

**DRAFT**

# **Sector Needs Analysis**

## **of the building services engineering sector in Northern Ireland**

**September 2006**

**Dr. M Hammond**



# 1 Executive Summary

## 1.1 Globalisation

Globalisation as a phenomenon is subject to a number of academic definitions determined in general by the academic discipline through which it is being studied. In relation to Government policy then the definition of globalisation is that of free markets and open competition. A corollary of this therefore is that building services engineering sector companies may in due course through open tendering systems experience competition for work in home markets.

The building services engineering sector companies within the Northern Ireland do perceive that the market within the province will be adversely affected by foreign competition to a great extent, with competition from Europe (including A8 countries) and the Republic of Ireland predominantly, Asia and China being identified by a number of companies as potential threats through globalisation. Within Northern Ireland there is a perception that competition is also coming from the English regions which is seen by the sector in the province as globalisation. This perception, if correct, means that the sector is well positioned to respond to the threats that globalisation presents, more so than other countries and English regions within the UK.

## 1.2 Technological / Environmental Change

Technological change is perceived to be a major issue by building services engineering companies within Northern Ireland, particularly in relation to environmental technologies. Many building services engineering companies claim to be competent to fit environmental technologies, although these invariably appear to be technologies such as condensing boilers and combined heat and power units which are currently specified by building regulations.

There is less evidence of perceived competence in solar panelling and photovoltaic panel installation, and this is in keeping with other areas of the UK, although there would appear to be more of a perception that this technology may affect the market and therefore more of an indication that the sector in the province is more ready to respond than elsewhere.

Although not known to the sector at the time of the primary data collection, the amendments to the Building Regulations within the province are likely to impact significantly on the country's employers. In addition, since the primary data collection more companies in the sector will have undertaken renewables technology training circa 200 solar, biomass and ground source heat recovery through the creation of five installer academies in the province that offer fully funded bespoke training for renewable energies.

The sector generally however still appears to be reactive to the new technologies rather than proactive in training for new environmental technologies. It is therefore recommended that more certified training opportunities are developed to meet perceived expansion demands ahead of Kyoto implementation in the country, and SummitSkills believes that there will be a need to extend the current five academies to cope with perceived demand, unless a more planned model can be developed for the training required for the sector within the province.

### **1.3 Government Regulation**

Government regulation is perceived to be important in relation to licensing schemes, with skill cards being perceived by the building services engineering sector as having an impact on the sector generally. Government regulation generally is not perceived by the sector in a favourable light, with a number of companies in Northern Ireland pointing to increased red tape and bureaucracy effects on business.

### **1.4 Government Involvement in Training**

Northern Ireland building services engineering contractors are generally unhappy with the current Government-driven policies in relation to the training of apprentices. They perceive the training generally to be un-coordinated and subject to constant change. There is concern about the Government's policies on funding and the lack of support that some companies in the province feel they have had in training new entrants, with the lack of funding for training being a major concern. SummitSkills has made a more detailed response on some of the issues contained within this SNA in the response to the Jobskills document.

### **1.5 Barriers to Business Start Up**

New business start up within the Northern Ireland building services engineering sector is perceived to be affected by a number of issues. There is a general perception in the province that there are insufficient numbers of skilled labour to meet the demands of new start up business. The bureaucracy and legislation from Government which increases costs and time is also seen as a major barrier to business start up, as is financing generally. Building a client base within the province is also seen as an issue.

### **1.6 Porter's Model**

For the purposes of this Sector Needs Analysis (SNA) the Department of Trade and Industry promoted Porter's model of competitive strategy. This was used as a theoretical construct through which to analyse the building services engineering sector across the UK generally, as well as Northern Ireland specifically. The model is more relevant to the manufacturing rather than the service (installation) sector where it is argued the building services engineering sector fits; however the theoretical framework enabled analysis of key business components within the sector.

### **1.7 Rivalry**

The building services engineering sector is made up of a diverse range of companies offering a range of services in a number of varied private and public sector markets, there is therefore [as in much of Porter's Work (1980)] no homogenous oligopoly through which the sector operates. The sector has been traditionally cost/price driven through a competitive tendering system from a set tender list of companies, and within Northern Ireland there is still a significant amount of evidence that suggests that rivalry between organisations within this context is a significant factor.

Within the public sector evidence of extended contracts and partnering arrangements, which encourage co-operation rather than competition and are beginning to become more prevalent in other regions, are not as evident in Northern

Ireland. Public procurement does use this model but the majority of companies act as a subcontractor to a main contractor within the province, and as such miss these opportunities. Rivalry may be so intense in some parts of the province that it may actually be damaging the companies within the sector who operate within it.

Further training on partnering and new business models of working needs to be integrated into new or existing curriculum to stimulate more interest in partnering within some areas of the sector within Northern Ireland, to address what is potentially becoming a problem.

## **1.8 Bargaining Power with Suppliers/Clients**

It might be argued that traditionally within the building services engineering sector the supply chain has been managed through 'bulk purchasing' and the 'playing off' of one material supplier against another. Some building services engineering companies identify prompt payment as a bargaining tool in receiving discounts from suppliers. Prompt payment of suppliers was also identified as an issue, but generally supply chain management/partnering with suppliers was mentioned within Northern Ireland by only a minority of building services engineering companies.

SummitSkills would argue that more efficiencies and effective supply management might be obtained through training of the sector on supply chain management techniques. In relation to bargaining power with clients then within Northern Ireland, the service provided, the company name and trust and confidence were cited by a number of companies, however price was seen as the main determinant.

## **1.9 Capital Investment**

Within Porter's model of competitive strategy, the concept of investment in plant and machinery as a way of gaining competitive advantage and business efficiency is stressed. The building services engineering sector within Northern Ireland is in this respect investing in plant and equipment significantly, with plant hire appearing to be in decline generally. This finding is in line with findings from other areas of the UK.

## **1.10 Research and Development**

Research and development within the manufacturing product dominated philosophy of Porter is a further way that companies can gain competitive advantage. This concept has less resonance within a services/installation industry such as the building services engineering sector, and as such only a minority of building services engineering companies within Northern Ireland claim to engage in any form of research, either as a company, or through research consultancies such as BSRIA. The performance of Northern Ireland under this heading is better than many places elsewhere within the UK.

The sector (and indeed the whole of the construction sector) is significantly under-researched with only a fraction of the GDP of the industry being invested in research. The Department of Trade and Industry points to professional institutions, research communities in universities or the private sector to bring research and development to the forefront, together to carry out effective research to improve business performance in the light of international benchmarked performance.

SummitSkills is committed to seeking to work as a broker between the various partners within the UK and Northern Ireland to enhance the marketability and relevance to the industry of research.

### **1.11 New Information Technology Implementation**

Porter identifies new technology as providing organisations with efficiencies in labour costs and improvement of productivity. Within Northern Ireland the building services engineering sector is responding extremely well to the information age, with examples of varying degrees of advanced automation and communication between office and site evidenced. Some older workers (see basic skills) within the sector may require further training to get skill levels in ICT up to the relevant standard to make full use of the technologies available.

### **1.12 Enterprise and the function of the Entrepreneur**

Within Northern Ireland, there is support for the concept of the entrepreneur within the building services engineering sector although this is not nearly so strong as in some English regions of the UK, however there is a belief generally, that those companies who do believe in the entrepreneurial concept don't have the necessary skills existing within their organisations. Those building services engineering companies who believe that entrepreneurship is a significant issue within the sector and feel they do not have the necessary skills, may benefit from further development training either through specialist be-spoke courses, or through integration into general vocational courses at all levels.

SummitSkills notes that as the predominance of new business and entrepreneurial activity starts with small businesses started by craft operatives then this training should be extended to all levels within the curriculum for the sector, and not seen as a management or technician function.

### **1.13 Competitive Advantage**

Porter defines competitive advantage as being the key or crucial factor that differentiates one building services engineering sector company from others. Within Northern Ireland, a number of factors were given different weightings by the sectors companies, and these include: service to customer care, reputation and quality of work and training of staff in the work place. There was also evidence of more business focussed thinking about competitive advantage and responding to competition through business analysis than elsewhere in the UK.

Notwithstanding evidence of some scientific business thought, SummitSkills believes that it may still be advisable to strengthen this concept within the curriculum to enable building services engineering companies in the province to develop an even sharper business focus in the future, particularly as the formal benchmarking is not present.

## 1.14 Benchmarking

Literature on benchmarking for the construction industry generally indicates an industry that carries out benchmarking by companies against each other in a very informal way. CIRIA research indicates that this scenario could be improved and more formal benchmarking take place, and the industry generally (including the building services engineering sector) is tending to retain informal benchmarking techniques. There is evidence to suggest that the business services engineering sector is now able to access more formalised benchmarking systems and benchmarking clubs, but the majority of companies within the business services engineering sector still choose not to do so.

Northern Ireland indicates a lower proportion in comparison with other areas of the UK for formalised benchmarking practice, which is very low in any event. SummitSkills believes that formalised benchmarking practices should be integrated into training for managers and supervisors, and senior managers within the building services engineering sector should be encouraged to attend be-spoke courses facilitating the implementation of effective formalised benchmarking practices within companies within the sector. The lack of formalised benchmarking within the sector may be adversely affecting the business analysis identified in competitive advantage, as how can a company adequately determine what its competitive advantage is, if it does not accurately know what its competitors are doing but relies on gossip picked up informally?

## 1.15 Building Services Engineering Sector International Benchmarking Performance.

The construction industry (which includes the building services engineering sector) within the United Kingdom is the ***second worst performing in Europe***, with only Southern Ireland performing more poorly in relation to productivity and efficiency. Potential suggestions for improvement of efficiency and productivity within the sector are made in the general recommendation at the end of this executive summary.

## 1.16 Basic / Essential Skills

Basic/ Essential skill levels in certain parts of the province are of concern (and these are highlighted in this SNA) and invariably these impact on the basic skill levels of new entrants coming into the building services engineering sector. There is concern among some Northern Ireland companies at the literacy and numeracy levels of new entrants to the sector in the province. There is also concern of older workers developing Basic Skills issues as new technology complexity increases. SummitSkills has seen this problem highlighted in a number of other areas of the UK and proposes to work with partners and stakeholders to develop be-spoke information technology courses to maintain skill levels so that the province's building services engineering companies can continue to enjoy productivity advantages through investment in Information Technology.

## 1.17 Skills Requirements

Research suggests a number of skill requirements identified by employers generally within the UK economy, and predominantly these are the soft skills of team working, communication and so on. Within the building services engineering sector in Northern Ireland, skills that employers have identified are multi-skills and IT skills. Many of these skills should be reasonably easily accessible through various existing training courses.

Within Northern Ireland, there is a desire that for craft operative training, the minimum standard required is NVQ 3, which is deemed by SummitSkills and the main trade associations as being the industrial standard. There is also a desire within the sector for technician training at National and Higher National Certificate level for a significant number of trainees.

Northern Ireland also shows an inadequate amount of training of management and supervisory staff in line with other regions within the UK. SummitSkills has some concern about how much of this management training is carried out through the Higher National Certificate building studies/services courses, and whether this is sufficiently practical to meet the needs of staff, and further research may be needed, although no evidence for this was derived from Northern Ireland. For staff unable to undertake a two-year day release course, there is also a need to investigate adequate alternative NVQ 3/4 courses and the access arrangements for them. SummitSkills believes that the level of supervisory and management training may be impacting directly on the productivity of the sector in the province, and this may have a detrimental effect on the sector and the regional economy, particularly if there is an economic downturn.

## 1.18 Future Skills Needs

Through a PESTEL analysis, a number of future skills needs have been identified in the literature related to the building services engineering sector. The primary data from Northern Ireland (not perhaps surprisingly) does not show the level of in-depth analysis of the market as is contained within the PESTEL analysis, however many of the future skills identified by Northern Ireland employers are for legislation and technology that are already present, though there is some evidence of perception of potential future market drivers, particularly around new environmental technologies.

Generally however the emphasis of the sector may perhaps be described as reactive rather than pro-active as invariably the province employers see their future skill needs through the context of existing skill sets, but perhaps requiring larger numbers of them i.e. requiring more electricians or plumbers, and this is generally in line with other regions of the UK, although a comparative analysis might suggest that the province is performing better than most other areas of the UK.

## 1.19 Retirement and Natural Wastage

The Turner proposals recently have received high media publicity, these put forward a number of proposals for meeting the pension needs of an increasingly aging population. One of the core planks of the retirement proposals include raising the retirement age. The labour market intelligence evidence provided by BSRRIA suggests that a significant number of craft employees may be leaving the sector in their fifties

because of the physical rigour of the job. Northern Ireland performs more poorly than most other regions within the UK in the concept of retirement planning, with very small amounts of retirement planning being identified. The BSRIA data may suggest that the problem could be exacerbated by 'early retirement' from the sector in the manner suggested above. The sector's trade associations do offer training for companies in retirement planning for senior executives and SummitSkills recommends that the principles of this training are rolled out to the sector more proactively.

## 1.20 Diversity

The literature research carried out on the construction industry (including the building services engineering sector) identifies an industry that remains predominantly white and male dominated. Literature suggests that women are dissuaded from pursuing careers in construction due to the 'laddish' culture of the industry and the negative attitudes of some employers. The Northern Ireland building services engineering sector mirrors the rest of the construction in the UK as the majority of firms employ no women in technical roles, and those that do only employ small percentages of women, and in fact the province performs more poorly in this perspective than the rest of the UK generally.

A major entrepreneurial opportunity identified in the literature and contextualised in the primary data within the Sector Needs Analysis is the role of women craft operatives working for housing associations and with women clients from vulnerable or ethnic groups who would be uncomfortable with working with a male operative.

People from ethnic minority groups appear to have similar issues to those of women, although major research on ethnic minority craft employees and community attitudes to the construction industry appears to be outstanding. SummitSkills believes that further consideration needs to be made to developing training in diversity issues and behaviours to make the existing and future workforce more cognisant with the needs of women and ethnic minority groups.

## 1.21 Migrant Workers

There is a perception that the building services engineering sector is inundated with 'Polish Plumbers'. The reality from the literature would suggest that this is not the case from the workers registration scheme, although this may not truly cover the whole scenario, as it excludes illegal labour. Literature suggests that where migrant workers are employed there are issues related to English language communication, qualification recognition, and migrant workers being paid below agreed rates.

Northern Ireland does not appear to have a larger body of migrant workers within it at this time than other areas of the UK. Therefore SummitSkills recommends that plans are made to develop ESOL courses and health and safety training, to meet current and potential future needs should this arise.

## 1.22 Scenario Planning

This Sector Needs Analysis contains two independent analyses of the requirements for trainees within the region produced by BSRIA and Experian. The Experian model is more optimistic than that of BSRIA, however the expectation of the building services engineering sector within the province, is that their market for services will

continue to grow, and therefore SummitSkills would argue that this phenomenon may fuel the need for further apprentices. It is therefore our considered view that the more optimistic rather than pessimistic analysis of trainees be applied within the short term, with continuing research and analysis taking place to identify market trends.

### **1.23 Overall Recommendation**

This Sector Needs Analysis would, it is argued, suggest that the building services engineering sector has a significant number of potential training needs emanating out of its current position and strategy. There might be a perception that the sector is reacting reactively to new technology rather than proactively, waiting for legislation or policy to filter through, rather than proactively preparing their businesses to meet potential demand, and this it is suggested is possibly the case in relation to renewables technology such as solar and photovoltaic panels for example.

There is also, it is argued, a need for more business orientated training, perhaps incorporated into curriculum below graduate level, as the industry appears to operate on a more anecdotal than evidence based footing than is desirable in the province specifically and the UK generally.

Courses in formal benchmarking, planning for staff retirement, supply chain management, competitive advantage positioning, future skills analysis and business positioning, entrepreneurial leadership techniques would all it is suggested allow the development of a more 'business focussed' discourse within the sector, and begin to tackle the worryingly poor productivity performance of the sector. SummitSkills believes that it has a major role to play in producing a climate of development of skills to improve productivity within the sector.

## 2 Introduction to the Sector Skills Agreement

Sector Skills Agreements are a new concept, which are designed to radically alter the way that skills within the economy are demanded, delivered and developed within the UK. A Sector Skills Agreement seeks to map the exact skills that employers need their workforce to have, how these skills will be supplied through the relevant providers, and where there are gaps in the supply of provision to meet a developing demand. An agreement is then designed to seek to address these needs, and enable providers to respond to industrial needs.

Although Sector Skills Councils (SSCs) are responsible for developing the Sector Skills Agreements, they do not have sole ownership of them. They must be signed up to, by everyone who supplies, funds and plans education and training within the United Kingdom. The agreements will also enable Government, employers, employee representatives as well as the organisations who plan, fund and support education and training to address the provision of skills for the building services engineering sector, around a set of common objectives (SSDA, 2005, p1).

The Sector Skills Agreement is a five stage process, with reports being produced for stage one, two, three and five. The stages are as follows:

Stage 1: A sophisticated assessment of the building services engineering sector's needs, which covers the long-term, the medium term, and the short-term future of the sector. This will be achieved by mapping the drivers of change in the sector five to ten years down the track and determining skill needs.

Stage 2: A review of the range, nature and employer relevance of current training provision across all levels of education and training, from Higher Education to NVQ level 2 craft operative courses.

Stage 3: An analysis of the main gaps and weaknesses in the building services engineering sector workforce development, which is demand and provision driven. Priorities are addressed by the sector to arrive at sector employer driven solutions.

Stage Four: A review of the scope for collaborative action between providers, funders and employers and other partners. This will also engage employers within the sector with a view to them investing in skill development which will support improved business performance. It is also an assessment of what employers within the sector are likely to be prepared to sign up to.

Stage 5: The production of the final Sector Skills Agreement for the building services engineering sector is the last stage of the process, which will identify how SummitSkills employers and employer representatives will work with key partners to secure the necessary supply of training (SSDA, 2005, p4).

Sector Skills Agreements are designed with four distinct outcomes for employers in mind:

- A genuine opportunity to shape and endorse the learning provision provided, so that it delivers world-class learning that meets the needs of business.
- A more collaborative environment within the building services engineering sector.

- Individual trainees and operatives, technicians and professionals working within the sector, will benefit from learning that is shaped by employers, and meets their needs, while providing real job opportunities for employees.
- Employees will benefit from ongoing career development that is linked to the future direction of their industry, and opportunities that fulfil their potential (SSDA, 2005, p6).

In addition to producing a national Sector Skills Agreement for the UK, SummitSkills is also producing regional and devolved nation Sector Skills Agreements. This is in order to address both the regional/national needs and from them extrapolate the national workforce development needs for the sector.

