cloth. Many companies have tried to develop a close relationship with their customers by working with them to provide bespoke products or assisting them in problem solving.

Company 34:

> "…we offer a free product development service for our customers."

Company 32:

> "...the ideal way to do it is to work specifically with customers on a specific route."

Branding

Companies see the branding differentiator as a means of reassuring their customers, giving them confidence to buy their products knowing they have an assured level of quality or service. 31% (14) of companies rated branding as one of their value differentiators, using it as a means of promoting their reputation within the target sector.

Company 19:

> "I think people are comfortable buying it as a brand… it's got credibility behind it."

Company 14:

> "It's the brand. I mean people know if they come to (us) they're getting quality."

Technology

This differentiator featured predominately in the scientific sectors (Medical and Chemical) where Scottish manufacturers have been using new technology to bring themselves to the forefront of their industry.

Company 12:

> "We have got other products in the pipeline from that technology. We are now developing another technology because this can only work for certain drugs and in certain applications."

Company 36:

> "…we are a new technology in a very conservative industry which is significantly bespoke to the chemistries."

Keeping ahead of the technology available for business process improvement was reported as an issue for some companies, with foreign competitors driving this.

Company 37:

> "A lot of our European competitors are totally driven by robots now, we're running way behind on that"

Low price

Price is discussed by 11% (5) of companies as a differentiator. However, only one company mentioned it as the principal consideration of the organisation. The remaining companies use price in conjunction with other differentiators in competitive strategy.
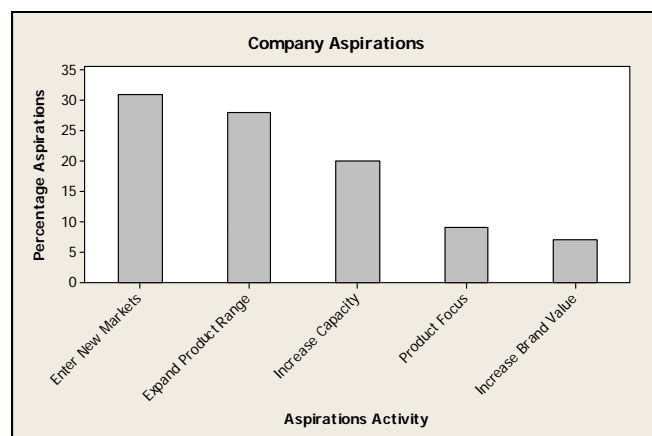
Company 37:

> "Price will always be pretty important."

Company 43:

> "…people come to us because they trust us and they come back. Trust us on delivery and on price."

5.2.7 Future Aspirations

Figure 5.2.D - Company Aspirations

The companies were asked to explain how they plan to develop over the next few years. Future strategies include 31% of (14) companies seeking to enter new markets both within and outside Scotland, 29% (13) of companies looking to expand their product

range, 20% (9) of companies planning on increasing their capacity, 9% (4) seeking to focus on current products and 7% (3) hoping to build on the value of their brand.

Company 19:

"So international, export …..is the really important development over the next 24 – 36 months."
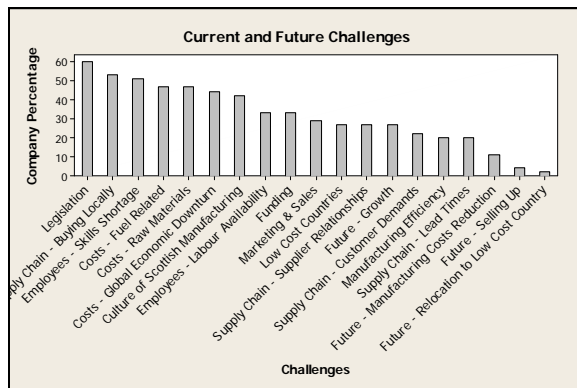
Company 3:

"We have actually got a range of new products we're just about to launch in August. Part of our design team over the next 12 months to be honest with you is to focus on engineering of these products just now."

Company 44:

"I would say the next, realistically in the next five years I'm quite comfortable trying to build the business and trying to build the brand."

5.2.8 Challenges

Figure 5.2.E - Current and Future Challenges

Employees

Labour availability was found to be a major challenge for 33% (15) of the companies interviewed. They have difficulty finding people to support current business and for expansion. Aberdeen is a good example where manufacturers cannot compete with the oil industry in terms of wages and therefore find it difficult to attract even modestly qualified and skilled workers. Three of the companies cited insufficient labour as a reason for not expanding the business in Scotland.

Company 1:

> "…if someone could magic up 50 or 60 staff we'll build up for Dubai."

Company 28:

> "Years ago we were competing (for staff) with Weir Pumps…we're not now, we're competing with Asda or Somerfield."