### 3 Contents

<b>1</b>	<b>Executive Summary .....</b>	<b>1</b>
1.1	Globalisation.....	1
1.2	Technological / Environmental Change.....	1
1.3	Government Regulation.....	2
1.4	Government Involvement in Training.....	2
1.5	Barriers to Business Start Up .....	2
1.6	Porter's Model .....	2
1.7	Rivalry.....	2
1.8	Bargaining Power with Suppliers/Clients.....	3
1.9	Capital Investment.....	3
1.10	Research and Development.....	3
1.11	New Information Technology Implementation .....	4
1.12	Enterprise and the function of the Entrepreneur.....	4
1.13	Competitive Advantage .....	4
1.14	Benchmarking.....	5
1.15	Building Services Engineering Sector International Benchmarking Performance.....	5
1.16	Basic / Essential Skills.....	5
1.17	Skills Requirements.....	6
1.18	Future Skills Needs .....	6
1.19	Retirement and Natural Wastage .....	6
1.20	Diversity.....	7
1.21	Migrant Workers .....	7
1.22	Scenario Planning .....	7
1.23	Overall Recommendation.....	8
<b>2</b>	<b>Introduction to the Sector Skills Agreement .....</b>	<b>9</b>
<b>3</b>	<b>Contents.....</b>	<b>11</b>
<b>4</b>	<b>Regional Introduction .....</b>	<b>15</b>
4.1	Overview.....	15
<b>5</b>	<b>SummitSkills Introduction.....</b>	<b>19</b>
<b>6</b>	<b>Methodology .....</b>	<b>22</b>
6.1	Introduction.....	22
6.2	Research Philosophy.....	22
6.3	Method of Data Selection .....	23
6.4	Nations, Regions, Participants: Selection, Process and Data analysis..	24
6.5	Validity and Trustworthiness.....	26
6.6	Conclusions.....	28
<b>7</b>	<b>Key Drivers of Business Competitiveness .....</b>	<b>29</b>
<b>7.1</b>	<b>Globalisation.....</b>	<b>29</b>
7.1.1.	Globalisation and the view of Government.....	32
7.1.2	Northern Ireland Perspective.....	33
7.1.3	Northern Ireland Contractors' Perspective on Globalisation.....	34
<b>7.2</b>	<b>Technological Change (Non-Environmental).....</b>	<b>38</b>
7.2.1	Northern Ireland Contractors' Perspective .....	38
7.2.2	Conclusions.....	39
<b>7.3</b>	<b>Technological Change (Environmental) .....</b>	<b>40</b>
7.3.1	Introduction.....	40
7.3.2	Microgeneration Technologies .....	43
7.3.3	Greywater Systems .....	48

7.3.4	Northern Ireland Perspective.....	49
7.3.5	Northern Ireland Building Services Engineering Contractors' Perception of Technological Change (Environmental) .....	50
7.3.7	Conclusions .....	55
<b>8</b>	<b>Government Impacts on the Building Services Engineering Sector .....</b>	<b>56</b>
<b>8.1</b>	<b>Government Regulation .....</b>	<b>56</b>
8.1.1	Contractors view on the Northern Ireland building services engineering sector government regulation.....	57
8.1.2	Conclusions.....	60
<b>8.2</b>	<b>Government Impacts on Training Policy .....</b>	<b>61</b>
8.2.1	Leitch Review of Skills (Interim Report).....	61
8.2.2	Conclusion.....	67
8.2.3	Further Education Means Business: DEL.....	67
8.2.4	Skills Strategy for Northern Ireland.....	68
8.2.5	Economic Vision for Northern Ireland.....	70
8.2.6	Economic Development Forum: Working Together for a Stronger Economy.....	70
8.2.9	Northern Ireland Building Services Engineering Contractor views on the Government Impacts on Training Policy.....	71
8.2.10	Conclusions.....	73
<b>9</b>	<b>Business factors impacting on the building services engineering sector .....</b>	<b>74</b>
<b>9.1</b>	<b>Theoretical Underpinning.....</b>	<b>74</b>
<b>9.2</b>	<b>Barriers to Entry / New Business Start Up .....</b>	<b>75</b>
9.2.1	Introduction.....	75
9.2.2	Northern Ireland Building Services Perceptions of Barriers to Entry/ New Business Start Up.....	77
9.2.3	Conclusions.....	77
<b>9.3</b>	<b>Rivalry as a Factor in Business Behaviour .....</b>	<b>77</b>
9.3.1	Introduction.....	77
9.3.2	Northern Ireland Views on Rivalry as a factor in Business Behaviour....	80
9.3.3	Conclusions.....	82
<b>9.4</b>	<b>Bargaining Power within the Building Services Engineering Sector .....</b>	<b>83</b>
9.4.1	Introduction.....	83
9.4.2	Bargaining Power of Buyers.....	83
9.4.3	Bargaining Power of Suppliers .....	84
9.4.4	Northern Ireland Perception of Bargaining Power within the Building Services Engineering Sector .....	84
9.4.5	Conclusions.....	87
<b>10</b>	<b>Business Enterprise.....</b>	<b>88</b>
<b>10.1</b>	<b>Capital Investment .....</b>	<b>88</b>
10.1.1	Introduction.....	88
10.1.2	Northern Ireland Building Services Engineering Contractors' View on Capital Investment.....	89
10.1.3	Conclusions.....	90
<b>10.2</b>	<b>Research and Development.....</b>	<b>90</b>
10.2.1	Introduction.....	90
10.2.2	Rethinking Construction Innovation and Research .....	92
10.2.3	Northern Ireland Research and Development - the contractors' view ....	94
10.2.4	Conclusions.....	96

<b>10.3</b>	<b>New Information Technology Implementation</b>	<b>96</b>
10.3.1	Introduction	96
10.3.2	Northern Ireland New Information Technology - the Contractors' View	96
10.3.2	Conclusions	98
<b>10.4</b>	<b>Enterprise and the function of the Entrepreneur in the Building Services Sector</b>	<b>98</b>
10.4.1	Introduction	98
10.4.2	Education for Entrepreneurship	102
10.4.3	What is the Relevance of this Debate for the building services engineering sector?	105
10.4.4	Northern Ireland Building Services Engineering Companies' Perspective	106
10.4.5	Conclusions	109
<b>10.5</b>	<b>Competitive Advantage</b>	<b>109</b>
10.5.1	Introduction	109
10.5.2	Academic Underpinning	110
10.5.3	Competitive Advantage and the Response of the Northern Ireland Building Services Engineering Sector	111
10.5.3	Conclusions	116
<b>10.6</b>	<b>Benchmarking</b>	<b>116</b>
10.6.1	Introduction	116
10.6.2	International Benchmarking against the European Union	117
10.6.3	Conclusion	119
10.6.4	Issues	119
<b>10.7</b>	<b>Building services engineering sector Performance Benchmarking</b>	<b>119</b>
10.7.1	Academic Underpinning	119
10.7.2	Constructing Excellence Benchmarking in HR Issues	120
10.7.3	Benchmarking the Construction Industry	121
10.7.4	Northern Ireland Building Services Engineering Sector Perception of Benchmarking	127
10.7.5	Conclusions	129
<b>11</b>	<b>Skills for Business Requirements</b>	<b>130</b>
<b>11.1</b>	<b>Workforce Qualification Levels</b>	<b>130</b>
<b>11.2</b>	<b>Essential skills</b>	<b>132</b>
11.2.1	Introduction	132
11.2.2	Essential Skills Northern Ireland Literacy and Numeracy Standards	133
11.2.17	Northern Ireland Building Services Engineering Sector Perspective on Essential Skills	141
11.2.17.1	Existing Staff	142
11.2.17.2	New entrants	143
11.2.17.3	Conclusions	146
<b>11.3</b>	<b>Skill Levels Required</b>	<b>146</b>
11.3.1	Introduction	146
11.3.2	Northern Ireland Building Services Engineering Sector Perspective on Skills Requirements	150
11.3.3	Conclusions	157
<b>11.4</b>	<b>Future Skills Needs</b>	<b>157</b>
11.4.1	Introduction	157
11.4.2	Political	158
11.4.3	Economic	158
11.4.4	Socio-Demographic	159
11.4.5	Technological	160

11.4.6	Legislative & Environmental .....	160
11.4.7	Skill Needs Assessment Based on PESTEL Analysis.....	161
11.4.8	Northern Ireland Building Services Engineering Sector Perception of Future Skills Needs .....	162
11.4.9	Conclusions .....	164
<b>11.5</b>	<b>Retirement and Natural Wastage.....</b>	<b>165</b>
11.5.1	Introduction.....	165
11.5.2	Perspective of the Northern Ireland Building Services Engineering Sector on Retirement and Natural Wastage .....	167
11.5.3	Conclusions .....	170
<b>11.6</b>	<b>Diversity .....</b>	<b>170</b>
11.6.1	Introduction.....	170
11.6.2	Issues from Gender Literature.....	170
11.6.3	Understanding the 'Lads' Culture .....	177
11.6.4	Solutions from Literature Review.....	178
11.6.5	Issues from Racial Diversity Issues.....	179
11.6.6	Solutions from the Literature Review.....	185
11.6.7	The Northern Ireland Building Services Engineering Sector's Perspective on Diversity.....	186
11.6.8	Conclusions .....	187
<b>11.7</b>	<b>Migrant Workers .....</b>	<b>187</b>
11.7.1	Introduction.....	187
11.7.2	The Construction Industry: Demythologising the Polish Plumber.....	191
11.7.3	The Northern Ireland Building Services Engineering Sector Perception of Migrant Workers .....	196
11.7.4	Conclusions .....	197
<b>12</b>	<b>Future Thinking / Scenario Planning.....</b>	<b>198</b>
12.1	Introduction.....	198
12.2	Scenario A: SummitSkills Amended Experian Model.....	198
12.3	Scenario B: Qualitative Research Data .....	199
12.4	Conclusions .....	201
12.5	Scenario C: BSRIA Model .....	201
12.6	Conclusions .....	202
<b>13</b>	<b>References .....</b>	<b>203</b>
<b>14</b>	<b>Appendices .....</b>	<b>210</b>
14.1	Questionnaire .....	210

## 4 Regional Introduction

### 4.1 Overview

Northern Ireland is a part of the UK with a troubled past, but a potentially very bright future. The current population of the province of working age (being aged 16+) consists of 631,000 males and 678,000 females, making a total working population of 1,309,000 people. The total number of males in employment as of February 2005 amounted to 403,000 and females in employment were 337,000, making a total of 740,000. The number of men not in employment accounted for 229,000 individuals, and the number of females, 341,000, making a total of working age people not in employment of 569,000. There are 369,000 males in full time employment and 200,000 women in full time employment, with 32,000 males being in part time employment and 137,000 women in part time employment. Males make 98,000 of the total self employed of 118,000, with women making up the remainder of 20,000. The numbers of males who are unemployed make up 26,000 of the total of 37,000, with women making up 12,000. There are however considerably more economically inactive people, than people currently unemployed, with males making 203,000, and females 329,000 of the total of economically inactive people of 532,000. In terms of inactive persons who do not want a job 33% are classified as long term sick, and in addition 27% are classified as long term sick, and 27% care for family and home, and 40% are students and retired people (ERNI, 2005,p10).

The inactivity ratio by age of the people in Northern Ireland for the total population are 7% 16-17 (NEET in Northern Ireland), 11% are aged 18-24 and 21% aged between 25-49, 16% are aged between 50-64, and 45% are 65+ (ERNI, 2005, p11). The number of people currently seeking work, making up 37,000, is currently made up of 13,000 males and 24,000 females. There are also a significant number of people of working age in full time education, with males making up 39,000 and women 37,000 of the total of 76,000 people in education (ERNI, 2005, p5).

The percentages of employment status within the province add up to 40% inactive, 56% employed and 3% unemployed. The number of people currently employed within the construction industry (which includes the building services engineering sector) makes up a total of 5.2%, although the proportion of staff working in construction rose 2.9% between 2003/2004 (ERNI, 2005 p6). The make up of staff within construction is predominantly male, as 32,690 males worked in construction, as opposed to 3,710 females, making a total of 36,400. Males working in construction were almost all working full time (95.2%), with only 4.8% of the total males working part time. The situation with women within construction in Northern Ireland are 64% full time and 36% part time, although it is suggested that the high number of part time workers within construction suggests that women may well be working in part time administration roles, rather than in managerial or craft operative roles (ERNI, 2005, p7). In relation to difficult to fill vacancies, the performance of the construction industry (including building services engineering sector) shows that between 2000 and 2002, the number of places has fallen from just under 2% of total vacancies, to 1.5%, which in general is below the total for other sectors within the Northern Ireland economy (ERNI, 2005, p12). In relation to employment costs as a total of the National Insurance turnover, then for construction (including the building services engineering sector, the industry sector as a percentage of total turnover for 2003 was 10.40%, and employment costs as a percentage of turnover for 2003 was 17.85% (ERNI, 2005, p17).

Gross Value Added per head indicates the number of incomes earned from the production of goods and services in a region, and is obtained by dividing this sum over the total resident population in this region. In relation to this performance, Ireland was the third worst performing region, with a GVA per head being 20.4% lower than the UK average (ERNI, 2006, p5). In terms of Gross Added Value per hour worked within Northern Ireland, then this is 15.7% lower (89.6 GVA per filled job, and 84.3 for GVA worked, with the UK average being 100) than the UK average. At just over 80% in 2004, it lagged behind the other regions and devolved nations of the UK (ERNI, 2005, p13-14). In relation to labour productivity when compared with other nations in relation to productivity then Northern Ireland ranks 13<sup>th</sup> out of 17 comparator countries (ERNI, 2005, p13).

In 2001 Northern Ireland had the worst productivity GDP, which was 40% below that of London, Northern Ireland, also suffered from high unemployment rates and low participation in employment rates, with labour productivity being the major issue for the Northern Ireland economy. The major problem for the Northern Ireland economy is one of labour productivity, which, as Northern Ireland exhibited the largest adverse performance of all their regions over this period (ERNI, 2006, p11). To put this issue in context, it is anticipated that three out of ten adults in Northern Ireland of working age are outside the labour market, and are not adding to productivity (DEL, 2004, p5). Since 1999, the labour market in construction and other sectors within Northern Ireland has grown 10%, which compares with a UK average of 6%, and Northern Ireland is only outstripped by London in relation to job creation (DEL, 2004, p14).

In relation to wages, then the Gross Weekly Earnings within Northern Ireland are approximately 14.5% lower than the figure for the UK as a whole, and this figure is reflected more in the amount of earnings that are earned within the private sector as the differential is 23% lower than the UK as a whole (ERNI, 2005, p21). This figure is also reflected within the construction industry, where the gross weekly earnings are 22.7% lower than the UK average, with the weekly earnings being £375 per week for Northern Island as at 2004, which was -22.68 than the UK, figure and -18.85 less than the UK figure excluding London and the South East (ERNI, 2005, p23-24).

The province also faces a number of challenges in relation to skills and the current working population, and these include dealing with the impact of globalisation and the issues surrounding the migration of employment particularly in manufacturing away from the province towards more low cost economies, as well as an acceleration in the pace of technological change, and the potential for new jobs with higher skills requirements. The migration of skilled employees out of the province, particularly those who go to University in other parts of the UK and never return, and the need to increase the skill levels of the existing workforce, particularly in relation to the issue of literacy and numeracy. As indicated above, there is a need for the province to address the high level of economic inactivity within the workforce and address the negative impact of skill deficiencies in relation to productivity and competitiveness (DEL, 2004, p4).

The problem of skills need in Northern Ireland can be classified into three distinct groups, being the essential skills of literacy, numeracy and ICT, as well as employability skills (being the 'softer' key skills of team working, problem solving and flexibility) and work based occupational skills from the national qualifications framework and the employer specific skills which build on this framework (DEL, 2004, p4).

The numbers of students in the Universities of Northern Ireland is steadily increasing, and evidence suggests that the number of people from the lower socio-economic

groups is also increasing significantly, and against this measure, Northern Ireland (22%) out performs England (19%), Scotland (19%) and Wales(21%). Performance of young people across the province in relation to five GCSE A\*-C is above the national average at 59% (UK national average 53.7%) and 95% of people engaged in 'A' levels achieved two or more 'A' levels. There is however a significant number of young people (5.2%) who left school with no formal qualifications (SSfNI, 2004, p21).

There are however a large number of low skilled people within the economy, with almost one in four adults having significant deficiencies in literacy and numeracy and one in three of the workforce not qualified to level 2, and 25% of the population having no qualifications whatsoever. It is perceived that in line with rest of the UK, the Northern Irish economy is likely to need an increase of people qualified to technician level 4 to carry out new roles in growing sectors requiring professional, associate professional, technical and personal service jobs. In addition, the Northern Ireland demographic profiles suggests that there is an aging population, as by 2011 there will be an 18% increase of people over fifty, and 11% fewer children. To address the issue of an aging workforce, it is imperative that the young people are trained and are sufficiently competent to retrain in the relevant skills to maintain the workforce. Unless Northern Ireland seeks to address this issue, then the region will suffer from skill shortages (DEL, 2005, p6, 19).

The Modern Apprenticeship scheme in Northern Ireland has grown steadily since its introduction, and as at November 2004, 6400 young people were studying NVQ level 3, with additional supporting qualifications. Interestingly, the average age for starting a Modern Apprenticeship is around seventeen years old, with very few young adults participating in the programme (DEL, 2004, p28). It is intended that the number of apprentices that will be on programme in 2010, will rise to 10,000. To address this issue, a new funding arrangement will be introduced which will encourage employer based apprenticeships and provide a progression routes for learners enrolled on Job Skills training courses to progress on to Modern Apprentices after successfully completing the course (DEL, 2004,p39).

Within Northern Ireland, there is an attempt through the "Essential Skills for Living" strategy to assist 46,000 adults to improve their literacy and numeracy from entry level through to level 2 by 2007 (SSfNI, 2004, p28). The devolved administration of Northern Ireland has set a number of targets to be achieved by 2015, and these are as follows: to support the essential skills programme, such that 100,000 adults have their basic skills of literacy and numeracy improved, and from whom it is targeted, that 18,500 will receive a qualification. There is also a target to allow 90% of the population of adults within the workforce will have a level 2 qualification, with the proportion reaching 75% by 2007. From a level 2 qualification it is also proposed to increase to 60%, the number of adults in the workforce with at least a level 3 qualification, with a milestone of 50% by 2007. There is also a target to demonstrate significant progress on increasing the employment rate, particularly among disadvantaged groups, taking into account the economic cycle. There is also as with other regions and devolved nations within the UK, a need to develop the management training for management at all grades, particularly that related to the first line supervisors etc. The Government is committed to address the needs of this group of learners through the development of the Investors in People standard (DEL, 2004, p34).

The Northern Ireland construction industry (which includes the building services engineering industry) is dominated by small companies, of which 80% employ less than five people, however, in terms of employment distribution, the sector is evenly spread, with 50% of workers approximately, working within companies with ten or

less workers (McGuinness and Doyle, 2005, p2). The qualification base of the construction industry in Northern Ireland suggests that there are approximately 67% of the workforce qualified to level 3 (NVQ) and above. Braidford and Stone (2003) research on qualifications within the industry suggests that Northern Ireland is consistent with the UK average. For companies within Northern Ireland, the SummitSkills profile is an area of concern as it is anticipated that only 13% of employee plumbers, are qualified to level 2, whereas the figure for bricklayers and carpenters is higher at 30% (McGuinness and Doyle, 2005, p3).