In addition to an overall shortage of labour there were specific skills deficits in certain areas. For example interviewees talked about particular difficulty in recruit people such as draftsman and engineers. Despite an increase in the availability of graduates, some of the employers felt that there was a gap between the skills they require and those that were available. Further, practical and trade skills were found to be in short supply. Company 41 felt that the shortage of skills was actually restricting their business.

Company 31:

> "Practical skills are definitely an issue that we've noticed over the years, the amount of practical experience people come with, at degree level has decreased."

Culture of Scottish manufacturing

Companies indicated that manufacturing is perceived to be unglamorous and in decline and many young people wish to avoid manufacturing related employment. It was the view of the companies interviewed that the service sector was perceived as a more attractive option. Part of the reason for this negative imagery has been attributed to the education system, where careers in manufacturing are not promoted.

Company 34:

> "…if you don't stick in at school you'll end up working in the chicken factory. As if to say it's some sort of punishment."

Company 27:

"Because kids at school think manufacturing is a dirty factory, it's steaming, and boiler suits and cogs and it's just nothing like that. But that's what they're told at school, that's what the teachers tell them."

24% (11) of companies proposed that growth was artificially restricted due to the inherently cautious nature of Scottish companies and were happy to settle with their current levels of production and development.

Company 2:

"probably it's just the whole natural Scottishness in us in terms our ability to sell ourselves, or market ourselves, I think we're just … because "we don't want to bother you … that type of Scottishness that just stops us from expanding I think."

Funding

Obtaining government funding is seen as a challenge by many companies. They either find that there is no funding available which meets their requirements (9% 4), they do not know where to seek it (7%, 3 sources) or are put off by the bureaucracy associated with obtaining it (18%, 8 sources). In addition, the issues associated with accessing funding were linked with willingness to engage with the wider support services.

Company 40:

"So to help our business grow we need to spend money, and again there's not much in the way of support there."

Company 28:

"But to try and build our business we don't seem to get much help and in that I mean we're probably at fault as well whereas we don't go actively looking for help but when I tried it on a couple of occasions it seems to me like there's a brick wall there, how do you get through that to the right person?"

Company 1:

"The faffing around you have to do to get grants for that type of thing. We just .. we'd have the vehicle out and produced before they would get us a grant."

Manufacturing efficiency

Manufacturing efficiency is still a key challenge for 25% (11) of companies interviewed. 20% (9) of companies are still concerned about inefficient work practices and see it as a barrier which they must overcome in the future.

Company 31:

"our challenge is to be as efficient and as effective as we can in the manufacturing and in all aspects so that we are competitive."

Company 14:"

"we've had to look at all the wastes involved, and we still are looking at all the wastes."

Marketing & sales

22% (10) of companies interviewed reported marketing as a challenge. Most companies lacked staff with the appropriate skills. Other issues associated with this were the costs of marketing (7%, 3) or access to data allowing them to conduct market research (2%,

1). Branding was highlighted as a specific marketing issue in relation to building a brand and raising product awareness.

Company 24:

> "The budget for marketing ….. last year was zero. We didn't spend any money on it at all, even the website which was thrown together."

Company 31:

> "Where there is a big gap is sales and marketing. That's tough to find somebody."

Legislation

38% (17) of companies discussed the challenges associated with legislation, these challenges include the perceived restrictive nature of legislation, issues in keeping up to date with current legislation and difficulties in remaining compliant with legislation.

Company 6:

> "To be running a business in the Scottish environment is just constricted beyond belief when you see what's happened in a country like the Republic of Ireland which is really no different to us."

Company 38:

> "But it is something that we must be aware of because every time we get a tender for business you've got to complete the section on environmental health and safety so it does have an impact."

Costs

47% (21) of companies stated that they were adversely impacted by rises in the cost of fuel and raw materials specific mention was made of fuel surcharges levied by suppliers. The current global economic downturn has introduced further challenges such as inflationary costs (4%, 2), exchange rate pressures (15%, 7), and falling demand in some industry sectors (13%, 6).

Company 4:

> "Fuel and energy surcharge which varies from between 5 and 55% on the price of the material."

Company 22:

> "We've seen, in the last 18 months 73% I think, rise in material costs which we largely haven't passed on to our clients."

Company 31:

> "The biggest barriers … I think probably it's going to be dealing with competition, increasing competition from China, particularly India too, but China in particular."

Supply chain

The main issues identified in relation to supply chain were sourcing appropriate suppliers, lead-times and availability, and in certain cases capacity problems in the supply chain resulting in dominance by larger companies and therefore neglect of smaller companies. In some instances companies could not find supply in the local market and as a result had to buy from the international market.

Company 27:

"We obviously try to buy as local or nationally as possible. But certainly that's changed over these last few years. I think there's even a greater shift with raw material supplies coming from the likes of China, Korea, etc."

As companies work to increase efficiency more reliable and responsive supply chains are required, and in some cases these were not available..

Company 10:

"So we now have a six week lead time on parts on engines and if anybody falls behind on that, that's horrendous."

From a demand side, customers are placing increasingly challenging requirements which can result in higher costs in terms of packaging (4%, 2), logistics (7%, 3) and lead-time (7%, 3). This often leads to greater costs which the customers are not willing to accept.

Company 17:

"But my problem is (in the past) we had one box that suited all supermarkets and every customer, (now) for that one product you now maybe have got six or seven boxes, so you've got a huge amount of packaging just to cater for the market. So why can't that just be one box."

Company 30:

"…they're going to come back and ask us for more deliveries; more frequently; smaller orders…"

5.2.9 Future challenges

The previous sections describing current challenges also reflect the challenges that companies have highlighted in relation to their future aspirations. In addition to these the following challenges were perceived to exist in the future.

In relation to Research and Development it was clear that current efficiencies were perceived to be priority before attention was given to the design of future products, this is a limiting factor in the generation of future business.

In some cases space for expansion was limited while in others the investment required to enable expansion was prohibitive.

Expanding further on the subject of Branding it was clear that some companies expected the importance of creating a strong brand to increase, as they seen it as a way to increase profit margins by concentrating on the manufacture of own-label, high-margin products rather than acting as a manufactury for the products of other companies.

5.2.10 Services used in the Support Environment

Figure 5.2.F - Support Services Used
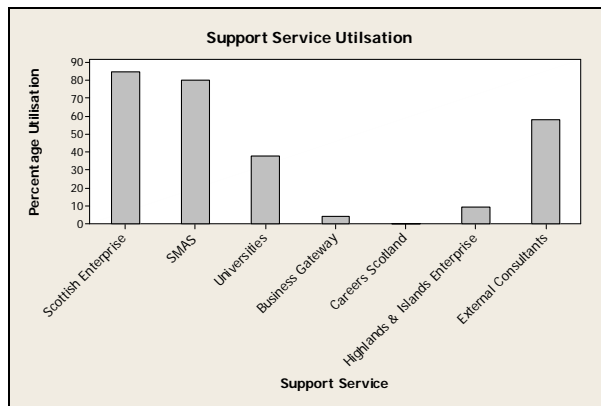
In terms of support services 62% (28) of the companies interviewed have previously used the services of Scottish Enterprise with 9% (4) using Highlands & Islands Enterprise, 80% (36) of companies had used SMAS, 38% (17) had worked with universities, 4% (2) had previously used Business Gateway and none indicated they had used Careers Scotland. 36% (15) of companies stated they had an SE account manager.

External consultants were employed by 58% (26) of the respondents for issues such as lean manufacturing, market research and human resources. There was mixed feedback about the use of consultants with 42% (19) of companies giving positives feedback and 22% (10) of giving some negative feedback, 7% (3) companies found the use of consultants to be both a positive and negative experience.

Company 9:

> "…lots of things have happened since 2004 when we started working with these consultants where our understanding of lean methodology principles philosophy had led us to unlock a lot of talent within the business and to get more out of the assets we had, grow the business…"

Company 6:

> "We have been using them [consultants] more and more in recent times. I'm not sure we're convinced that we're getting it right yet in terms of managing consultants. Our experience to date, there's been a lot of giving them our watch and them telling us the time."

5.2.11 Company networks

Of the 36% (16) of companies who are members of sector networks, 31% (14) found it beneficial, 2% (1) company felt their network had not helped them in any significant way and 2% (1) of companies was indifferent. Of the 5 companies who said they were not members of a company network, 3 felt they would not add any tangible benefits to the business, 1 was dissuaded by the costs associated with being a member and the other had not yet joined.

Irrespective of the existence of an industry network, most companies acknowledged the benefits of knowledge transfer. In particular many interviewees talked about learning from the experience of other organisations.

Company 27:

> "One of the great things about it was I was sitting down in training sessions with other managing directors and they would tell you a

story, and you would tell them a story, and "this is how we solved it" and that was even more valuable than the courses."

Company 44:

"…the whisky guys should be speaking to tourism, and tourism should be speaking to technology, and technology should be speaking to manufacturing. But what we're doing just now is we're stand alone units when we should be getting it all together."