There is also an issue in relation to the training provided for operatives within the construction and building services sectors, who do not class themselves as being within definable trades, as Clarke and Wall (1999) point out, that while workers within the traditional craft occupations make up only 44% of the labour employed within the construction industry, they account for 89% of the total training undertaken, which suggests that there is throughout the UK as well as Ireland, a significant training 'black-hole' for non-specific craft operatives, which Clarke and Wall (1999) attribute to a lack of flexibility on the UK training system over the designation of trades, which is not replicated on the continent (McGuinness and Doyle, 2005, p5).

The research by McGuinness and Doyle (2005) also identified unfilled vacancies among SummitSkills footprint organisations within Northern Island, and the research suggests that the number of unfilled vacancies were more prevalent among smaller firms, and firms who had lost staff to competitors within the industry. In addition firms who had a poor view of the qualifications and skills of younger workers also tended to carry unfilled vacancies while they waited to see if the more experienced operatives would come available for employment (McGuinness and Doyle, 2005, p6). Taking the results together from the research that they carried out, McGuinness and Doyle (2005) conclude that there is no evidence to support a hypothesis, that in Northern Ireland an imbalance in the existing structure of craft training, is translating itself into an imbalance and the creation of skills shortages, which are in turn constraining performance within the organisations within the SummitSkills footprint. An explanation for this phenomenon, suggested by McGuinness and Doyle (2005) is that operatives skilled to level 2 in traditional craft areas are able to adapt their skills to various occupations within the non-traditional craft occupations and through a range of common construction skills, and are thus able to move at will between the various occupations (McGuinness and Doyle, 2005, p7). McGuinness and Doyle (2005) therefore argue that any skills shortages within the industry are therefore more likely to derive from a lack of transferable skills, rather than from a lack of provision, although this hypothesis will be inadvertently tested throughout this Sector Skills Agreement process (McGuinness and Doyle, 2005, p8).

If the hypothesis of McGuinness and Doyle is correct, then the development of multi-skilling is an almost natural progression for the industry to respond to the need to have a pool of transferable skills. Burleson, Hass, Tucker and Stanley (1998) have argued in relation to a US context, that the single skill approach is well documented as containing labour inefficiencies within it, such as multiple tiers of field supervision and complex crew co-ordination management. Gomar, Hass & Morton (2003) argue that a multi-skill approach to labour and raining can therefore improve productivity, quality and work continuity, as operatives are able to transfer from task to task, and remain on the site as a consequence for longer. Another issue that is important within this context is the use of prefabrication, where the production of major components ready fixed take place under factory line conditions. This process reduces the need for traditional craft skills, but is a significant growth area. The benefits of prefabrication which will be explored within this Sector Skills Agreement are according to Gruneberg (1997) that this method of construction, which impacts significantly on the SummitSkills footprint not just in Northern Ireland, but in the UK as a whole are that labour times on site are reduced, as up to 60% of the value of construction work, is carried out by off-site suppliers (McGuinness and Doyle, 2005, p9).

## 5 SummitSkills Introduction

SummitSkills is the Sector Skills Council (SSC) for the building services engineering sector. The SSC has responsibility for the following areas of business covered by the following SIC codes:

**31.10 Manufacture of electric motors, generators and transformers.** This class includes:

- Manufacture of AC motors.
- Manufacture of AC generators.
- Manufacture of universal AC/DC motors.
- Manufacture of DC motors or generators.
- Manufacture of AC or DC generator sets.
- Manufacture of electric rotary or static converters.
- Manufacture of electrical transformers.

However within this class, the following items are excluded:

- Manufacture of vehicle generators and cranking motors cf.31.61.
- Manufacture of diode valves cf.32.10.

**31.62 Manufacture of other electrical equipment not classified elsewhere.** This class includes:

- Manufacture of electrical signaling, safety or traffic control equipment for motorways, roads or streets, railways and tramways, inland waterways, ports and harbours and airports.
- Manufacture of diverse electrical sound or visual signaling apparatus.
- Bells, sirens, indicator panels, burglar and fire alarms, etc.
- Manufacture of electromagnets including electromagnetic or permanent magnet chucks, clutches, brakes, couplings, clamps or lifting heads.
- Manufacture of electrical insulators and insulating fittings, except of glass or ceramics.
- Manufacture of insulating fittings for electrical machines or equipment except of ceramics or plastics.
- Manufacture of carbon or graphite electrodes.
- Manufacture of electrical conduit tubing and joints for such tubing, of base metal lined with insulating material.
- Manufacture of diverse electrical machines and apparatus, manufacture of particle accelerators, signal generators, mine detectors, electrical detonators, etc.

However, within this class, the following items are excluded

- Manufacture of glass envelopes for lamps cf. 26.15.
- Manufacture of hand-held electrically operated spray guns cf.29.24.
- Manufacture of electric lawn mowers cf. 29.32.
- Manufacture of electric shavers cf. 29.71.
- Manufacture of electronic valves and tubes (including cold cathode valves) cf. 32.10.
- Manufacture of electrically operated hand-held medical or dental instruments cf.33.10.

### **33.30 Manufacture of Industrial Process Control Equipment.**

**33.30/1 Manufacture of Electronic Industrial Process Control Equipment.** This subclass includes:

- Design and assembly of automated production plants consisting of various machines, handling devices and centralized controlling apparatus.

**33.30/2 Manufacture of non-electronic industrial process control equipment:** This sub-class includes:

- Design and assembly of industrial continuous process control systems.

**45.31 Installation of Electrical Wiring and Fittings.** This class includes the installation in buildings or other construction projects of:

- Electrical wirings and fittings.
- Telecommunication systems.
- Electrical Heating Systems.
- Lifts and Escalators.
- Fire Alarms.
- Burglar Alarm Systems.
- Residential Antennas and Aerials.
- Lighting Conductors etc.

**45.33 Plumbing.** This class includes the installation in buildings or other construction projects of:

- Plumbing and sanitary equipment.
- Gas Fittings
- Heating, Ventilating, Refrigeration or Air Conditioning Equipment and Ducts.
- Sprinkler Systems.

This class excludes:

- Installation of electrical heating systems.

### **52.72 Repair of Electrical Household Goods.**

The Occupational profiles for operatives working within the sector and covered by SummitSkills are deemed to be:

Manager and Senior Officials

- 1121 Production works and maintenance managers.
- 1122 Managers in Construction.
- 1131 Financial managers and chartered secretaries.
- 1132 Marketing and sales managers.
- 1136 Information and communication technology managers.
- 1141 Quality Assurance managers.
- 1152 Office Managers.

### Professional

- 2121 Civil Engineers.
- 2123 Electrical Engineers.
- 2124 Electronics Engineers.
- 2126 Design and Development Engineers.
- 2129 Engineering Professionals not elsewhere classified.
- 2132 Software Professionals.
- 2433 Quantity Surveyors.

### Associated Professional and Technical

- 3112 Electrical and electronic technicians.
- 3113 Engineering technicians.
- 3122 Draughts persons.
- 3541 Buyers and purchasing officers.
- 3542 Sales Representatives
- 563 Vocational and Industrial Trainers and Instructors.

### Administrative and secretarial

- 4122 Accounts wages clerk bookkeeper.
- 4131 Filing and other records assistants and clerks.
- 4150 General office assistants or clerks.
- 4214 Company secretaries.
- 4215 Personal assistants and other secretaries.

### Skilled Trades

- 5221 Metal machinery setter and setter-operator.
- 5223 Metal working production and maintenance fitter.
- 5241 Electricians electrical fitters.
- 5242 Telecommunications engineers.
- 5243 Lines repairers and cable jointers.
- 5244 TV, video and audio engineers.
- 5245 Comp engineer installation and maintenance.
- 5249 Electrical and electronic engineer not elsewhere classified.
- 5314 Plumb heat and ventilating engineers.

### Process, plant and machine operatives

- 8131 Assemblers (electrical products)
- 8133 Routine inspectors and testers.
- 8139 Assemblers and routine operatives not elsewhere classified.
- 8141 Scaffolders, staggers, riggers.
- 8142 Road construction operatives.
- 8149 Construction operatives not elsewhere classified.
- 8211 Heavy goods vehicle drivers.
- 8212 Van drivers.
- 8229 Mobile machine drivers and operatives.

### Elementary

- 9121 Labourers build and woodworking trades.
- 9129 Labourers other construction trades not elsewhere classified.
- 9149 Other goods handling and storage operations not elsewhere classified.

## 6 Methodology

### 6.1 Introduction

This section identifies the proposed methodology to be utilised within the primary research and data collection in relation to the Sector Needs Analysis (SNA) portion of the Sector Skills Agreement (SSA). In the first section, the philosophical basis of the study is discussed, and the paradigm for the work is described. The second element in this section deals with the methodology it is proposed to use for data collection itself. In the third element of this section, the rationale for the design of the work is discussed in relation to the national and regional perspectives and the structuring of the primary data within the report structure, in addition the choice of participants is described and justified in relation to the SummitSkills footprint, and how the data will be analysed is described. Finally there is an element that addresses the issues relating to trustworthiness in both quantitative and qualitative studies. The potential delimitations and limitations under which the study will be carried out are defined and considered in relation to both quantitative and qualitative analysis.

### 6.2 Research Philosophy

In carrying out this research, the research manager was to a certain degree directed by the requirements and expectations of the Sector Skills Development Agency (SSDA) towards the need to follow an eclectic paradigm involving both quantitative and qualitative data (SSDA, 2005a). In carrying out any piece of research, clear paradigm grounding is required (Silverman, 1985; Patton, 1990; Cohen and Manion, 1994).

There are two overarching paradigms in which research can be couched, and these are the positivistic paradigm and the interpretative paradigm (Cohen and Manion, 1994, p25). Positivism postulates that the truth is out there and can only be identified by a process of empirical science and rational methods of analysis and data collection, with objectivity as its goal (Burrell and Morgan, 1979; McNeil, 1990).

The Skills for Business Network (SfBN) has a clear and long standing association with LMI, and positivistic quantitative studies, which form a key part of the data collection process in previous SNAs (SSDA, 2005a, p28).

The research manager however took the view that the use of a purely positivistic paradigm based on LMI data collection would not facilitate the production of an effective SNA, as it would reduce the effectiveness of employer involvement and focuses, required by SSDA to create an employer focused document (SSDA, 2005a, p26). It therefore was deemed important by the research manager, to incorporate a more objective interpretative paradigm to supplement the robust positivism of LMI, with an interpretive paradigm to give the 'voices' of contractors within the building services industry the chance to inform policy makers through the vehicle of the SNA.

An interpretative paradigm is eminently suitable for social science research (Cohen and Manion, 1994, p56). The harnessing of positivism and interpretative paradigms therefore has created an eclectic paradigm mix, which it is hoped will complement the overall quality of the final product, where in relation to policy grounded research in any case, 'methodological eclecticism' is deemed to reign supreme (Finch, 1985; Troyna, 1994; Cohen and Manion, 1994).

In deciding to a qualitative element within the paradigm design, the research manager allowed for the individuals involved to have different social constructs (Berger and Luckmann, 1967). Based on SSDA suggestions, the research has designed this part of the research, to not only get answers to the questions that form the part of the SNA, but allow the voices to get behind the questions themselves, and to gain the individual insights and experiences of the interviewees; that are considered important for the research (SSDA, 2005, p27).

SummitSkills had already commissioned some Labour Market Intelligence reports through BSRIA Limited, a company experienced in positivistic quantitative data collection. For scenario planning purposes, this data is triangulated by using statistical data produced by Experian, which also covers the SummitSkills footprint.

In selecting a qualitative element to the research in addition to the other issues already discussed, the researcher facilitated staff in SummitSkills, in becoming through interpretative naturalistic enquiry the instruments of the research (Lincoln and Guba, 1985; Tesch, 1990). This helped the operations managers, who led on the field research<sup>1</sup>, to engage in debate and argument with participants to extract rich meanings around the research questions, as well as facilitate a primary function of the organisation of employer engagement (LeCompte and Preissle, 1984). Qualitative data does leave the possibility of bias open, and concessions were made to the fact that the qualitative section of the SNA cannot be value free (Brinberg and McGrath, 1985, p97). Within the research design however, the research manager made allowances for the fact that on some occasions this type of research cannot easily be replicated, and thus verification of the finding are difficult, which is why multiple qualitative, quantitative and literature sources were used (Miles and Huberman, 1994, p17-18).<sup>2</sup>

The benefits of qualitative data within the report have already been referred to within this paper, but they can be defined as being 'rich descriptions', interpretations of social phenomena, serendipitous' findings and new research integration, as well as the more meaningful presentation that words can give to concepts, rather than mere quantitative numbers (Miles and Huberman, 1984, p14-1; SSDA, 2005a, p27; Maykut, P. and Morehouse, R. 1994, p27).

### 6.3 Method of Data Selection

Although not considered under paradigm analysis, the role of literature was considered vital within the production of this paper, especially in relation to the policy research element of the SNA (Salter and Tapper, 1981). It was anticipated that the primary and secondary literature, would supply both statistical data to underpin current LMI data produced nationally and regionally by SummitSkills. It was also anticipated that regional and national reports relating to construction and/or building services produced elsewhere and by others would also be incorporated as secondary literature and as further support to the primary data analysis and thus facilitate the more theoretical areas of the SNA, where it was anticipated that relevance and contextualisation may be an issue in relation to building services contractors. Where possible, secondary literature was used to contextualise primary policy literature, with a view to aiding robust triangulation (SSDA, 2005a, p28)<sup>3</sup>.

---

<sup>1</sup> See methods of data collection section of this paper.

<sup>2</sup> *ibid*

<sup>3</sup> See trustworthiness and validity section of this paper.

The type of interview that was used in this research was the semi-structured in-depth interview. This approach was considered apposite, since an in-depth semi-structured interview may be seen as a conversation, in which the researcher encourages the informant to relate in his or her own terms, experiences and attitudes, which relate to research, and helps to prevent the 'restricted and jerky' response problems sometimes encountered by using a very rigid questionnaire (Walker, 1985, p4-5).

The operations managers were issued with an interview guide, which contained open questions related to SSDAs Part 1 Guidance (SSDA, 2005b). The purpose of using open questions was to seek to avoid simply 'Yes' and 'No' answers (Patton, 1991). The interview guide encouraged researchers to concentrate on the issues that were central to the research question, but in addition allowed the type of questioning and discussions to be more flexible, although all questions were required to be considered within the interview (Patton, 1990, p90; Minichiello et al, 1995, p65).

As the research manager, who was responsible for managing and conducting the data analysis was not carrying out the interviews, the possibility of researcher bias through preconceptions contained in the secondary literature was avoided and was not an issue in this research (Bogdan and Biklen, 1992, p161-2).

To collect the rich data sources in the way stated, the research manager purchased twenty five MP3 players for recording purposes. To avoid any allegations of duplicity or breaches of research ethics, the participants in the research were advised at the commencement of each interview the ethical basis under which the interviews were being carried out which was the British Educational Research Association (BERA) code of ethics in relation to primary data collection. The participants were therefore guaranteed anonymity and any references within the interview that might identify the participant or any other individuals were deleted from the text, and would not be used within the reports. The exception to this being where Government agencies were identified, and where good practice was identified, as it was felt that it was in the public interest for these agencies to be named. Where criticisms were made of organisations excluding Government bodies, then the names were expunged from the reports. Due consideration was given to the possibility that some participants may feel inhibited by the presence of a MP3 recorder; however it was anticipated that this would not be a problem.

#### **6.4 Nations, Regions, Participants: Selection, Process and Data analysis.**

In preparing this methodology, the research manager had conversations with the Scottish Executive and Education and Learning Wales (ELWa) as well as operations managers who fed back data into the process. The view had been expressed that previous Skills Needs Analysis have not met the needs either of the devolved administrations in the nations, nor the regional agenda. It has therefore been decided to produce not one SNA, but twelve, one for each region and one for each nation<sup>4</sup>

It was therefore decided by the research manager, in consultation with other managers in the nations and regions, that SummitSkills would design a standard template for the SNA through which quantitative and qualitative data would be fitted.

---

<sup>4</sup> Effectively Scotland will consist of two reports, as it will consider Highlands and Islands and Central Scotland differently, this is considered more later in this section.

The template would then be varied to incorporate the data from the large national LMI project that SummitSkills had commissioned, with comparative analysis being made between this and regional/national statistical data produced by organisations such as Future Skills Wales and Future Skills Scotland. Further triangulation and comparative analysis was obtained through primary and secondary literature, which was standard across the suite of reports excluding the regionally specific literature produced by the local and regional LSCs/WAG/ DELNI/Scottish Enterprise/Highlands and Islands Enterprise and qualitative interviews.

SummitSkills' footprint breaks down nicely into five primary areas, and these may be defined as:

- Electrotechnical
- Plumbing
- Heating and ventilation
- Air conditioning and refrigeration
- Consultancy

Therefore to obtain methodological robustness<sup>5</sup> it was decided to carry out thirty interviews within each region. These interviews were divided equally between the five areas of the footprint, and equated to six interviews per region per sector of the footprint. The operations managers were instructed to further subdivide the interviews so that they took place in 'small, medium and large' contractors and to spread the interviews out around their nation/region. In Wales the demographics of that country required sixty interviews, and in Scotland thirty in Highlands and Islands and Scottish Enterprise.

The definition of what constitutes a small, medium or large company within the SummitSkills footprint was somewhat constrained by the way that SummitSkills LMI has been computed, rather than by other definitions. Thus, a small contractor is defined as being an organisation with up to ten employees, a medium contractor having up to seventy employees, and a large contractor having over seventy-one employees. This is at variance with EU definitions, which place a small-medium enterprise as having 250 or less employees. SummitSkills LMI data suggests that in the building services engineering sector, there are in any event only 468 contractors that have over 71 employees and the LMI does not identify 250+ employee contractors that would satisfy the criteria of being a large contractor, which would make analysis under that heading difficult (BSRIA, 2005, p24). On occasions it was deemed necessary to 'blur' the edges of this definition in regions like Highlands and Islands where there simply were not companies of the larger size on the ground.

The MP3 players had a computer download function which permitted the user to interface with their computer and upload the data to a company identified by SummitSkills for audio typing purposes, and from this the transcripts were typed and returned to the research manager for analysis. To keep up a steady flow of data, operations managers were instructed to upload data after every interview, so that as much as possible log jams are avoided, and the audio typists were able to maintain a free flow of data. All interviews were coded according to nation/region sector of the footprint and size of contractor. Data was then filed according to nation/region and sector and sector size. Analysis did not begin until all interviews were received as the literature took considerably longer than had originally been anticipated.