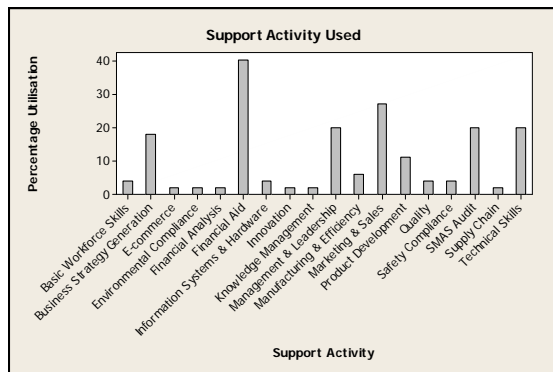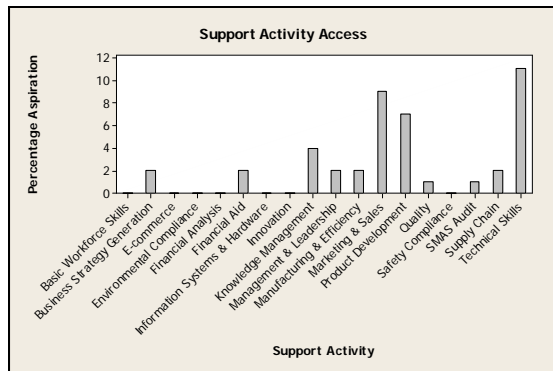## 5.2.12 Support Activities

Figure 5.2.G - Support Activities Used

Figure 5.2.H - Support Activity Required

There are numerous services on offer from the various support agencies; the above graphs quantify the services the companies indicated they use and the services they require.

5.3. Questionnaire

Strathclyde Institute of Operations Management

Manufacturing in Scotland

Industry Matters…..

The purpose of this questionnaire is to provide a profile of manufacturing in Scotland, outlining the changes that have occurred in Scottish manufacturing and indicating its future direction.

This questionnaire aims to obtain facts from manufacturing organisations regarding the changes in their manufacturing activities.

More specifically, this questionnaire seeks to address the following areas:
- How have manufacturing activities changed in Scotland?
- How successful is Scottish manufacturing?
- How has manufacturing in Scotland been affected by globalisation?
- What is the future for manufacturing in Scotland?
- What can government and academia do to provide an enabling environment for Scottish manufacturing?

After we have received your response……you will receive a summary of the key findings of this survey.

Sending your response
We appreciate your response. Please send completed surveys in the stamped addressed envelope provided.
Please contact Laura Davidson on l.j.Davidson@strath.ac.uk if you have any queries.

Your Name_____

Your Organisation_____

Organisation Address_____

_____

Your Email Address_____

Section 1. General Information

1. How many employees do you have within your organisation in Scotland?
    (a) 1 – 50   ☐
    (b) 51 – 100   ☐
    (c) 101 – 250   ☐
    (d) 251+   ☐

2. In long has your organisation been established?
    (a) Less than 5 yrs
    (b) 5 – 10 yrs   ☐
    (c) 10 – 20 yrs   ☐
    (d) 20 – 50yrs   ☐
    (e) over 50 yrs   ☐

3. In what region is your facility based?
    (a) Ayrshire   ☐
    (b) Borders   ☐
    (c) Dunbartonshire   ☐
    (d) Dumfries and Galloway   ☐
    (e) Edinburgh and Lothian   ☐
    (f) Fife   ☐
    (g) Forth Valley   ☐
    (h) Glasgow   ☐
    (i) Grampian   ☐
    (j) Lanarkshire   ☐
    (k) Renfrewshire   ☐
    (l) Tayside   ☐

4. Do you have a parent company? (If no, then move on to question 6)
    (a) Yes, we have a parent company   ☐
    (b) No, we do not have a parent company   ☐

5. Is the head office of the parent company located in Scotland?
    (a) Yes, the head office is located in Scotland   ☐
    (b) No, the head office is located elsewhere   ☐

6. What types of decisions are your top management team in Scotland empowered to make? (Please select all that apply)
    (a) Strategic decisions – future direction of the company   ☐
    (b) Operational decisions – activities/processes carried out in the company   ☐
    (c) Financial decisions – setting financial objectives etc.   ☐

7. What percentage of your sales (£) are from Scottish based customers?
    (a) 0- 25%   ☐
    (b) 25-50%   ☐
    (c) 50 – 75%   ☐
    (d) 75-100%   ☐

Section 2. Products

8. What is your facilities main product?
   (a) Food and beverage ☐
   (b) Lumber and wood ☐
   (c) Printing/ Publishing ☐
   (d) Stone, glass and concrete ☐
   (e) Machinery ☐
   (f) Electrical equipment, appliances or components ☐
   (g) Medical/lab supplies ☐
   (h) Plastic, rubber ☐
   (i) Apparel, leather ☐
   (j) Textiles ☐
   (k) Furniture ☐
   (l) Chemical, petrol ☐
   (m) Primary metals ☐
   (n) Computer and electronics ☐
   (o) Transportation equip ☐
   (p) Fabricated metal ☐
   (q) Pulp, paper ☐
   (r) Other (Please specify)_____

9. What sector(s) do you belong to? (Please check all that apply)
   (a) Aerospace ☐
   (b) Agriculture ☐
   (c) Bioscience ☐
   (d) Chemicals ☐
   (e) Construction ☐
   (f) Electronics ☐
   (g) Energy ☐
   (h) Engineering ☐
   (i) Food and drink ☐
   (j) Forestry ☐
   (k) Manufacturing ☐
   (l) Medical ☐
   (m) Oil and gas ☐
   (n) Paper ☐
   (o) Technology ☐
   (p) Textiles ☐
   (q) Other, (Please specify)_____
   _____