---

<sup>5</sup> This is explained in more detail in the next section.

The data was identified against a generic heading of concept, and whether the interviewee is generally in favour/not in favour of the concept discussed<sup>6</sup>, and then any potential statement that might be incorporated within the text to illuminate the rationale for the conclusions was drawn out. Where other threads could clearly be identified, these were referred to if there is sufficient triangulation from elsewhere within the regional data to substantiate this as an issue, otherwise they are mentioned and related to proposals for further research post the SNA. Over time it is proposed to revisit this data to identify meaning units for in-depth analysis, but the time submission deadlines for the SNA documents make this prohibitive initially (Tesch, 1990, p95).

The data collected here formed a rich data source that will feed updates to the SNA and further research, but even this limited analysis has it is argued allowed the voices of the interviewees to speak out on the face of the document, and aid the ownership process (SSDA, 2005b, p27).

## 6.5 Validity and Trustworthiness

Stakeholder consultation is an important part of SummitSkills' mandate, and one of the main group of stakeholders are the trade associations for the various trades associated with the SummitSkills footprint. To receive feedback for the process, the research manager identified a number of individuals within the following trade associations:

- Association of Plumbing and Heating Contractors (APHC)
- Electrical Contractors' Association (ECA)
- Heating and Ventilating Contractors' Association (HVCA)
- Scottish & Northern Ireland Plumbing Employers' Federation (SNIPEF).
- SELECT

All these stakeholders were invited to comment on the research data and the process particularly in relation to LMI data and the proposed methodology and other matters of importance were discussed with them. It is anticipated that these organisations will be major drivers in the 'bedding' of the SSA in the later stages, as well as having an input into the research in the earlier parts of the research process.

In any piece of research, it is important to create credibility. Triangulation will be used to achieve credibility both between primary and secondary data and between quantitative and qualitative data, and between the data sets themselves. There are a number of different methods of undertaking triangulation (Denzin, 1978; Lincoln and Guba, 1985; Smith and Kleine, 1986; Patton, 1990). For this research the research manager adopted Denzin's (1978) four categories of triangulation, being data triangulation, investigator triangulation, theory triangulation and methodological triangulation.

Data triangulation involves using various data sources to test for robust messages, by testing these data sources against each other. In this research, this was achieved by triangulating primary literature sources against secondary ones, national LMI data against secondary and primary literature, national LMI against any regional and nation LMI, and LMI both nationally and regionally/nation against qualitative interview material. Internal triangulation of the qualitative data took place through cross

---

<sup>6</sup> It is expected that this would then create a tabular descriptor of qualitative responses for comparative analysis against the quantitative data.

triangulation of small companies with identical small companies within the same sector of the footprint, and with small companies from other parts of the footprint. Upward triangulation took place between small to medium, small to large and medium to large contractors within the same footprint, and also between small to medium, small to large and medium to large contractors across the footprint. SummitSkills believes that this cross, downward and upward triangulation creates an extremely robust interpretation of the needs of all building services contractors across the whole footprint and where there are both areas of commonality and variance.

Investigator triangulation was achieved through the use of a significant number of operations managers to collect the primary qualitative data, this helped to identify where there may be an element of researcher bias creeping into the research, and this allowed the research manager to compensate for that during the data flow when necessary, although this was not an issue in actuality.

Theory triangulation was achieved through the use of multiple perspectives, to interpret a single set of data. To attempt this form of triangulation, it is proposed before final draft to allow stakeholder groups, special interest group members and the operations managers to review documents and make sure that the messages identified by the research manager and any other people involved in data analysis are justifiable given the data received. This is a very important area of the triangulation process, and it is intended that where possible time will be allocated for it in some way, although the timelines are tight, and may have to be retrospective in nature.

Methodological triangulation uses multiple methods, to study a single problem or programme. It was anticipated that this form of triangulation would equate with areas of theory triangulation in that the research manager designed an eclectic paradigm which sought to harness both quantitative and qualitative methodologies of data collection, to give as accurate a picture of the industry as possible, so that it can be owned by employers and other stakeholders within the industry.

A delimitation of the proposed methodology that can be identified by the research manager is that data analysis will by virtue of time constraints be reduced, although the quotes extracted from the transcripts and incorporated in the final texts were pertinent and relevant, the deeper meanings and alternative paradigms that might be identified and the meaning units identified by Tesch (1990) which could yield such rich multiple meaning work, will have to wait for analysis until a future date, and be the basis of further work. The limitation of this was that the document will not be as rich as it can be initially, although this can be developed over time.

Delimitation was the way that the operations managers identified the participants for the qualitative data. Some used contacts in FE colleges to access their databases, others approached stakeholder trade associations to access their databases, some used their own contacts. All participants therefore were likely to be companies that train, or that are active in the promotion of their industry. This, it was argued, created the limitation of not getting to the organisations who habitually do not train to elicit their views, or find out why.

A further delimitation was the quality and quantity of regional construction data, and this to some extent depended on the RDA and the LSC, as well as ConstructionSkills and any work that they might have done in their regional observatories. It was apparent that the work was patchy, but that stakeholders in the regions expected to see it included in the SNA/SSA, to ensure buy in where possible, although it was

argued that the lack of it would not denigrate the quality of the SNA reports given the large volume of data available from multiple sources. This is particularly true in the English regions and possibly Northern Ireland, although Scotland and Wales through Future Skills Scotland and Future Skills Wales appear to have a more mature data collection source. The limitation of this problem on the quality of the SNA may be that there will be an over reliance on national LMI, which feedback suggests is already being questioned by stakeholders in the regions, and to triangulate or differentiate between 'wrinkles' between national data and regional perceptions may incorporate very close attention to qualitative participants and data received. To overcome this to a certain extent, qualitative LMI collected regionally is indicating trends within that region for the benefit of partners and stakeholders.

The delimitation of timelines has already been identified within this section and these were tight, there was no slack in the system, and writing had to commence before data collection and analysis was totally complete. This means that the synergy one would normally expect in a piece of academic work was compromised, and the SNA came together in a more 'modular' fashion than is normal in work of this kind.

## **6.6 Conclusions**

This research methodology was designed to take into account the tight timelines required for production of the research intensive parts of the SSA. If more time and resource had been available, then further work on increasing the interview base of the research would have course been beneficial, and a further interesting category might have been the sole trader as a distinct entity. Notwithstanding this however, the research manager believes this SNA was a robust methodological piece of work, which will enable a real and effective debate to take place on the future of the industry.

## 7 Key Drivers of Business Competitiveness

### 7.1 Globalisation

The definition of globalisation remains somewhat elusive, and it may be argued differs according to the academic discipline into which its concepts have strayed, thus Ashcroft (1995) could speak of globalisation as being the concept of a shrinking world, which is a continuous process that has been going on since Alexander the Great.

Hawken (2000) an economist sees globalisation as being a system of emerging global corporations and markets, and akin to this is the view of geography, that these corporations transcend national barriers, thus leading to national boundaries as a concept disappearing (French, 2000). As borders vanish then from the political perspective the concept of the nation state becomes less meaningful as power shifts towards more influential international organisations (Parenti, 1995).

To the American Forum for Global Education (2001) the concept of globalisation is centered in the developing use of the internet. For environmentalists such as Swartz (2000) globalisation is centered on issues such as global warming, which ignore national boundaries, where as Hwang (2001) sees globalisation as being a concept for contextualising A.I.D.S. and other international diseases.

Lynee (2000) treats globalisation from an ethical standpoint as being a concept which will impact more on the decisions we take locally, as these decisions will invariably have more impact than previously on others around the world. Bollag (2000) fears that globalisation will lead to the loss of minority languages, and Jameson (1998) fears that McDonald's/ Coca-Cola dominated type international globalism will pose a threat to local culture, ethnicity and literature.

Both Illich (1968) and Rahema (1998) see globalisation leading to a culture of increased scrutiny of schooling as the predominant institutional approach to learning, as this model is popular or becoming equally popular in the developed countries of the world.

To new labour ideologue Giddens (2000) globalisation is a blending between traditional left of centre values, and neo-liberal type economic models in the post communist (and post Thatcher) era.

Globalisation it is believed will also lead to a blending of religious faith, with ecumenicalism rather than fundamentalism being the dominant paradigm (Ansell-Pearson et al, 1997). Finally in relation to agriculture, Postal (2000) and Chimelli (2000) see globalisation bringing a growing realisation that food, water and petroleum are finite products.

Given the diversity of usage, it is perhaps not surprising that some writers such as Easterbrook (2000) see globalisation as being a descriptor of secret societies seeking world domination, and to Marrs (2000) globalisation is just a word, that is much banded about, but is actually meaningless.

Bache and Mitchell (1999) however conclude that at its minimum, globalisation provides a temporary discourse on a set of historical process going back over a long period of human history, while at its maximum; globalisation is referred to a

particularly new phenomenon of linkages, transcending existing territorial boundaries (Bache and Mitchell, 1999, p1).

Cogburn (2000) describes globalisation at its most organic and fundamental as being about monumental and structural changes in the processes of production and distribution in the global economy, driven by the development of advanced ICT technologies into their core business processes. The use of advanced ICT is such that it allows global companies to diminish the impact of space, time and distance, and distribute work around the world, which traditionally might have taken place in one locality.

A secondary function of globalisation for Cogburn (2000) is that globalisation is affecting the social, political and economic structures and processes that emerge from global restructuring as a result of globalisation. These processes lead to the development of knowledge as a central part of what globalisation is all about through the concept of a global information society, as knowledge becomes an important factor in production (Cogburn, 2000, p1).

Greider (1997) and Henderson (1998) postulate, that globalisation is taking the world economy from a 'golden age' of capitalism driven by a post war boom in the 1950's, to a system of global crisis and uncertainty, as the structures of production and distribution change within the global economy.

Lipietz (1992) argues that the 1950's manufacturing concepts of Fordist-Taylorism, with its dependence on factory system and mass production concepts, scientific management and a moving assembly line with job roles very tightly demarcated. This then leads to theoretical specialism. But in actual fact caters for the needs of vast numbers of unskilled and semi-skilled men and women within the factory environment. Leading to what Lipietz (1992) and Kenny and Florida (1993) call an innovated- mediated production model that challenges the Fordist-Taylorist model. Which also specifically challenges the demarcation of knowledge labour and physical labour, thus using knowledge in the production process itself? This therefore is creating a shift in the world economy away from labour skills and towards knowledge skills. The need to manipulate and develop knowledge for competitive advantage is leading to more investment being made in research and development, to enable organisations to keep ahead of the competition (Cogburn, 2000, p2).

The development of knowledge is a major factor in production, and has led to the need for the development of education and training to meet the needs of this emerging model. Particularly at tertiary level, but also across the whole of the workers life, with lifelong learning being a major priority, to keep knowledge fresh. Cogburn (2000) argues that knowledge; education and learning might be treated as being different facet in relation to globalisation, as education might be seen as a formal process of instruction under formal teaching structures, whereas learning does not of itself require any formal structure.

Knowledge accumulation and the accumulation of skills for using ICT will occur increasingly outside formal educational environments, and will come probably through increased ICT competence, with learning in the workplace and through collaborations that may be global or involve more 'tightly nit' local communities with similar interests, will become more commonplace (Cogburn, 2000, p4).

Mansell and When (1998) argue that formal learning centres will become less relevant as custodians of knowledge, with educational institutions being reshaped to

be consistent with the national priorities of the country, in the achievement of competitive national advantage.

There is also a need to develop within learners in a globalised economy new skills and disciplines than those that are traditionally taught in educational establishments within the developed world. Coburn (2000) argues that there needs to be a much more focused development of thinking in the abstract, and a move away from problem solving from determined information. As a globalised knowledge economy requires learners to develop solution from less developed and determined sources and be able to search for knowledge to enhance existing data (Coburn, 2000, p4).

There is further a breakdown in the concept of discrete academic disciplines, with more cross-disciplinary working being required within the knowledge economy, to address the problems that occur. Akin to this, is the ability of learners to analyse and manipulate symbols, from political, legal and business terms and concepts (such as intellectual property rights) and from financing and accountancy systems, the concepts of digital money (Coburn,2000, p5).

The GIIC Forum (1998) stated that the globalisation of the economy and its concomitant demands on the workforce require that the workforce receive an education that enhances their ability to access, assess, adopt (or reject) and apply knowledge to given situations. Learners within a global economy will need to be able to think independently, and to apply appropriate judgment to make sense either alone or with other new situations.

Thus, the objective of education is no longer simply to convey a body of knowledge, but to teach how to learn, problem-solve and synthesise the old (knowledge) with the new (GIIC Forum, 1998, p4).

Learners within a globalised world will need to have highly developed team working skills, not simply locally within teams with they work day by day, but globally through virtual internet and conferencing teams in various parts of the world. Learning Colburn (2000) argues will have to adjust to reflect these needs, with curriculum offers being tailored to meet business needs, breaking the boundaries of space and time, through new and interactive distance learning techniques through the internet (Coburn, 2000, p6).

A move that will be resisted by some is the GIIC Forum's contention that within the delivery of education and skills, the role of the private sector should be increased, as the GIIC believe that private sector thinking can help to impasse difficulties that public sector organisations alone have in responding to new demands.

In relation to schooling within the UK, Tooley (2000) makes a similar claim for the validity of involving the private sector within the delivery of school education in the UK. The second role suggested by the CIIC Forum (1998) also incorporates using employers to deliver training to their employees (this issue is explored in the Assessment of Current Provision part of the Sector Skills Agreement) as employers can train their workers quickly and place them in relevant provisions, and the cost of training is low, the technology with which workers will be trained will be the latest, the costs of training will be lower, and the training can be brought on (or taken off) stream quickly to meet the needs of employers (CIIC Forum, 1998,p6).

The rationale the GIIC (1998) and to a similar degree Tooley (2000) make for the development of private sector involvement in education is that Governments will not be able to remain as the sole providers of education, due to capital cost, de-

unionised and more flexible working agreements and the need to constantly be upgrading technology to meet knowledge demand.

### 7.1.1. Globalisation and the view of Government

The Government for many of the reasons cited above is very interested in globalisation and the Government, and in 2004 the DTI laid a white paper '*Making globalisation a force for good*' before parliament. The main thrust of the Government's concerns within the White Paper revolves around free markets, and the need for the economy to develop a response to globalisation through this process.

The Government is proud of the United Kingdom's record in relation to inward investment, as the economy receives more inward investment than any other EU country, which helps to create new jobs, and finance infrastructure, and provide access to new technologies. At one and the same time the City of London is the second largest supplier of foreign direct investment, which benefits the UK through the return of funding to the pension funds and other savings (DTI, 2004, p10).

The Treasury (2005) relates the issue of free trade and globalisation to be fitting within the principles of comparative advantage first developed by Ricardo in the early nineteenth century. Ricardo's theory suggests that in a world without trade barriers, the innate characteristics and resource endowments of countries such as their labour supply, land availability, natural resources and climate will determine the activities in which they specialise.

Comparative advantages suggests that when economies have the flexible necessity to adapt to more open markets, then labour intensive, lower technology (and therefore lower skill) production will take place in countries with an abundance of low cost labour, while advanced economies, where the labour costs are higher, will concentrate on exporting more skill-and capital intensive goods.

Ricardo's theory then postulates, that this specialisation by countries in the production of goods and services allows specialisation, and the more effective use of resources, which then benefits the whole of the world economy, by allowing growth (Treasury, 2005, p19; DTI, 2004, p45).

New Labour will not however be following the example of the 1974-79 Labour Government of Wilson and Callaghan, by seeking to protect through nationalisation or subsidiary British Industry failing to be able to compete in world markets as a result of globalisation. As the Treasury believes that Government is not in the best position to see where support might be advantageous, and also, the failure of certain sectors or part sectors in the economy would free up labour to be moved into the new or growing sectors (Treasury, 2005, p31).

Free trade within globalisation implies the free movement of products and services, capital and labour, although the White Paper does put a caveat on the free entry of labour into Britain, with the proposal of a strong framework for managed migration into the country. This will be used to allow immigrants in to carry out work in hard to fill areas of employment, while at the same time preventing illegal immigration and the exploitation of illegal immigrants (DTI, 2004, p57).

The Government however feels that migration can be no substitute for the development of the existing workforce in new skills, and the Government remains committed to enhancing skills to meet the global challengers from emerging

economies of Brazil, China and India, all of which are enjoying unprecedented growth at this time.

The development of these new economies has meant that traditional manufacturing and production job in mass production markets are migrating to these and Eastern European countries where labour is cheaper. This means therefore that new jobs within the UK will be created in value added knowledge jobs, and will rely on the development of good research, design and innovation to facilitate the development and retention of these types of jobs (DTI, 2004, p45).

The Treasury identifies skills at basic and intermediate level as being a priority of the current workforce, alongside an attempt to encourage development of higher level learning, which will enable the UK workforce to respond to some of the issues cited above in response to rapidly changing methods of working and technologies (Treasury, 2005, p52).

Another response brought about by the increase in competition in high growth industries as a result of globalisation, is the clustering of like minded businesses (Silicone Valley being a classic example). These companies invariably are in high valued added industries, investing heavily in knowledge, innovation and creativity, and requiring advanced skills. By clustering together, similar companies are able to draw on networks of researchers, which advanced the cluster as knowledge is accumulated, and there develops in that area a highly skilled and specialised pool of workers, who are transferable between the organisations. A good example of this is banking in the City of London.

There may however be a down side to the concept of clustering caused by high wage costs, traffic congestion etc, which may cause a company to leave the cluster. But it would appear that the current trend is towards clustering, allowing specialisation in the cluster and for those companies outside the cluster, but who provide goods and services to the cluster (Treasury, 2005, p29).

### **7.1.2 Northern Ireland Perspective**

Cooke, Roper and Wylie (2002) in their research monograph for the Northern Ireland Economic Council point to the development of a regional innovation system, as being the key to regional economic competitiveness in the global economy. The Northern Ireland economy is defined by these academics as being relatively globalised and non-associative. The economy is dominated by relatively few large firms with predominantly national and global rather than local and regional linkages, and these are supported by relatively low levels of regional private and public research and development. The economy also exhibits low levels of business innovation, and inadequate development of linkages in innovation. Cooke, Roper and Wylie (2002) state that firms within the Northern Ireland economy need to dwell less on price competition and more on developing innovation growth to, through collaboration in the regional innovation systems, the academics argue that such an approach will address the challenges of the knowledge economy and globalisation (Cooke, Roper, Wylie, 2002, p x). A similar view in relation to the place of innovation as a driver for a successful economy is drawn from the EC (1998), which argues that 80% of productivity growth and GDP increase being accounted for by product, process and organizational innovation.