Section 3. Processes

10. What is your company's main operational activity? (please tick only one)
    (a) Design of products ☐
    (b) Manufacture of Products ☐
    (c) Servicing of Products ☐

11. What is your company's main operational activity in Scotland? (Please rank in the order of most importance, 1 = most important, using each number only once)
    (a) Design of products ☐
    (b) Manufacture of Products ☐
    (c) Servicing of Products ☐

12. Please indicate if the following activities in your company have increased, decreased, or stayed the same in Scotland over the last 5 years:

	I	NC	D
(a) Design	☐	☐	☐
(b) Manufacture	☐	☐	☐
(c) Service	☐	☐	☐

13. On what basis do you compete? (Please order from 1 – 7, with 1 being most important to the competitiveness of your company, using each number only once)
    (a) Low price ☐
    (b) High quality ☐
    (c) Innovation/new tech ☐
    (d) Responsiveness ☐
    (e) Flexibility ☐
    (f) Branding ☐
    (g) Customer service ☐

14. On what basis do you forsee your company competing on within the next five years? (Please order from 1 – 7, with 1 being most important to the competitiveness of your company, using each number only once)
    (a) Low price ☐
    (b) High quality ☐
    (c) Innovation/new tech ☐
    (d) Responsiveness ☐
    (e) Flexibility ☐
    (f) Branding ☐
    (g) Customer service ☐

Section 4. Changes in Your Organisation

15. Please indicate if the following have increased, decreased, or stayed the same in Scotland over the last 5 years

	I	NC	D
(a) No. employees	☐	☐	☐
(b) Turnover	☐	☐	☐

16. Please indicate how company expenditure has changed in Scotland in the last 5 yrs

	I	NC	D
(a) Labour	☐	☐	☐
(b) Materials	☐	☐	☐
(c) Infrastructure	☐	☐	☐

17. Has any work that was formerly performed in Scotland been moved outside of Scotland within the last 5 yrs? (If no, please proceed to question 20)
    (a) Yes, work has been moved outside of Scotland ☐
    (b) No work has been moved outside of Scotland ☐

18. The type of work that has been moved out of Scotland is:
    (a) Design of products ☐
    (b) Manufacture of products ☐
    (c) Servicing of products ☐

19. Why has work been transferred outside of Scotland?

_____
_____
_____
_____
_____
_____
_____

20. Has work been transferred to this facility from outside of Scotland in the last 5 years? (If no, please proceed to question 23)
    (a) Yes, work has been moved to Scotland from another location ☐
    (b) No work has been transferred to Scotland ☐

21. The type of work that has been moved inside Scotland is:
    (a) Design of products ☐
    (b) Manufacture of products ☐
    (c) Servicing of products ☐

22. Why has work been transferred to Scotland?

_____
_____
_____
_____
_____
_____

Section 5. Support Services

23. What public support services have you used in the last 5 years? (If none, please proceed to question 26)
    (a) Scottish Enterprise ☐
    (b) Scottish Manufacturing
       Advisory Service ☐
    (c) Business Gateway ☐
    (d) Careers Scotland ☐
    (e) Highlands and Islands
       Enterprise ☐
    (f) UK funded initiatives (eg ☐
       KTP, SPUR)
    (g) Other (Please
       specify)_____

24. For what business requirement did you seek support for? (Please indicate all applicable)
    (a) Manufacturing Efficiency ☐
    (b) Product development/
       Innovation ☐
    (c) Information systems and
       hardware ☐
    (d) Financial analysis ☐
    (e) Technical skills ☐
    (f) Supply chain ☐
    (g) Quality ☐
    (h) Marketing and sales ☐
    (i) Business strategy
       generation ☐
    (j) Basic workforce skills ☐
    (k) Management and
       leadership ☐
    (l) Safety compliance ☐
    (m)Environmental ☐
    (n) Other (please
    specify)_____

25. How would you rate the service you received? (Please move onto question 27)
    (a) Poor ☐
    (b) Good ☐
    (c) Very Good ☐
    (d) Excellent ☐

26. If you have not used support services on offer, why is this?
    (a) Do not require them ☐
    (b) Are unaware of where to
       seek support ☐
    (c) Do not think they can help
       with your business
       requirement ☐

27. Which of the following areas would you like to have access to support for?
    (a) Manufacturing Efficiency ☐
    (b) Product development/
       Innovation ☐
    (c) Information systems and
       hardware ☐
    (d) Financial analysis ☐
    (e) Technical skills ☐
    (f) Supply chain ☐
    (g) Quality ☐
    (h) Marketing and sales ☐
    (i) Business strategy
       generation ☐
    (j) Basic workforce skills ☐
    (k) Management and
       leadership ☐
    (l) Safety compliance ☐
    (m)Environmental ☐
    (n) Other (please
    specify)_____

Section 6. The Future of Your Organisation

28. What do you consider to be
the future aspirations of your
organisation in Scotland for
the next five years? (For
example, financial growth or
product diversification)

_____
_____
_____
_

_____
_____
_____
_____
_____
_____
_____
_____
_

Thank you. Please send your response in the stamped addressed envelope
provided.

Please contact Laura Davidson on l.j.Davidson@strath.ac.uk if you have
any queries

5.4. Questionnaire Accompanying Letter

Dear **Managing Director**

Re: The Future of Manufacturing in Scotland

Strathclyde Institute of Operations Management are conducting research into the future of manufacturing in Scotland. The aim of this research is to understand the current environment for manufacturing organisations, establishing a profile of the changes that have occurred within the Scottish manufacturing sector.

Within this envelope, we have enclosed a short survey for you to complete. The questions surround the changes that your organisation has experienced internally in response to the increasing pressures of todays business environment.

We value your response, providing us with an industry perspective of these important issues. These findings will help to inform policy.

Yours Sincerely,

Jill MacBryde
Director of Research
Strathclyde Institute of Operations Management

5.5. Interview Protocol

Overview

The objective of this research is to identify the mechanisms behind encouraging small to medium manufacturing businesses to invest in their organisation, with the ultimate benefit of growing the Scottish economy. Such mechanisms will be understood via in depth research with a range of organisations, investigating the changes they have experienced in the face of globalisation, the challenges they are currently facing and the future aspirations they for see for their business. This will allows us to make industry informed recommendations to the Scottish Manufacturing Advisory Service regarding the nature of the support services they should be offering to such companies.

The data will be collected through a series of interviews with Scottish based manufacturing SMEs. The objective of this interview protocol is to provide guidelines to ensure that the data can be collected, presented and analysed in a repeatable and reliable manner by a number of different researchers by minimising interview bias as well as ensuring that the data is appropriately triangulated.

Phase 1: set up
Phase 2: formulate interview strategy
Phase 3: conduct interviews
Phase 4: Interview analysis

Phase 1
Set Up

Phase 2
Formulate Interview Strategy

Phase 3
Conduct Interviews

Phase 4
Interview Analysis

Cognitive Map   Standard Write Up

Interview Report
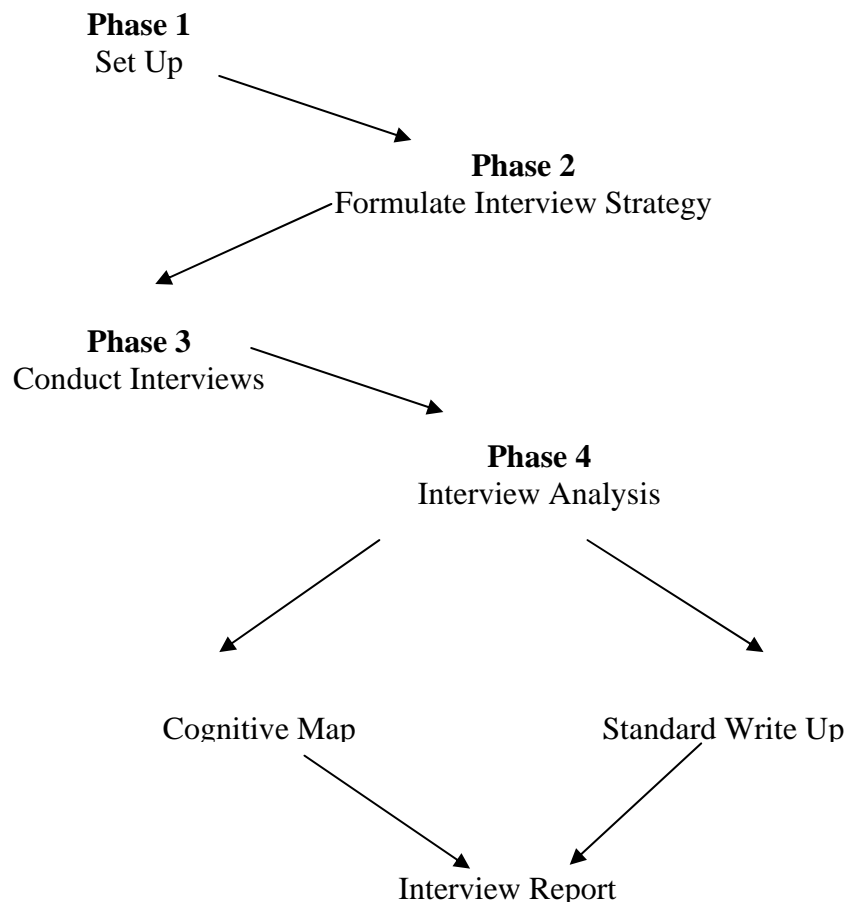
Unit of Analysis

The unit of analysis in this research is the changing business environment. This includes changes in products, activities, challenges, competencies and requirements of the enabling environment.