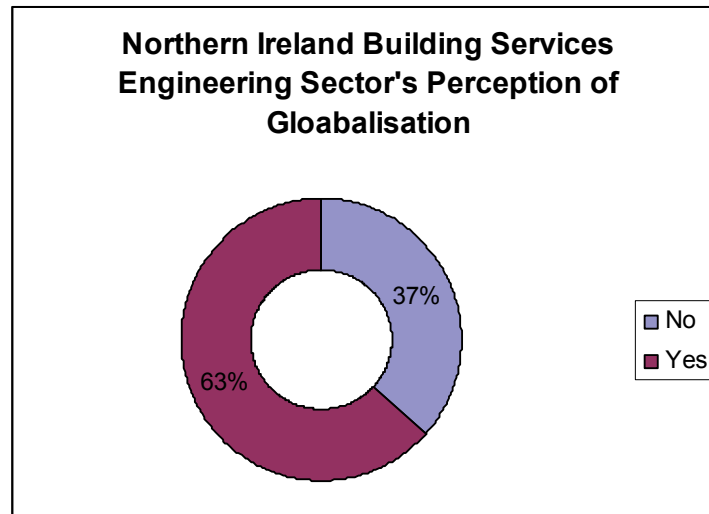
Northern Ireland also has a number of firms working globally, which Cooke, Roper and Wylie (2002) define as Old Economy Indigenous Firms, having a distinct

management style. These companies come from a family firm tradition, and have rather individualistic management styles, and strong global linkage, which has been achieved either due to acquisition or as a necessary part of company strategy in cost competitive fields. Interestingly, it would appear that many of these firms are in different segments of the clothing and textile industry, and this is interesting in the fact that this is an industry that was heavily affected by globalisation in the 1980's and 1990's as firms relocated to Asia to take advantage of cheaper labour. As Cooke, Roper and Wylie (2002) point out, this feat of surviving against the general decline, has been achieved against a backdrop of poor regional innovation is impressive, and shows a determination on the part of those companies in finding ways to survive and prosper in competitive markets, where their competitors have the benefit of more developed internalised innovation. Cooke, Roper and Wylie (2002) define these companies as being innovation 'takers' rather than innovation 'makers', but show a good example to other companies from all sectors in survival and development despite the NI poor regional innovation (Cooke, Roper, Wylie, 2002, p35).

The Sectoral Development Branch of NI Government in their Draft Priorities and Budget Consultation in relation to globalisation state the their vision to address globalisation will be achieved through increased productivity and value added business, leading to enhanced market share in products and services. The measures of achievement of that vision will be a closing of the productivity gap by the province with the UK, an increase of the GVA, and an increase in the percentage of people in the province who are economically active (SDBNIG, 2004, pp6-7). The Skills Strategy for Northern Ireland identifies globalisation as an issue due to the economic competition that the province is receiving from the developing economies of China, India, Asia generally, and the emerging economies of Eastern Europe, with their low cost workers, and increasing numbers of graduate educated people. To address this issue, and engage in innovation (as described above), creativity and skills development, the skills strategy is promoting the development of more qualified and skilled workers, stronger management, leadership and team working skills, more literate, numerate and ICT and a greater focus on creativity and design, which focuses on ability to translate ideas into saleable products, and engage in problem solving (DEL, 2004, p16).

### **7.1.3 Northern Ireland Contractors' Perspective on Globalisation**

The building services engineering sector in Northern Ireland is far more aware of globalisation as an issue for the sector in the province than the English regions as is intimated in the following graph, although this possibly has more to do with the positioning of the province in relation to the Republic of Ireland than is the case with England. The following diagram indicates the views expressed:



The quotes below are indicative of the views of the sector in Northern Ireland in relation to this subject:

*A number of Polish employees ... a number of polish people have been around looking for work in various bits and pieces trying to compete in the marketplace against us. And south of Ireland, whether I class that in a Northern Ireland context, would be a bit of competitors as well. And again, there's a few Germans coming over as well. But certainly there is ... starting to see more and more people coming over to compete against us. (NISP01)*

*There isn't a big deal of influence at present from overseas, although lately there has been quite an influx of foreign workers coming in actually. (NIMP02)*

*I haven't experienced any competition ourselves at this present time from companies based overseas but I think it will happen in the future. (NILP01)*

*Yes. (NILP02)*

*Within my own business, because we are a small electrical audit company, we find very little competition coming from our immediate neighbour which is the Republic of Ireland. But in the contracting side of things we find that within Great Britain as a whole and the Republic of Ireland there are people who will venture into this arena. (NISSET01)*

*Yes, we have experienced some competition in the past. (NISSET02)*

*Currently we have only had a minimal impact from overseas companies. One French company currently competed against us several years ago. They had a vested interest in that particular project. So it's not a major problem with us, overseas, European companies. (NIMET01)*

*Not as yet but I can see it in the future. (NIMET02)*

*We would class overseas as the mainland sometimes. I would say predominantly our work is locally in Northern Irish but the majority of our competitors would be large multinational companies. We have also had some inroads recently from France. (NILET01)*

*As yet we haven't experienced any of that within our business, but we think that we may experience that in the near future with the new investment coming in via the Strategic Investment Board. (NILET02)*

*Yes, yes, we do. (NISHV01)*

*Not specifically. However, we do find occasionally competition from organisations based in the Republic of Ireland. But, not very often... (NIMHV01)*

*To a limited extent in Northern Ireland there's certainly an obvious case, not so much overseas, but certainly from Northern Ireland, sorry.... Southern Irish based companies moving forward into the market place in Northern Ireland, but not so much from overseas. (NILHV01)*

*Yes, we're seeing evidence of overseas contractors in the building services sector at this point in time. (NILHV02)*

*We have done yes, some from England, some from Republic of Ireland. (NISACR01)*

*UK Mainland mainly... We've had a couple of occasions where European companies have been coming in and doing work that we would normally have been doing, Dutch companies. (NIMACR01)*

*Other than companies in from the mainland GB that have national contracts with the multiple retailers and some of them would be granted contracts which cover Northern Ireland as well as the mainland. (NILACR01)*

*Yes there are FM companies since the trouble stopped basically. They've flowed in. (NILACR02)*

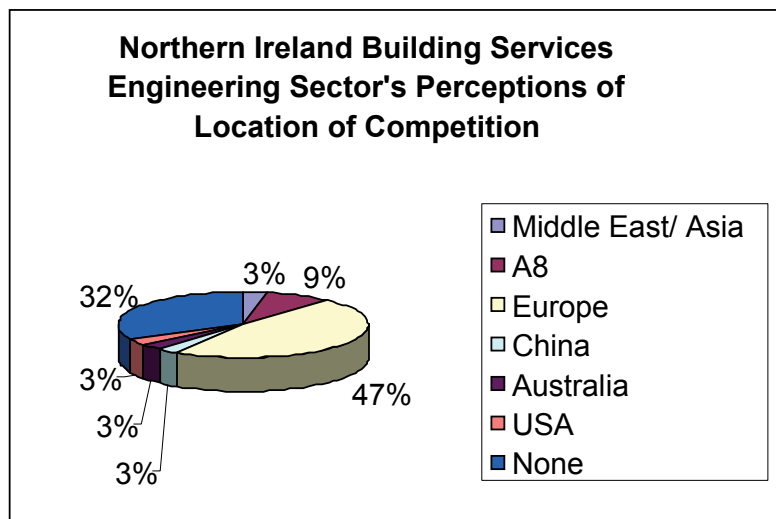
*Yes. (NISBSEC01)*

*Yes I think more and more with the use of the Internet we're facing competition from UK wide and overseas. (NIMBSEC01)*

*We are ourselves are a company which has started to open offices in other areas for example Oman, Eastern European countries, southern Africa, we have recently been involved with a construction project in which a contracted company from Greece has expressed interest. (NILBSEC01)*

*I haven't experienced it yet. But with the massive amount of work that's about to take place, especially in the healthcare sector, the answer will be yes. (NILBSEC02)*

The next question sought to elicit from the interviewed companies in the sector from Northern Ireland where they thought that the globalised competition was coming from or likely to come from, and the diagram below indicates these areas:



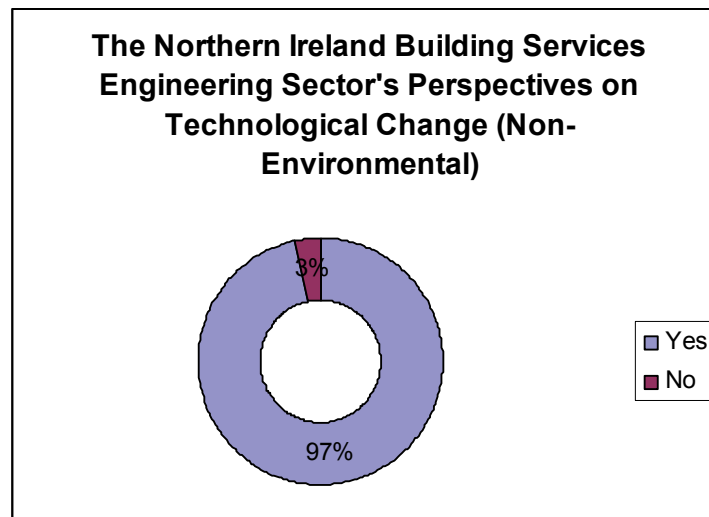
#### 7.1.4 Conclusions

As already stated, the data for Northern Ireland differs significantly from that of main line England, with the sector in the province appearing to be far more globally aware than their English counterparts. There is therefore not the urgency of selling the message to the sector of preparing their businesses to compete against foreign competition, rather SummitSkills believes that the province may benefit from training looking at competition strategies and theories to respond to competition, and indeed use globalisation positively to enable Northern Ireland contractors to access foreign markets. SummitSkills is committed to working with partners and stakeholders to meet the perceived needs of the sector in the province in relation to this issue.

## 7.2 Technological Change (Non-Environmental)

### 7.2.1 Northern Ireland Contractors' Perspective

The Northern Ireland building services engineering sector would appear to be deeply involved in new technologies. The diagram below indicates that substantially the whole of the sector within the province sees itself as being affected by new technologies:



As in the English regions there is some overlap in the answering of this question with the section on environmental technologies, however these responses are left in for the purposes of clarity, and the quotes below indicate the primary data making up the diagram above:

*Yes particularly renewable and with the new concept of the environmental issues, there's new products. Secondly, new plumbing products coming out everyday, it's hard to keep up to speed with what products are coming out. And I think, and I know maybe it's a question for later on, is the quality of the products coming out, I must admit, has gone down dramatically over the years and certainly something that was issued on that, would be a lot happier with.  
(NISP01)*

*There are, yeah. Especially in the domestic small commercial gas appliances... The technology seems to be racing way ahead of what we can pick up in some of the technical literature coming through. But, yeah, it is... (NISP02)*

*Yes. Very much so. New products are coming on line all the time. I think one of the things about Northern Ireland too, we sort of are maybe a bit slow technologically-wise. I think things come through from Europe. I think Central Europe are a lot further more advanced, technologically advanced, than us. (NILP01)*

*Yes, we do find there are more companies bringing in new products, which are coming from all parts of the world really. (NISET02)*

*Specifically projects that we find we're getting involved in now involves environmental issues. That may form part of the interview later. But specifically areas of CHP units and biomass, wood burning stoves. (NIMHV01)*

*There... to a degree it's... having spoken to a few refrigeration, air conditioning companies... you might have come across VRV and VRF systems in relation to air conditioning and basically, normally you have one outdoor unit which is connected to an indoor unit, well a VRV or a VRF system just has one big outdoor unit which can do you know, twenty, thirty, forty units inside an office block and that's... that's probably a recent development. (NISACR02)*

*Mainly heat recovery, etc, and that sort of thing, but other than heat recovery from refrigeration plant, no. (NIMACR01)*

*Yes, the refrigeration is... to a certain extent is getting more and more technical. Everything is... it's getting like a throwaway, you know, society. If something breaks down you don't repair it, you throw it away and you buy a new expensive part to put in, albeit you can send stuff back to get redone and so forth. But there's no training. They're keeping all that to themselves so they're sending stuff in, they're putting systems in here where you have to go back to them to get advice on what to do. And the first thing they said, "Just send it back, I'll give you a new one". (NIMACR02)*

*Mostly plastic and heat efficient boilers and condensers... (NISBSEC01)*

## 7.2.2 Conclusions

The advent of new technologies both environmental and non-environmental is changing the nature of the sector considerably for all of the industries within it. SummitSkills believes that the new technologies are creating training issues although only 3% of companies within the province identified a training need arising out of the new technologies, which was lower than in some of the English regions. SummitSkills wishes to work with partners and stakeholders within the province to identify where companies would benefit for bespoke training on new technologies and with manufacturers, to make sure that manufacturing training is quality assured, and can be integrated into existing qualification frameworks to attract accreditation against existing curricula. SummitSkills is also committed to working with partners and stakeholders as well as providers within the province to amending existing qualifications for current workers and new entrants to the sector to take account of current technological advances.

## 7.3 Technological Change (Environmental)

### 7.3.1 Introduction

Renewables within the energy sector is a major growth area in the economy due to the decline of fossil fuels. This emerging technology surrounding renewables and the perceived new skills needing development cross a number of SSCs including SummitSkills, and thus are an important part of this Sector Needs Analysis. ECOTEC (2005) has identified key occupations within the renewables industry sub-industries, and the SSCs with joint responsibility for their development:

Sub-Industry	Occupation	SSC with Joint Responsibility
Biomass	Team Leaders, Rate of Burn Technologists, Electrical/ Instrumentation Technician; mathematical modelling within IT skills	Energy & Utility Skills Lantra (Supply Chain) SEMATA SummitSkills
Hydroelectric	Engineers-mechanical, electrical, electronic; Civil Engineers (Construction): low skilled manual workers.	ConstructionSkills Energy & Utility Skills SummitSkills
Photovoltaic	Electricians; electricians with design skills	Energy & Utility Skills SummitSkills
Solar	Carpenters, Plumbers, Electricians; electricians with design skills.	ConstructionSkills Energy & Utility Skills SummitSkills
Geothermal	Electrical engineers, Electricians, electricians with design skills, Electronic technicians; pipe and systems laying; mathematical modelling within IT skills	ConstructionSkills Energy & Utility Skills SummitSkills
Heat Pumps	Heat Pump Installers-plumbers and electricians	Energy & Utility Skills SummitSkills
Wind	Service engineers, Fabrication engineers, Structural Engineers, Site Wardens, Installation engineers (large scale)	AssetSkills ConstructionSkills ECITB Energy & Utility Skills SummitSkills

ECOTEC (2005, pi).

The development of these new roles incorporating many of the core footprint occupations related to SummitSkills is related to the problems of climate change and reduction of CO<sub>2</sub> and other harmful greenhouse gases within the world. The Prime Minister (Mr. Blair) in the introduction to the Climate Change: The UK Programme 2006 (EFRA, 2006) points out that since 1990, global temperatures have risen by 0.2C, and that atmospheric carbon dioxide concentrations have increased from 354 parts per million to over 380 parts per million and are still rising. Scientists believe that if the emissions continue to increase, then global average temperatures could be as high as 5.8C higher by the end of the century, which it is believed would have a devastating impact on the UK economy and natural world, as well as the economies of the world generally, particularly third world countries (EFRA, 2006, piii).

The Energy White Paper sets the framework for the UK's energy policy, and suggests that carbon dioxide emissions will be cut by 60% by 2050, with real

progress by 2020. There will be a maintenance of the reliability of energy supplies, and the promotion of competitive markets, as well as ensuring that every home is adequately and affordably heated (DTI, 2006, p6).

The UK Government has been extremely proactive in seeking to address the issues of climate change (global warming) through a number of policies such as Climate Change Levy and agreements, Renewables Obligation and Energy Commitment.

The UK has also been effective in working at EU level with the EU Emissions Trading Scheme, and as a result of this work, the UK seems likely to be able to achieve its commitments under the Kyoto Protocol to reduce emissions of greenhouse gases by 12.5% below 1990 levels by 2008-12, as the UK will be almost 20% below 1990 levels in 2010 (EFRA, 2006, p3). The table below shows the global warming potential (GWP) for selected gases from the IPCC Third Assessment Report (EFRA, 2006, p9).

<b>GAS</b>	<b>GWP</b>
CO2	1
CH4	23
N2O	296
HFC-23	12000
HFC-134a	1300
CF4	5700
SF6	22200

Source; EFRA, 2006, p9.

The construction and built environment sector (which includes building services engineering) is a significant generator of these greenhouse gases, and has a major role in achieving the Government's reduction targets, through significantly reducing the output of these gases in a number of ways.

First, the Government is seeking to improve building design and performance through the Building Regulations Part L (which are considered in the Government regulations section of this report) but which do not apply to Scotland and Northern Ireland, which have their own regulations (EFRA, 2006,p5). Since 1990, the energy efficiency of new buildings has been increased by 70%, so a house built in 2002 uses about half the energy consumed in the average existing house. The Building Regulations for England and Wales are expected to deliver reductions in carbon dioxide emissions in 2010 of 0.7 metres cubed (MtC) in the domestic sector.

In September 2005, the Government announced that there would be further changes to the Building Regulations to make buildings more energy efficient, and so from April 2006, these measures will increase energy efficiency standards 27% in non-domestic buildings, and 27% in houses, and 18% in flats. Because of the increasing number of flats being built, it is anticipated that the average across the built environment will be about 20%. The total improvement taking into account all the various standards mean that there will be an overall new build standards energy efficiency increase of 40%, with a projected fuel bill reduction of 40% also against a 2002 new build house, with one built in 2006.

The development of condensing boilers in response to regulations is expected to deliver carbon savings of 0.75 MtC per year by 2010. To enforce and encourage compliance with the building regulations, the Government has piloted a number of initiatives, such as train the trainer workshops, e-learning packs on Part L and a

requirement for random sample air leakage testing within buildings (EFRA, 2006, p80).

In addition the Government is seeking to introduce a code for sustainable homes, which will contain minimum standards for energy and water efficiency, which the Government intends will exceed the mandatory level set by the Building Regulations (EFRA, 2006, p5). The code will set out what initially at least will be voluntary standards beyond the mandatory level laid down by Building Regulations. The code will cover a range of environmental impacts including energy, water and waste, and its purpose will be that builders cannot trade energy and water efficiency for other kinds of improvements. In addition through a Code points system, the use of micro-renewables such as wind turbines will gain extra code points. In time it appears that the Government intends that this code will be implemented into the building regulations. It is assumed that Scotland and Northern Ireland will have similar schemes (EFRA, 2006, p81).

The Government is also intending to implement parts of the EU Energy Performance of Buildings Directive (EUPD). A further provision of the directive is the provision of energy performance certificates where buildings are constructed, sold or rented out, with a further proviso that these certificates are on display in public buildings over 1000m<sup>2</sup> (EFRA, 2006, p82).

Another key provision of the EU directive is the provision for there being a regular inspection of boilers, or alternatively a national advice system, and also the inspection of air conditioning in buildings. The Government anticipates that the implementation of this initiative will deliver an additional 0.2 m<sup>3</sup> by 2010.