The research is interested in:
- Small to medium size enterprises with 20 – 250 employees.
- Manufacturing businesses – including all aspects of manufacturing, from research to service manufacturers, as well as all industry sectors.
- With a location in Scotland, for example Company 4 have locations in America and South America and Ayrshire. In this case it is the office in Scotland that is within the research focus in this project, as this is the location that contributes to the Scottish economy.

Phase 1 – Set Up

Prior to conducting interviews with the selected organisations, try to collate appropriate information about the organisation that you are going to interview. This will aid the development of the interview strategy for each organisation. Further, all administrative and housekeeping activities should be completed to allow a smooth procedure.

Desk Research

In some cases the researcher may be aware of the company and have some knowledge of it. Where this is not the case, a general overview of the company should be obtained prior to the interview, such as the following
- What the company does – products etc
- Various basic facts – location, indication of size, indication of governance

There are various sources of data that will provide this information for you. These include:
- Company website – a lot of information on the company is available here. However, the quality of websites can be variable. Usual information on such websites includes products, locations, ownership etc.
- Press – articles may appear on the company that you are researching, these include positive and negative reports, which will inform you on the recent activities of the organisation.
- Industry based market research reports – there are a limited number of these available through the business school. It is likely however that companies will charge for these.

Meeting with the Company Sponsor

Usually there will be a key contact in the organisation that you will contact at the organisation. These contacts are warm contacts, as they have developed a relationship with the Scottish Manufacturing Advisory Service. In the database created of the

companies that SMAS have worked with, there are contact details of the main contacts. This is the contact that you should use for the organisation, to increase the response rate. You should contact them firstly by standard email (see appendix A) and make arrangements to conduct the interview, deciding upon a date, time and location.

You may find that the contact requires further information on the project in the following areas, this will be particularly true for this study as the contact is likely to be someone in a high position within the company (such as MD or OD). (see appendix B for additional project information).

- Timescale
- Facilities
- Confidentiality –it must be ensured that confidentiality is maintained within all aspects of the research. This covers all information regarding the organisation and the individual that is being interviewed. If the organisation or interviewee requires formal confidentiality then this can be provided, with the signatures of the researchers in the study.
- Documentation – given the nature of the intended interviews, it is likely that there will be no documentation accessed from the organisation, as all data will be obtained from the interview questions. However, given that you are interested in the strategy of the organisation, you should ask if there is any formal documentation outlining this. If such documentation is obtained, then it should be filed in a secure manner to maintain confidentiality.

Site Visit

The interviews will take place at the location of the organisation. Whilst the interview questions are designed to give you an informed overview of the processes used in the organisation, a tour of the site would be beneficial. If this is possible then this should be communicated between you and the main contact prior to the interview, for time considerations.

Arranging Interviews

It is important that you arrange to interview someone in a high position within the organisation, such as the Managing Director or the Operations Director. These are the types of positions that will have the most informed knowledge of the changes in the business and the future strategic direction of the organisation.

Since there are time constraints on the number of interviews you are able to conduct, in view of location and time availability of researchers, the following points should be considered when scheduling interviews:
- Location – from a logistics point of view, try and arrange companies in the same region for the same day.
- Timing – allow one hour for each interview, to ensure that all areas of the study are covered.
- Leave at least one hour between interviews, to allow time to gather thoughts from the previous interview and prepare thoughts for the next.
- Contact interviewees in advance to confirm the appointment details to ensure that there are no cancellations.

Phase 2: Interview Strategy

An important aspect of interviewing involves formulating the strategy. You should decide whether you are going to follow the same research protocol for each interview or tailor the questions depending on the organisation you are visiting.

However, given the nature of this project, the type of organisation that you are going to visit will have similar characteristics. Therefore, to ensure the reliability of the data and to allow comparison, the interview process should be standardised as much as possible.

The objectives of the interviews are to have generic conversations with the interviewees to understand the following:
- The changing activities of the business
- The changing product/ services offered by the business
- The current challenges that the business is facing
- The future strategy of the business (what changes they forsee)
- The enabling environment they require to make these changes successful

Guidelines on the following page outline the sorts of conversations that might need to be held under the above headings. **These are not a list of questions to be followed. The natural conversation should allow the answers to these questions to emerge naturally.**

Introduction to project by researchers:
- Briefly explain project
- Explain the process
- Ask permission to record the interview
- Tell them who we are
- Confidentiality agreement

Interviewee Orientation:
- What do you do for the organisation?
- In your opinion, for your organisation, how would you define
  - Value
  - Value chain

Organisational Orientation:
- Do you have a parent company?
- Where is this parent company based?
- How much independence do you have from them (strategically, financially and operationally)?
- Do you make investment decisions for your organisation?

Changing nature of the business:
- Have your activities at your site changed within the past 5 years? How?
- Have your products/ services changed within the past 5 years? How?
- Has your company grown in the last 5 yrs (no employees, turnover etc)
- Have you moved any work outside of the UK? Why?
- Have you moved any work inside of the UK? Why?

- How has company expenditure changed in the past 5 years? Why?

The Current Environment:
- How successful are you in the current market place? (market share, competitors etc)
- On what basis do you compete?
- What do you believe is important to your customer?
- What challenges are you currently facing?
- What do you believe are the cause of these challenges (globalisation, boom of services etc)

Future of the organisation:
- How do you forsee the market place changing?
- How will your company adapt in the future to these changes?
- Overall, what is the main focus of your organisation within the next 5 years?

Enabling Environment:
- In view of your future direction, how can the government aid you in this transition?
- How can academia help you to develop your organisation?
- Have you used any support services? To aid?
- How helpful were these services?

Closing
- Thank you for your time
- Would you like to know anymore about the project?
- Please take the time to fill in this questionnaire.

Phase 3: Conducting Interviews

The interviews should be carried out as detailed in the previous section. The researchers should ensure that:
- All interviews are recorded using electronic recording equipment – MP3 etc
- Choose to take notes in the appropriate manner – mind mapping, standard English etc.
- Maintain a research diary.
- Submit all electronic recording files to the researcher with notes, to ensure reliability and repeatability.
- When leaving the interviews and returning to the office, the company must be categorised by the interviewer into I) Liveseys Model II) U shaped value model

Phase 4: Analysing Data

Data from the recorded files will then be transcribed into software N vivo. The results of the interviews will be captured in an interview report. Summary data from the interview reports will be documented in a support services report that will be submitted to the Scottish Manufacturing Advisory Service.

Interview Report

Following analysis, each interview will have a document that summarises the main findings under the following headings:

- Introduction – company, sector, location, no employees, ownership, governance
- The changing business – details of changes to activities, processes and products/ services offered, the current business environment (capabilities and competencies)
- Current challenges facing the business – details of problems that they are experiencing with the above changes, other challenges in relation to both the internal and external environment
- The future strategic direction – details of the future direction of the organisation, what support services the company will require to aid its future development.
- Conclusion – researcher/ interviewer conclusions relating the changes of the organisation to providing an enabling environment.

The highlights and key findings from the each interview report will then be the basis of the recommendations made in the support services report.

(Support Services Report
- Introduction – intro to project and research conducted.
- Main Body – key findings from survey and interviews conducted, recommendations made for support services.
- Conclusion – recommendations made.)

Summary of Deliverables:
The following will be submitted as part of the high value manufacturing project:
- Interview recordings
- Interview notes
- Interview reports

Appendix A

Good Afternoon **Contact Name**,

Strathclyde Institute of Operations Management are conducting research on behalf of the Scottish Manufacturing Advisory Service into the future of the manufacturing sector in Scotland. This research will inform government on the support services they can offer to aid the development of manufacturing organisations such as **Organisation** in Scotland.

For this research, it is imperative that we speak to industry members and gain their valuable insights into the future of their organisations within Scotland. As a result, we are hoping to conduct a series of interviews with industry members.

It is our wish to interview you as a knowledgeable member of your organisation. We would request only one hour of your time. Is this something that you feel you could oblige? We understand that you are very busy and would appreciate any input you contribute.

I look forward to your response.

Kind Regards,
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 Laura Davidson

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Appendix B

This research project is funded by the Scottish Manufacturing Advisory Service. The research team includes academics from various disciplines including manufacturing engineering, management and management science disciplines, each with many years of experience in the area of operations management.

The project, in short is looking at the mechanisms behind encouraging investment from Scottish based SMEs into their organisations, to ultimately grow the Scottish economy. To comprehend these complex mechanisms, the research will investigate the following:

- Changes to manufacturing organisations in Scotland (past, present and future)
    o Activities
    o Products/ services
    o Competitive base
    o Strategy
    o Challenges

- The support mechanisms that support bodies can offer to aid the future transition of manufacturing

The findings of this research will go onto recommend future services to the Scottish Manufacturing Advisory Service, filtering through to the Scottish Government.

By talking to industry members, we will view manufacturing at the frontline, providing an informed industry view of organisational requirements from government.

This objective is being pursued in a number of ways in addition to the outlined interview process:
- Large scale survey aimed at manufacturing SMEs
- Academic literature analysis to bridge the gap between value definitions in academia and industry.

These activities will result in an in depth analysis of manufacturing within Scotland.