Other provisions of the directive include the provision of minimum energy performance requirements for all new buildings, minimum energy performance requirements for large existing buildings subject to major renovation and a requirement to consider renewable energy and Combined Heat and Power (CHP) in new buildings over 1000m<sup>2</sup> (EFRA, 2006, p82).

Continuing a scheme in operation for many years, the Government is also committed to 250,000 additional subsidised installations of home insulation up to 2008, which is over and above existing commitments. There is also a commitment by Government to invest twenty million pounds over two years to strengthen consumer demand for energy efficiency with energy suppliers and local authorities. In addition the Government intends to provide more specific consumer advice and devise effective standards for energy using products. The Eco-design of Energy Using Products provides a formal mechanism for establishing product standards, and this EU directive allows member states to set mandatory energy and other eco-design requirements for products circulating within the EU zone, which the EU commission believes could cut energy consumption by 10%. (EFRA, 2006, p83).

Finally, the Government is committed to using the Energy Efficient Commitment, Warm Front and Decent Homes Schemes to deliver energy efficiency measures to reduce fuel poverty, and continue to support the activities of the Energy Saving Trust and the Climate Change Communications Initiative to raise awareness of climate change and what can be done about it by individuals (EFRA, 2006, p5).

A further drive towards the development of renewables technology is the desire by Government to reach a target set in January 2000 to increase the amount of energy generated by renewable sources to reach 10% of the total electricity supplied by

2010. However this target was subject to a heavy caveat; that the cost of this target was unacceptable to the consumers (EFRA, 2006, p36).

As renewables are also a developing business in their own right, and energy efficiency and the reduction of fuel costs can facilitate competitive advantage, it is perhaps not surprising that the Department of Trade and Industry (DTI) is also interested in the development of a microgeneration strategy. Microgeneration is defined in Section 82 of the Energy Act 2004, as being the small-scale production of heat and/or electricity from a low carbon source. The technologies that are covered by microgeneration include solar and photovoltaic (PV) micro-wind, micro-hydro, heat pumps biomass, micro CHP and small scale fuel cells (DTI, 2006, p4).

In Germany, the DTI estimate that around 150,000 people now work either directly or indirectly in the renewable energy sector. The renewable industry has an annual turnover of 12 billion Euros. Germany's micro generation strategy has played a part in this by granting funding to nearly 300,000 applications for solar panels, small installations for burning solid biomass, heat pumps and energy saving measures in buildings worth 550 million Euros. As well as promoting 100,000 roof programme photovoltaic installations for electricity generation with a goal of achieving 100MW capacity at some point in the future. There is a similar performance from Japan, which has led the way in PV, installing 200,000 PV rooftop systems by 2004, through an aptly named 'sunshine' programme (DTI, 2006, p11).

In Sweden technological development has favoured the heat pump, with the result that over 10% of all households in Sweden use a heat pump. Canada has sought to develop wind turbines, fuel cells and household PV systems in the belief that uniform installation standards will allow for better market penetration, higher volumes, and more competition and as a result reduced costs.

In the UK the Government and Ofgem made a commitment between 2000-2006 of £53.5million for small scale renewable projects, split between three projects, and support for renewables will continue through the Low Carbon Building Programme of £80 million over three years between 2006 and 2009 (DTI, 2006, p11).

### **7.3.2 Microgeneration Technologies**

There are a number of technologies for heat and electrical generation that arise from under this heading, and these are:

#### **Heat Generation**

Solar water heating systems comprise of solar collectors, which can take the form of either evacuated tubes or flat plates, a heat transfer system, which comprises of fluid in pipes and a hot water storage vessel, such as a conventional hot water cylinder. A 4m<sup>2</sup> collection area will provide between 50-70% of a typical home's annual hot water requirement (DTI, 2006, p13).

Heat pumps are a ground source; heat pump uses the warmth stored in the ground to heat fluid circulating through the pipes. A heat exchanger extracts the heat, and then through a compression cycle similar to that used by refrigerators, raises the temperature to supply hot water for heating purposes. In addition there are air and water heaters, both air and water source heat pumps operate in a similar fashion using temperature differentials in the air and water to create the heat, although these are not generally as efficient as ground heat pumps (DTI, 2006, p13).

Biomass stoves and boilers can provide space and/or water heating from burning wood, which can either be in the form of pellets, chips or logs and non-wood fuels. The biomass fuels are generally derived from forestry products, energy crops (willow and miscanthus) and waste wood products such as saw dust pallets or untreated recycled wood (DTI, 2006, p13).

### **Electricity Generation**

Solar photovoltaic (PV) generates electricity from sunlight, and in small scale models are available as roof mounted panels, roof tiles and conservatory or atrium roof systems. A typical PV cell consists of two or more thin layers of semi-conducting material, which is most commonly silicon, and an electrical charge is generated when the silicon is exposed to light and is conducted away by metal contacts (DTI, 2006, P13).

Micro-wind turbines convert wind to electricity, with the most common design being three blades mounted on a horizontal axis with the blades driving a generator directly or alternatively through a gear-box to produce the electricity. Traditional designs have the system mounted on a mast, but building mounted turbines are now starting to come onto the market in the UK and elsewhere (DTI, 2006, p13).

Micro-hydro systems are to be found typically in areas where there are steep declines such as hills or in river valleys. Hydro power however can be captured wherever a flow of water falls from a higher to a lower level, and may occur when a stream for example runs downhill, or a river passes over a waterfall or man made weir, or indeed where a reservoir discharges water back into the main river. The amount of electricity produced, depends upon the amount of water available, and how fast the flow is (DTI, 2006, p13-14).

### **Combined Heat and Power (CHP)**

As the name suggests CHP is a hybrid of both electrical and heat generation. In micro-CHP, these technologies use natural gas as a fuel but also provide electricity as well as heat. CHP comprises of two main systems, being either reciprocating engines or Stirling engines. Within this species, fuel cells can also be a source of power (DTI, 2006, p14).

The total number of installations for the various micro-generation technologies is shown below, however DTI (2006) states that the number of installations has flattened in recent years, which is a worrying trend, and goes against Government objectives suggesting that further marketing and persuasion of the general public is required.

The micro-generation industry has three distinct components; product manufacture; design; and installation, which in the main relates to plumbers and electricians which come under the SummitSkills footprint. The installer market for micro-generation is highly fragmented with there being over 275 installers with an average turnover of £62,000 per company. This excludes companies operating in the microchip and fuel cell markets, as these sectors tend to have a fewer companies, which employ significant numbers of people. The DTI (2006) estimate that there are between 200-600 jobs in micro-generation excluding micro-CHP and fuel cells, and some stimulus has been achieved in the industry due to the Government grants programme (DTI, 2006, p35).

Technology	Number of Installations
Micro-wind	650
Micro-hydro	90
Ground Source Heat Pumps	546
Biomass boilers (Pellets)	150
Solar Water Heating	78,470
Solar PV	1301
Micro CHP	990
Fuel Cells	5
Total	82,202

Source: DTI (2006, p14)

As already stated, many of the skill sets required to increase the fitting of micro generation technologies fit within the SummitSkills sector, generally, these can be defined as:

Sub-Industry	Core Occupations and Skills	Qualifications and future plans for FE/HE vocational development	Training provision sufficiency to meet current and future skill needs
All Industries	Engineering skills are central to the renewable energy sector but there is greater competition between sectors in the economy for such skills.	Personal Development Plans (PDP) and Continuous Personal Development (CPD) need greater recognition to build up skills and promote succession planning	University courses need more hands-on training and not just theory; need for theory at University Courses in engineering to be put in context of renewable energy applications
	There is a greater expectation by customers of technical reliability and associated skills of workforce.	FE Colleges that have Plumbing, Electrical Installation, Electronic Control, Construction and Civil Engineering courses should ensure a renewables content	There needs to be an apprenticeship framework that includes Renewable Energy qualifications or core elements.
	Plumbing, electrical installation, electronic control, construction skills across all sectors are core skills.	Partnership working between HE/FE and employers is a way forward to ensure skills of trainers, employees and trainees are updated in relation to manufacturers.	The adequacy of current and futures training provision is dependant upon policy drivers and future market position, considered to be adequate at present in general terms but systems and processes change and so should courses
	A combination of integrated electrical and plumbing skills is required.	Funding learning opportunities is an issue. Some Colleges are offering a range of courses in 2006 leading to formal qualifications as and when QCA provides funding, which address skills for renewables. Employers are not aware of this.	Need for funding of units as well as qualifications. Some concern over 'bolt on' courses.
	Welding and mechanical fitting skills/pipe fitting/ steel erecting trades are in demand	SQA Skills for Work Courses that provide taster opportunities for learners aged between 14-16 should be applied to renewable energy skills for work courses.	

Source: ECOTEC (2005, p27)

ECOTEC (2005) has broken down skill requirements into the relevant micro-generation industry as well as the larger energy plant for larger scale generation as an alternative to fossil fuel plants. Within the biomass sub-industry the required skill sets appear to revolve around graduate and level 4 training.

Sub-Industry	Core Occupations and Skills	Qualifications and future plans for FE/HE vocational development	Training provision sufficiency to meet current and future skills needs
Biomass	<p>High turnover at low skill levels in Biomass.</p> <p>Potential shortage of engineering graduates may affect biomass.</p> <p>Design and Modelling, production of plant is staffed by highly skilled people; low staff turnover.</p> <p>At the waste treatment level, little interest in skill development at operative/manual levels.</p>	<p>Businesses use HE for selection of staff, courses are considered more than adequate at graduate level.</p>	<p>Linkage with HEIs is strong and recruitment is made through this linkage with relevant departments.</p>

Source: ECOTEC (2005, p28).

Hydro also has a skill set biased towards higher education, however there is evidence that lack of structuring of apprenticeship training negates against successful attraction of younger workers to the industry.

Sub-industry	Core occupations and skills	Qualifications and future plans for FE/HE vocational development	Training provision sufficiency to meet current and future skills needs.
Hydro	<p>Rural nature of site location hinders recruitment.</p> <p>Shortage of Civil Engineers in Hydro. They are out there in the economy but rural location of businesses is an issue affecting supply.</p> <p>In power systems the Electrical Engineer is the core occupation.</p> <p>In R&amp;D Compressor design staff and Mechanical Engineers are required.</p> <p>New build programmes will involve a range of construction skill including repair and maintenance-these skills are competitive.</p>	<p>Workforce at management and professional level is ageing- PDP and CPD essential to promote succession planning.</p>	<p>Very little apprenticeship training is in place which negates early capture of young people.</p> <p>Industry would like to see sandwich courses that combined academic and work experience.</p> <p>Graduates lack hands-on vocational experience.</p>

ECOTEC (2005, p29)

There would appear to be more of a need for craft level skills as opposed to engineer and graduate skills in the PV, Solar, Geothermal and Heat Pumps, reflecting the

microgeneration speciality of these technologies within the domestic and commercial markets, rather than as large energy producers for the national grid for example.

Sub-industry	Core occupations and skills	Qualifications and future plans for FE/HE vocational development	Training provision sufficiency to meet current and future skill needs.
<p>PV, Solar, Geothermal and Heat Pumps</p>	<p>Shortage of plumbers and qualified electricians.</p> <p>Increasing demand for accredited Heating installers in PV, Solar and Heat Pumps; Design Engineers with CAD capability.</p> <p>Engineering skills-mechanical, electrical a thermal technology application.</p> <p>Accredited installers with knowledge/skills in above and building and construction regulations.</p> <p>Quality verifiers are required.</p> <p>Installation and maintenance skills at craft level are increasingly required.</p>	<p>Various courses are appropriate and adequate for plumbers, electricians and installers.</p> <p>Plenty of courses available for electro-technical, plumbing, refrigeration and air conditioning, heating and ventilation building services occupations.</p> <p>There is a Solar Domestic Heating Hot Water (SDHW) Heating course being developed for qualified or experienced domestic Heating Engineers and Plumbers. A BPEC certificate will be awarded and exemption from the mentoring aspect of SCHRI accreditation.</p>	<p>More integrated courses are required that capture flexible working and multi-skilling.</p> <p>But note: These conventional trades need training or retraining and development for qualifications on renewable installation. Is there a case for freestanding renewable energy sector qualifications or should they be 'Bolt-Ons' to existing courses?</p> <p>Encouraging Heating Engineers to participate in solar training courses can only be driven by good potential market opportunities.</p> <p>The Government should support the development of accredited installation and design training courses, especially the recently developed BPEC accredited solar water heating training course.</p>

Ecotec (2005, p30).

Wind electricity generation requires both craft and technician skill relevant to the SummitSkills footprint to be developed:

Sub-industry	Core occupations and skills	Qualifications and future plans for FE/HE vocational development.	Training provision sufficiency to meet current and future skills needs.
Wind	<p>Tendency to use overseas skilled labour to construct wind turbines.</p> <p>Local contractors input into the construction of foundations and access roads.</p> <p>Electricians, Builders, Generator Operators with wind turbine and switching skills/ Electrical Engineers.</p> <p>Considerable mobility of staff at operator and supervisory levels.</p> <p>Technicians with basic mechanical and electrical technical background, enhanced with specific plant maintenance and operations training by the manufacturer.</p>	<p>NVQ 3 level for Technicians.</p> <p>HNC or above for Supervisors or Operations Managers.</p> <p>For Developer Managers an academic and professional qualification in planning or an environmental discipline.</p>	<p>Needs to be a common set of competencies across the industry and standards that can be assessed.</p>

ECOTEC (2005, p31).

### 7.3.3 Greywater Systems

Greywater systems are not part of microgeneration as they do not generate heat or electricity, but are a method of water conservation. It is however extremely pertinent to the SummitSkills footprint, as it is a technology that sits within the role of a plumber. Greywater is the recycling of water that has been used for other purposes for flushing WCs, as there is no real requirement for drinking quality water to flush the WC. Greywater therefore is the waste water from baths, showers and washbasins, which can be collected in a household-scale reuse system, which gives the water a reduced amount of treatment to make it fit for WC flushing.

Using greywater can save up to 18,000 litres of water a year for each person, which represents a 33% reduction of daily household use and this therefore, constitutes a significant saving in treatment costs and if the property is on a water meter, water bills would be reduced. The reuse system in the Well Butt greywater system for example consists of a collection tank with a submersible pump which feeds a separate water tank, which in turns provides water to the WCs on a separate circuit. A plumber would fit the system in new build at the same time as fitting a normal water supply system (Environment Agency, 2005, p1-2).

### 7.3.4 Northern Ireland Perspective

The total primary energy requirement in Northern Ireland in 2002 was 41,000,000MWh, which is equivalent to 3.42Mtoe (tonnes of oil equivalent). The energy requirement was broken down across the following sectors:

- Residential Users -43.9% (17,600,000MWh)
- Transport -27.6% (11,000,000MWh)
- Industry -16.8% (6,700,000MWh)
- Commerce and Buildings -6.4% (2,600,000)
- Public Sector -5.3% (2,100,000MWh)

The above energy was made available from the following sources:

- Coal -29.4%
- Oil and LPG -26.3%
- Natural Gas -22.4%
- Fuel for Transport -18.9%
- Imports of Electricity -2.8%
- Renewable Energy -0.2% (Action Renewables, 2005, p3).

The demand for energy within the province is believed to be growing by about two to three per cent per annum. This growth in demand is leading to questions as to the provinces capability in securing the necessary supplies of fossil fuels in the future to meet the expanding needs, and indicates a need for the province to begin thinking of investing in renewables technology as an aid to guaranteeing demand (Action Renewables, 2005, p3). This has led the Department of Enterprise, Trade and Investment (DETI) to set a target for the province of 6.3% of electricity to be produced from renewable sources by 2012 (Action Renewables, 2005,p3). There is evidence that the province has developed and is continuing to develop a renewables technology. Currently the province has the following technologies delivering the following electrical energy outputs:

- Ground Source Heat Pumps 669kWth (57 installations)
- Hydro Electric Schemes 3755kWe (31 installations)
- Photovoltaic 373.16kWe (53 installations)
- Solar Water Heating 210,862kWh (69 installations)
- Biomass 3066kWe & 41,446kWth (53 installations)
- Anaerobic Digestion 145ke (2 installations)
- Wind 108,615kWe (103 installations, where wind farms count as one installation)

(Action Renewables, 2005, p5).

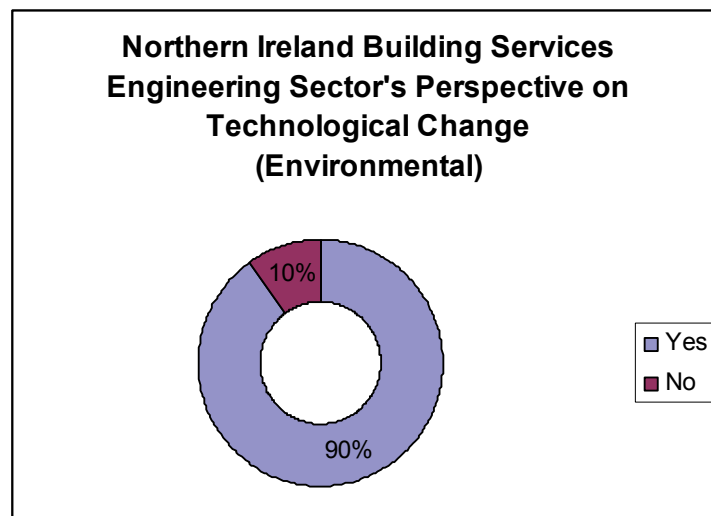
The technologies are however not evenly dispersed around the counties of the province, so for example the installed capacity for Anaerobic Digestion, is centred in County Down and Antrim, the large-scale biomass (electric) being concentrated in Fermanagh (88%), with Derry (3%) and Antrim (9%). There is however a better spread around the province in relation to large-scale biomass (thermal) with Londonderry (38%) being the biggest, followed by Fermanagh (28%), Antrim (20%), Tyrone (9%), Down (3%) and Armagh (2%). All large scale ground source heat pumps are in Antrim, and large scale photovoltaic in Derry. Large scale hydro installations are more evenly spread, with Tyrone (32%) Antrim (36%) and

Londonderry (4%), with another not specified (28%). Large scale wind installation is well distributed across the province with Derry (28%), Tyrone (25%), and Fermanagh (23%) ROI (13%), Antrim (11%). (Action Renewables, 2005, p8-15).

In relation to small scale (microgeneration) installations within the province, then small scale biomass installed capacity then Londonderry (46%) is the biggest installer, followed by Antrim (32%), Fermanagh (16%) Down (4%) Tyrone (1%) and Armagh (1%). There is also a good spread in relation to the installation of small-scale ground source heat pump installed capacity then Armagh (24%) is the biggest, followed by Tyrone (21%) Down (17%) Londonderry (16%) Antrim (13%) and Fermanagh (9%). Small Scale Hydro however is restricted to Antrim (52%) and Derry (48%). Small scale Photovoltaic is concentrated in Antrim (61%) with smaller concentrations inn Down (15%) Derry (9%) Armagh (7%) Fermanagh (5%) and Tyrone (3%). There is a similar spread in relation to small scale solar water heating installed capacity with Antrim (46%) Down (35%) Fermanagh (13%) Londonderry (3%) and Armagh (3%). In considering small-scale wind installed capacity, and then Antrim (35%) has the biggest concentration of installations with Antrim (35%) Armagh (22%) Down (16%) Fermanagh (10%) Tyrone (9%) and Derry (8%) (Action Renewables, 200

**7.3.5 Northern Ireland Building Services Engineering Contractors’ Perception of Technological Change (Environmental)**

The building services engineering sector within Northern Ireland would appear to be becoming highly involved in the specification and installation of environmental technologies, although this is not as strong as for non environmental technologies currently. The diagram below indicates the extent of exposure of the companies from the sector in Northern Ireland who have encountered environmental technologies:



The quotes below are indicative of the views expressed by the companies encapsulated within the diagram above:

*Yes, purely because I think unfortunately with us living in Northern Ireland, the furthest western tip in Europe, the fuel costs are very expensive and it seems to be coming more to the fore where people are very conscious of the fact of environmental issues; how we can*

*reduce fuel costs. Certainly we as installers... do suggest to our customers to manage their fuel a lot more efficiently and better than what they do. So it seems to be a big market here at the minute purely based on fuel cost. (NISP01)*

*Yes. Very much so... New products are coming on line all the time. I think one of the things about Northern Ireland too.. we sort of are maybe a bit slow technologically-wise. I think things come through from Europe. I think Central Europe are a lot further more advanced, technologically advanced, than us. (NILP01)*

*Yes. We find this across the board. Most of the pre-tender questionnaires that we're asked to fill out requires us to fill out our undertaking in respect to specific legislation, whether it's green issues or waste management or even training and awareness of most of the legislation. (NISET01)*

*Yes. Over the last several years there's been an increasing use of computer technology within the electrical contracting industry. Now this particularly relates to the installation of data cabling for point of sales installations. And also new innovations in the installation of trunking and cable tray and other cable systems... There is a more [rapid] tendency in the last seven to ten years for innovation in what there hitherto had been. (NIMET01)*

*Yes, particularly with issues involving the disposal of waste materials. (NILET02)*

*We do notice it appearing more in the tender documentation, although I do feel there's a lot of room for it to expand yet. (NISHV01)*

*Most definitely. (NISHV02)*

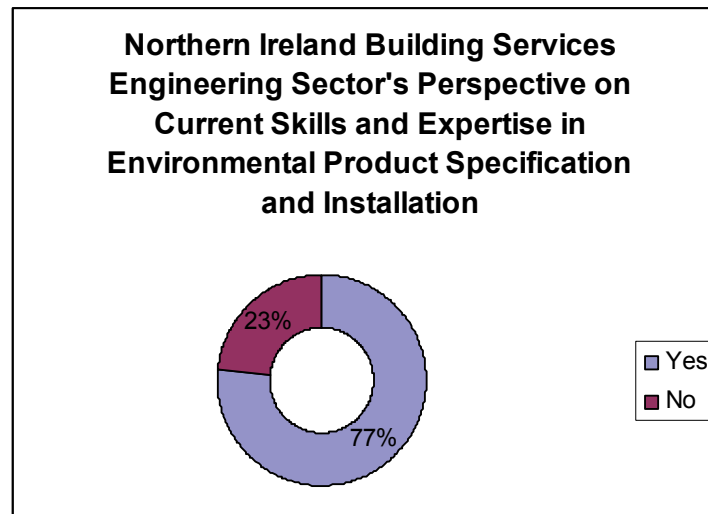
*Not so much on the individual customer, just... whose just paying for the job themselves, but if it's coming through consultants yes, there is, there is an issue for the environment then. (NIMACR01)*

*It was a request from the company. It was a Republic of Ireland company and their storage and they wanted to do something for the green... and it was the first installation we had carried out of that type. (NILACR01)*

*Definitely. As I say, there's been a real upsurge in the amount of stuff that people have been asking us to deal with. I have to say that most of it is stopped in its tracks due to the capital cost of that. But I do anticipate that the government may eventually get their act together and grant aid these things to the level that they need to in order for basically... (NILBSEC02)*

The next question sought to elicit whether the Northern Ireland building services engineering sector felt that it had the requisite trained staff to adequately specify or install the new technologies. The diagram below indicates that the sector was less

confident about having skills in this area than might have been expected given identified exposure in the diagram above:



The quotes below are indicative of the views of the sector in relation to the data contained in the diagram above:

*Don't know about this. It's ... sustainable ... depends what ... are people trained in renewable energy, solar and all that type of thing? No we really haven't at the present time but that's one of the things we're undertaking to try to do. I think it's up in Derry there's a course coming out through the BTec and Derry are doing one of them where we're going to try to get the people trained, because, as I say, it's a growth market. (NILP01)*

*Because we're such a small company it relates to key members of staff. Whereby we would make ourselves aware through picking up from information on tenders about what the specific legislation means to us as a trading entity. (NISSET01)*

*Oh, yes, they're excellent, yes. (NISHV02)*

*In very limited quantities in certain of the areas. We have sent some of our guys on training courses specifically in the technologies which we've talked about which have been become part of the sustainable growth. (NIMHV01)*

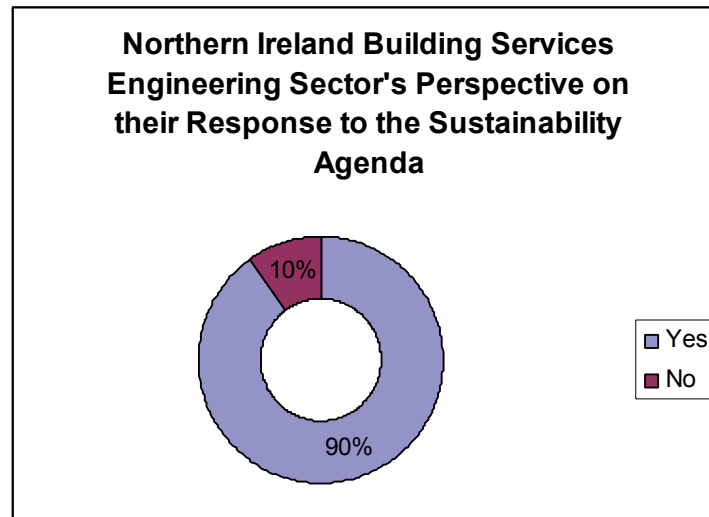
*Yes. (NISACR01)*

*I would have, to a degree but it's been because of the work that I do myself... to read up on things and try and keep abreast of what's happening... (NISACR02)*

*Yes, we do. For the most part we're self-taught on that in that we'll be attending courses and advising ourselves of those. (NIMBSEC02)*

*Yes, we do, we have a number of environmental engineers and we're also developing a skills base within our own building services engineers. (NILBSEC01)*

In the next question, the building services engineering sector within Northern Ireland were asked about whether their companies were seeking to address the greener building/sustainable development agenda. As can be seen from the diagram below, predominantly there was an attempt by the companies to address this agenda:



The quotes below are indicative of the data contained within the diagram above:

*Seems to be a fair degree of confusion and I feel that wading through that confusion, a lot of people, reference grants, and such like, have come from Government. Because of the all Ireland concept now, that it seems to be that the south seemed to be pushing ahead quite a bit with grants and certainly the north, not up to speed. Training is slightly confusing but there is a good grounding and everybody seems to be wanting to get involved with renewable energies because they see it as another string to their bows, a business concern. (NISP01)*

*It's all down to training. We need to get a few of the contracts that have all the bits and pieces in it for to get them trained up on it. But, yeah, we are looking certainly in the next part or the last part of this year we're looking for training in sustain. (NISP02)*

*Well, certainly we have looked at the various possibilities. What I think I'd like to see, the various systems out there, basically get a wee bit more developed before we go down there ... Well they are changing and there's a lot of the ... It's like the underflow. There's a lot of rogue systems out there, which we really wouldn't want to jump on the bandwagon. (NIMP02)*

*As before, we're going to start getting the guys trained on to it. There's numerous things like Bio Mass, solar power, so on and so forth. We'll have to get trained into it and learn the technology to be able to deliver it. (NIMET01)*

*We're working with local consultants who have experience with greener buildings and issues and we are utilising our process control knowledge. (NILET01)*

*Well I suppose we're not just where we would like to be – we would like to be further on and the problem for an organisation, such as ours, because we are contractors, rather than designers, we're really dependent on what the designer and what the client is prepared to pay for it. A lot of the green energy costs are higher – the installation costs, initially, are probably higher and, therefore, it'd be, you know, when it comes down to a factor of money versus ... cost versus design, you do see that there's probably not as much of it going in, so because we are dependent on what is actually specified and designed, we're not probably as much involved on it as we'd like to be. (NISHV01)*

*Again, they sort of fall into maybe some part of the answer to the last question. We find that because we... we have a wide range of clients for whom we do business. A lot of them are based in government and local government. And there's a great emphasis within those organisations obviously to look at cleaner and greener issues. We find that more frequently now we're being asked to get involved, to price for specify and look at projects which involve the green issues. (NIMHV01)*

*Being part of a group of companies, we are communicating inter-company with not only specifiers and client bodies, but also with main contractors, to try and build up our knowledge of that there. The consulting engineers equally are doing the same thing. (NILHV01)*

*We're looking obviously at the, at the carbon issues locally that are being driven from the plan specifications and a number of project we're involved in from a design and build point of view where we're bringing a value engineering aspect to enhance the sustainability of the design proposal. (NILHV02)*

*Well we're in with the Carbon Trust doing a survey so we're well aware of all the new technological breakthroughs in that department... (NISBSEC01)*

*As I said in the previous question, we have and continue to send selected staff on training and awareness courses as required and demanded. (NISBSEC02)*

*Through a mixture of organic growth and training in new skills and new software products. (NILBSEC01)*

*Well, there's three legs to this. There's being aware of it. And we are aware of it by getting information in the office, either by having in-house briefing seminars or going to external seminars, we're aware of what's going on. There's the aspect of actually working out the feasibility of it in terms of, you know, the life cycle cost. So, working*

*out, you know, can these things be sustained or do they make economic sense. And then thirdly we're now really moving into an area where the whole building is sustainable, which goes beyond our own specialities. And that side of it is something that is requiring us to bring more backup information and more skills to the design than we had traditionally had to do. (NILBSEC02)*

### **7.3.7 Conclusions**

The data from the building services engineering sector within the province would suggest that the sector is increasingly being exposed to new environmental technologies in relation to the sector. As in the English regions, there is a general belief that the sector currently has the requisite skill requirements to fit the new technologies, although there are some companies within the sector that do appreciate that they have skills needs. Generally, the sector mirrors England in that although many companies feel they do have the skills, there is no discussion about specific technologies which the literature indicates may be required to play a significant part in the creation of renewable energy or reduction of greenhouse gases, such as solar and photovoltaic panels. This it might be argued therefore indicates that the sector is not proactive in planning to address new technologies, but is reactive in getting training for existing technologies that are being prescribed by legislation, so for example this would include things such as condensing boilers.

SummitSkills believes that Northern Ireland in line with the rest of the UK does require more training in the fitting of renewable micro regeneration technologies, through quality assured training programmes that can be incorporated into the existing qualifications framework. SummitSkills is keen to work with providers and stakeholders within the province to bring this initiative forward. SummitSkills is also keen to work with partners and stakeholders to incorporate new environmental technologies training into existing curricula programmes within the sector for both existing workers and new entrants, to keep the curriculum up to date. SummitSkills also believes that within the province, there is a need for there to be the development of general be-spoke training courses to facilitate the development of consistent sustainable policies for the sector. SummitSkills proposes to work with stakeholders and partners within the province to facilitate this development.

## 8 Government Impacts on the Building Services Engineering Sector

### 8.1 Government Regulation

Although not related directly to training, the affect of Government through legislation such as the Building Regulations in England and Wales indirectly impacts on training as companies within the sector are required to carry out certain functions to address legislative requirements.

Employer needs for this indirect training changes in relation to initial base competence and thus varies between each employer. It is not possible to engage in an in-depth discourse at this stage, although further research on the primary data presented below will it is argued aid SummitSkills in developing bespoke training standards to meet employer needs that are identified.

In England and Wales (not Scotland or Northern Ireland, although it is anticipated that similar legislation will be forthcoming in due course) two main pieces of legislation emanating from the Building Regulations are certain to affect companies within the building services engineering sector, and these are Part P and Part L.

Part P relates to the design and installation of electrical installations, and requires that electrical installations should be designed and constructed, suitably enclosed and separated by appropriate distances such that they provide mechanical and thermal protection, thus preventing electric shock and injury.

To facilitate the operation of this statute, there is a requirement that electrical installations should be inspected and tested as necessary and appropriate during and at the end of installation and certified with the issue of a BS 7671 certificate. The issue of the certificate though may only be carried out by a person competent to do so. The certificate is required to show that the electrical installation work has been inspected appropriately during erection as well as on completion to verify that the components are made in compliance with appropriate British or harmonised European Standards and have been selected and installed in accordance with BS 7671: 2001, taking into account external factors such as moisture, and finally are not visibly damaged or defective so as to be unsafe.

The legislation provides that the competent person who issues the certificate should be "qualified" which means that the appropriate person should have relevant qualifications, and the knowledge and experience required to carry out the inspection and testing procedures and complete the relevant electrical installation certificate (BRPP, 2006, p10). It is envisaged that legislation such as this will increase the requirements for training within the SummitSkills footprint among those who wish to be 'qualified' as being competent to sign off electrical work.

Within the renewables section of this Skills Needs Analysis (SNA, reference is made to the legislative effects on CO2 and greenhouse gas emission reductions and the desire to conserve energy thus helping the environment. In England and Wales, Part L of the Building Regulations seeks to do just that through a legislative framework. Part L Conservation of Fuel and Power regulations require that reasonable provision shall be made for the conservation of fuel and power in buildings through first, the limitation of heat gains and losses, secondly, through thermal elements and other

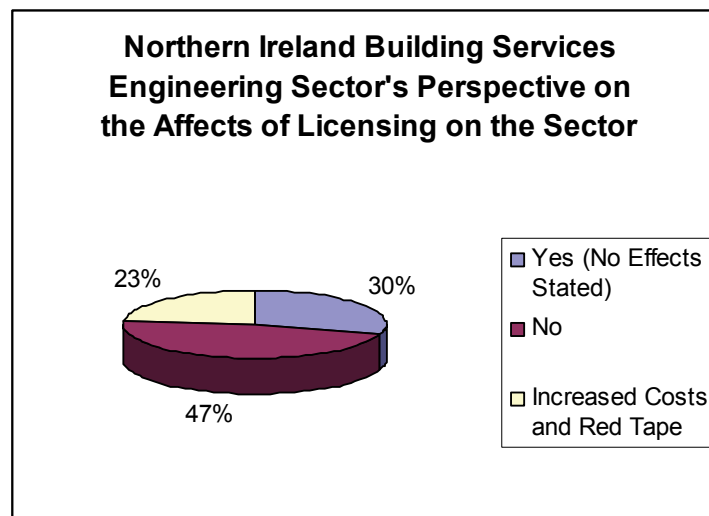
parts of the building fabric, and thirdly from pipes, ducts and vessels used for space heating, space cooling and hot water services.

The legislation also requires companies within the SummitSkills footprint to provide and commission energy efficient fixed building services with effective controls and provide the building owner with sufficient information about the building, the fixed building services and their maintenance requirements, so that the building can be operated in such manner as it uses no more fuel and power than is necessary and reasonable in the circumstances (BRPL, 2006, p5).

Again it is argued that the environmental requirements of Part L will raise a training need among many existing employees within the SummitSkills footprint, as well as changing the training requirements for new entrants into the sector. Although as stated above, these regulations relate only to England and Wales, it is argued they are indicative of the type of training needs that will be created indirectly within the building services engineering sector as a result of Scottish Executive or devolved Northern Ireland Government.

### 8.1.1 Contractors view on the Northern Ireland building services engineering sector government regulation

The first question within this section sought to analyse the views of the building services engineering sector towards the new licensing schemes which have been introduced within the sector across the UK. The diagram below indicates that licensing schemes have touched the sector significantly, and although it is seen by some companies as having increased costs and red tape, there would appear to be some support for the schemes across the sector within the province:



The quotes below are indicative of the views of the companies within Northern Ireland encapsulated within the diagram above:

*I think this is the single thing that can make my business a lot better. I think licensing is a linchpin for getting a bit more credibility back into our industry. I just feel that at this minute in time, there's far too many people out in the marketplace, half-trained, people who profess to be*

*plumbers or gas fitters or whatever, and they've come through a fast track system. They don't have the technical skills which have been built up over years. I think that the licensing scheme where you need to be a certified engineer, secondly you have to have a bona fide business and thirdly, have credibility within the sector itself, is the only way in which we can get the public's perception of us as an industry, back, and confidence installed back into industry again. (NISP01)*

*It hasn't no. Although we are a licensed installer, I don't see it has because there's more and more competition coming in from the smaller guy, who's not aligned to anyone. (NISP02)*

*CORGI clearly has, industry licensing schemes in terms of licensed business as yet, commercially it hasn't, on the domestic side of the industry I think it has, certainly within the commercial sector, no. Licensing for going back to sustainability and renewables is having an impact. (NILP02)*

*The only thing that we find currently is that we have to be continually updating our electrical... our regulations and our health and safety issues, which are affecting us. (NISET02)*

*Well, when you say industry licensing scheme, relating in particular to quality assurance management and Safe-T-cert for health and safety, we support this. And we would like to see the government bringing in stricter guidelines for the control of electrical contractors. By not only introducing a license requirement for the contractors but also for electricians. The trade and construction industry requires a greater tightening up by legislation. Most evidently in my experience over fifty years the industry is not capable of self regulating itself with an acceptable degree of integrity. (NIMET01)*

*Well one of the things that I have noticed myself, personally, and 25 years that I have been involved in this business, is now we are becoming laden down with requirements to be members of different Associations and different Bodies and I don't always think they're advantageous to the clients, because at the end of the day, when it comes down to the fact the client, actually, pays the cost of that, whereas, if that drive has been put into some light green energy, or something like that, the cost would be better ... they would have more benefit from their cost and the environment and everything else would benefit in the cost. (NISHV01)*

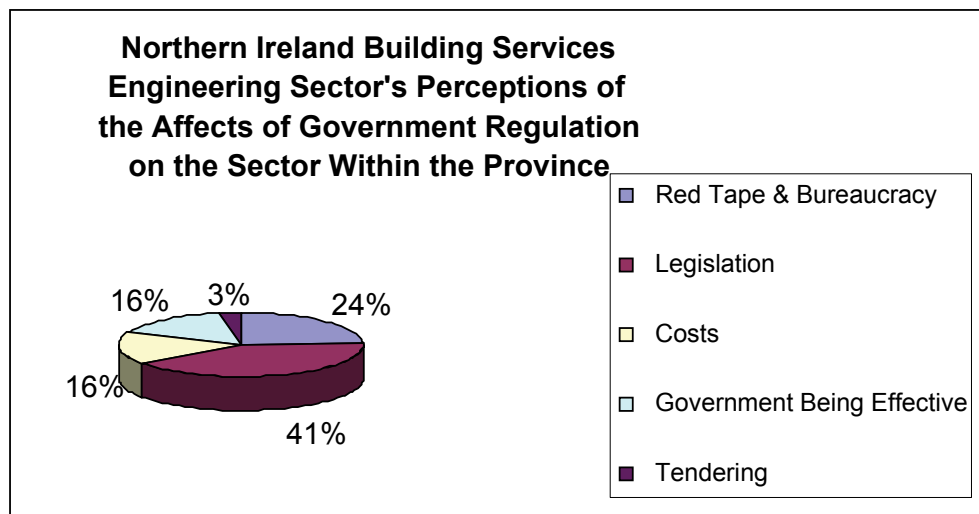
*No. Not directly. But we have been aware of, although through my contacts with HVCA I am aware that it will have an impact shortly. But there are a number of issues that do affect our business which may, I'm not just sure of the relevance of some these things, but we do find there's an awful lot of unnecessary, we believe, legislation which is being imposed on us through various schemes. Safe T Cert being one. Which is now Work Safe through HVCA. It was largely driven by the building organisation down the health and safety road. But there are a number of pre-qualification areas which we have to get involved in. Construction Line being another. There are a number of these*

*things which every corner we turn there appears to be something else which we need to pay towards having. And if we don't have we don't get work from certain quarters. So, those type of issues I find more of a concern than maybe some of the technological advances.*  
(NIMHV01)

Yes. New [FCAS] regulations for refrigerant disposal (NISACR01)

*Well the FGAS regulations that'll come in and they cordon off all of the gas that's used from purchase in a cylinder to it's return to the supplier will entail more paperwork and control of the gases that are being used and the equipment.* (NILACR01)

The next question sought to extrapolate from the interviewees their views on the way that government regulation was affecting the building services engineering sector within the province. The diagram below indicates that the companies within the sector identified a number of issues that related to Government regulation:



The quotes below are indicative of the views of the sector encapsulated within the diagram above:

*I think it's affected it greatly over the last number of years. Many things have changed – such things like where ... registration etc has come into it, a lot of people don't see that it's necessarily been a beneficial change to us because it doesn't really seem to be tackling the points of getting the rogue traders – just seems to be putting a burden on to contractors who do it correctly. But as I say, the government ... there's lots of things come in with the new regulations, the efficiency of the boilers etc., so on and so forth, have all come in. In Northern Ireland the new Part L regulations come in this August I think it is, where the whole efficiency of buildings is going to have to be improved. So government policy does have a great influence.*  
(NILP01)

*Oh, that's a very broad brush. If I was honest I would say that it has impeded the progress of my company. But to be realistic, there has to*

*be legislation to control the actions of others or we would aimlessly go through life doing what we wanted. It's why we have individual contracts and agreements. And it's the same... somebody has to drive... some knowledgeable body has to oversee the quality and quantity of work that we would be doing. (NISET01)*

*Well, government regulations, particularly on health and safety and more recently in sustaining the environment have, in our opinion, improved the construction and in particular the electrical contracting industry. Those particular contractors, businesses that do wish to be responsible and play the game find that this supports their past efforts. We ourselves welcome any regulations in relation to health and safety, protection of the environment and waste management and regulations. (NIMET01)*

*Well I think Government regulations they have ... there's far too much regulation, there's far too much administrative work and I feel this is a knock-on effect from the EEC, that the jobs that were initially promised to be created by EEC are now being created in paperwork and in management trails, rather than in productivity, and that is what makes our industry, well maybe it doesn't affect us so much, as it makes the industry unproductive. (NISHV01)*

*I think the government regulations... I suppose really it goes back to the sustainability thing. I think again we're looking at something that people are not being definitive enough in what they're likely to expect. If we're talking about methods of procurement, government certainly in Northern Ireland are looking more and more at the PPP, PFI route of procurement. That is a major issue for the specialist engineering contracting sector. I don't know whether that sounds fine. (NILHV01)*

*It's hard to say, I'm not sure. (NISACR02)*

*Well it creates business for us in as far as the customers who have the gases in there systems have to adhere to the new regulations and therefore we're being requested to change gases by these large multiples and by some other customers. (NILACR01)*

*Well, certainly in terms of the building regulations and so on they have a major impact certainly in terms of disability regulations and their impact. Certainly in the services we provide we're very aware of that. And I certainly think any Government initiative probably has an impact on what we do. (NIMBSEC02)*

## 8.1.2 Conclusions

The Northern Ireland building services engineering sector is not as critical of Government regulation as many of their colleagues within the English regions for example. In relation to both licensing and government regulation however there is evidence that the sector has similar issues to their colleagues in England in type if

not in ferocity. SummitSkills believes that there may be a need within the province for bespoke training courses to take place to deliver training to help companies within the sector in the province keep in touch and comply with legislation as well as seeking to show companies how where necessary to effectively navigate legislation and create systems that maintain and improve current productivity levels. SummitSkills will work with partners and stakeholders where necessary to facilitate this training.

## **8.2 Government Impacts on Training Policy**

Within this section of the SNA, we consider the impact that Government policy on training has generally on the education section generally and the construction and building services engineering sector specifically. The literature part of this section considers the main policy documents, which may impact on the building services engineering sector. The documents considered are not meant to be exhaustive, but indicative of the policy directions within the four nations of the UK and in this context specifically Northern Ireland. The section concludes by looking at the regional views of the participants from the SummitSkills footprint within the research. The inclusion of the Leitch (2005) report it might be argued is not specific to Northern Ireland as it emanates from England, however SummitSkills believes that as Leitch (2005) took a UK wide perspective and some of the modelling and conclusion are likely to have wider influence than simply England, that it is important to include it within the Northern Ireland SNA.

### **8.2.1 Leitch Review of Skills (Interim Report)**

Lord Sandy Leitch was asked by the Government in 2004 to carry out a review of the skills in the UK, with a view to considering what the UK's long term ambition should be for developing skills in order to maximise economic prosperity and productivity and to improve social justice. The interim report was produced in December 2005, with the full report due at the end of 2006. The definition of skill or human capital, which Leitch (2005) accepts as given, comprise of: innate ability, qualifications and knowledge acquired through formal education, and competences and expertise acquired for example through on-the-job training. In addition a skill can be measured in three interrelated ways through the level of competence (which might be described as relative ability) achievement of competence (a qualification) or how competence is used (for example within an occupation) (Leitch, 2005, p37).

Leitch (2005) in his report reiterates much of what has already been written elsewhere about the weaknesses of skills among the UK workforce, pointing out for example that more than one third of adults do not hold the equivalent of a basic school-leaving qualification, with a sixth of adults being not fully literate and almost half being not functionally numerate.

In conclusion to this, Leitch (2005) points out that as 70% of the workforce in 2020 have already left school, therefore simply improving schools will not alone do (Leitch, 2005, p1). In addition Leitch (2005) concludes that half of the working age population in 2020 is already over 25 years old, which is beyond the age when people normally participate in the traditional education route from school to university. Furthermore 60% of the workforce will consist of people aged between 50-65 years of age (Leitch, 2005, p8).

When compared with other nation comparators then the UK is consistently out-performed by Sweden, Finland, USA and Germany for example, and it may be argued that the UK is only performing at the mean because of very poor performing countries such as Mexico, Portugal and Turkey. The UK performs well however on higher-level qualifications but performs poorly on intermediate skills, and has more people with low qualification levels than many major competitors and as such is ranked eighteenth across the OECD (Leitch, 2005, p43).

New research as part of the Leitch (2005) report shows that if the Government meets its current ambitious targets for UK skills improvement by 2020, then the proportion of the workforce without any qualifications will fall to 4% and the proportion holding a degree will increase from 27% to 38%. This leads to subsequent benefits through increasing annual productivity growth by 0.2% and in turn leads to a net benefit to the economy of £3billion a year, which is equivalent to 0.3% of GDP (Leitch, 2005, p3).

In context, Leitch (2005) points out that currently, the proportion of adults in the UK without a basic school leaving qualification is double that of Canada and Germany (Leitch, 2005, p6). A further globalisation driven problem is that although India and China, with large populations, produce as a percentage significantly less graduates, the absolute number of graduates produced is significantly higher, as between them India and China produce four million graduates a year, as opposed to 250,000 in the UK. To respond to the emerging economies of India and China et al, then the UK must make sure that it has a world-leading skills base, or risk losing out on high value industries and new technologies. Failure to address this issue will lead to a risk of the UK becoming trapped in low value-added activities (Leitch, 2005, p18).

But notwithstanding this, even if the UK can meet these targets then the human capital will still fail to be world class, and considerable problems will remain, with at least four million adults still not having the literacy skills expected of an eleven year old, and twelve million not having the requisite numeracy skills. The report also recommends that if even more optimistic scenarios are adopted, then these should be centred on tackling the stock of low-skilled adults without qualifications, basic literacy and numeracy and investing more in intermediate skills, which is effectively a continuation of the current policy of level 2 entitlements being pursued by the LSC in England currently (Leitch, 2005, p3).

The Leitch (2005) review accepts the five drivers of productivity as being: enterprise, skills, innovation, competition and investment. These five drivers are reputed to increase output per worker and thus increase productivity and increase the sustainable growth rate of GDP per head/per hour. The drivers also increase the number of people economically active, thus increasing the employment rate and from there increase the sustainable growth rate of GDP per head/ per hour (Leitch, 2005, p20).

Skills impact on productivity directly by increasing human capital in a firm or country; they also indirectly impact on productivity indirectly by 'spill-over' impacts on productivity of other workers. Leitch (2005) also argues that skills also indirectly impact via other drivers by encouraging greater investment and innovation. Leitch (2005) also makes reference to two economic growth theories to underpin his rationale on skills, and these are the neoclassical growth theory. Which postulates that a boost to growth as the effects of improved education feed through the economy until the economy reaches its new equilibrium at a higher than previous level of national income and the previous rate of growth. Secondly, endogenous

growth theory suggests that improvements in education can permanently increase the growth rate of the economy by encouraging innovation (Leitch, 2005, p21).

Leitch (2005) accepts the concept that wage returns on qualifications can be analysed by level of qualification, type of qualification, and subject, with basic skills qualifications, National Certificates and Higher National Certificates having good returns in relation to wages, and this should justify an employee investing in his education. Leitch (2005) goes on to argue that productivity gains from employing workers with higher qualifications may be higher than wage returns data suggest for a variety of reasons as if the company has paid the training costs themselves, then this additional skill may not have fed through directly to significant wage increases. This it is argued would be particularly relevant in times of recession where employers may take benefit from skills with no proportional wage increases (Leitch, 2005, p23).

A further productivity benefit from increased skill levels is that people with skills tend to stay on average significantly longer in work than those without skills, who tend to get caught in a trap of low paid jobs and worklessness, what Leitch (2005) describes as a 'low pay, no pay' cycle. This can be seen in the circumstances where 25% of people who come off 'jobseekers' allowance to move into work return to benefits in three months. This figure rises to 40% in six months, a situation which Leitch (2005) argues might be stemmed by increased training (Leitch, 2005, p27).

Leitch (2005) also introduces a concept of increased skill levels being needed by employees, just to stay still, with the example being ICT. What was once considered to be a high level skill, ICT is now becoming increasingly important in the world of work, that it might now be seen as a basic skill (Leitch, 2005, p29). The analysis of Leitch (2005) on skills also introduces a social justice and societal argument that investment in skills can help improve the health levels of individuals in society, as well as a way to reduce crime and improve social cohesion (Leitch, 2005, p35). In relation to skills deficiencies, then although there was no true consensus among employers about where the main deficiencies lie, intermediate and higher level skills were mentioned, as were adult literacy and numeracy skills (Leitch, 2005, p44).

The Leitch (2005) review also engages in some useful theoretical modeling around potential scenarios (or combinations) that Government might adopt in taking forward a skills policy, which it is argued might impact significantly in relation to the building services engineering sector obtaining what it requires from Government. The current model that has been adopted has raised the qualification levels of the populace significantly, and the table below indicates this:

### The model's estimate of the impact of past qualifications improvement

<b>Productivity</b>	Output per worker: 2 per cent higher in 2004 than in 1994.	Productivity growth: 0.2 percentage point contribution to annual productivity growth.
<b>Employment</b>	Employment level: 160,000- 210,000 higher in 2004 than in 1994	Employment rate: 0.4- 0.6 percentage points higher.
<b>Net Benefit</b>	Total over whole period: £30-50 billion	Average annual benefit: £1.3-£1.5 billion per year.

Source: Leitch (2005, p87).

A further improvement in the qualifications profile of the UK according to the Government's current ambitions would have significant benefits to the UK at large based on the 2020 targets. The table below shows the scenario should the 2020 targets be met:

## Achieving Current Ambitions to 2020 Key Results

<b>Productivity</b>	Output per worker: 3.0 per cent higher in 2020 than it would otherwise be	Productivity growth: 0.20 percentage point contribution to annual productivity growth.
<b>Employment</b>	Employment level: 275, 000-325,000 higher in 2020 than today.	Employment rate: 0.65- 0.85 percentage points higher in 2020.
<b>Net Benefit</b>	Total over whole period analysed: £80-100 billion.	Average annual benefit: £2.9- 3.1 billion per year.
<b>Sensitivity</b>	Impact of 1% fall in wage returns each year:	Net benefit reduced to £40-60 billion equivalent to an average annual benefit of £1.5- 1.7 billion.

Source Leitch (2005, p88).

The table shows that productivity would increase by 3% more than if the qualification base of the country did not improve. From this it can be extrapolated, that annual productivity growth would be equivalent to 0.20 percentage points- over 10% of the expected annual growth in productivity (Leitch, 2005, p88). It is also anticipated that the employment rate would grow by 0.65-0.85 percentage points, equivalent to an annual growth in employment rate of 0.04-0.06 percentage points, which would account for one third of the Government's predicted employment growth. The current ambition would have a large net benefit average of £2.9- 3.1 billion each year, which equates to 0.29-0.31 GDP (Leitch, 2005, p89).

The second model is derived from delivering the basic skills ambitions of the Government, which would reduce the number of people with a literacy level of less than Level 1 literacy skills by 1.2million people to 4.4million, and level 1 numeracy skills by 400,000 from 17million to 16.6million.

## Basic skills Current Ambition Key Results

<b>Productivity</b>	Output per worker: 0.2 % higher in 2020 than it would otherwise be.	Productivity growth: 0.01 percentage point contribution to annual productivity growth.
<b>Employment</b>	Employment level: 20,000- 50,000 higher in 2020 than today.	Employment rate: 0.05 – 0.15 percentage points higher in 2020
<b>Net Benefits</b>	Total over whole period analysed: £15- 25 billion	Average annual benefit: £500-700 million per year.

Source: Leitch (2005, p89).

This scenario, although bringing many benefits to the UK, will still leave a large number of people with basic skills deficiencies. As a result the impact on productivity and employability are relatively limited, although an additional 0.01 percentage points to economic growth, with an impact on employment of 20,000-50,000 by 2020 (Leitch, 2005, p89). Basic skills qualifications are less expensive to deliver than other curriculum, and therefore pursuing this scenario would deliver £500-700m worth of savings per year in the education budget over other models (Leitch, 2005, p90).

The thrust of Leitch (2005) is that the current models described above are not sufficient to achieve the skills improvements that the UK needs to become more competitive or indeed to remain competitive (see above) with major competitors. Leitch (2005) therefore recommends that the Government consider a range of additional/alternative scenarios to 2020. The first of these is to work towards upskilling an additional 3.5 million people to level 2 on top of the current 2020 ambitions. The main results of this scenario are shown in the table below:

## Tackling Low Skills Scenario Results

<b>Productivity</b>	Output per worker: 3.2 % higher in 2020 than it would otherwise be.	Productivity growth: 0.21 percentage point contribution to annual productivity growth.
<b>Employment</b>	Employment level: 375,000- 425,000 higher in 2020 than today.	Employment rate: 0.9- 1.1. percentage points higher in 2020
<b>Net benefit</b>	Total over whole period analysed: £85- 105 billion.	Average annual benefit: £3.1-3.3 billion per year
<b>Average additional annual cost</b>	Total: £1.5 billion	Of which: Direct course provision: £300 million.
<b>Sensitivity</b>	Impact of 1% fall in wage returns each year.	Net benefit reduced to £60-80 billion equivalent to an average annual benefit of £2.3- 2.5 billion.

Source: Leitch (2005, p92).

The increase in qualification levels would raise productivity by a modest 3.2% above what it would be otherwise if the Government target described above remained unchanged. A major social justice argument might be made for investment in Leitch's new target, as employment could be 375,000-425,000 higher, around 25% higher than current predictions. The scenario would also deliver £200 million, being 0.3% of GDP higher than that under the current scenario. The cost of delivering this additional provision is estimated to be £1.5billion, of which direct course provision is £300 million, which is currently around 5%- 10% of current LSC spending on adult skills (Leitch, 2005, p92).

The second model proposed by Leitch is the improving of intermediate skills. Within this model, the number of people with skills at level 3 is improved by £3.5million. The table below shows the potential impacts of adopting this model:

## Improving Intermediate Skills Scenario Results

<b>Productivity</b>	Output per worker: 3.5% higher in 2020 than it would otherwise be.	Productivity growth: 0.24 percentage point contribution to annual productivity growth.
<b>Employment</b>	Employment level: 350,000 – 400,000 higher in 2020 than today.	Employment rate: 0.8- 1.0 percentage points higher in 2020.
<b>Net Benefit</b>	Total over whole period analysed £105- 125 billion.	Average annual benefit: £3.8- 4.0 billion per year.
<b>Average Additional Annual Cost</b>	Total: £3 billion	Of which: Direct course provision: £800 million.
<b>Sensitivity</b>	Impact of 1% fall in wage returns each year.	Net benefit reduced to £50-70 billion, equivalent to an average annual benefit of £1.9 -2.1 billion.

Source: Leitch (2005, p93).

Within this model, the affect on employment would be modest; being 5% less than the tackling low skills scenario could deliver. There is however a lightly larger impact on productivity, with an output of 3.5% in 2020, bring 0.3% higher than the 'tackling low skills' model. The net benefit within this model is higher than that of the tackling low skills model at £3.8-4.0billion, which is equivalent to 0.4%GDP. This scenario would cost £3billion in addition to the cost of current ambitions, of which direct course provision would be £800million, which is equivalent to increasing the current LSC adult budget by 40% (Leitch, 2005, p93).

A third scenario proposed by Leitch (2005) involves focusing on high-level skills, which raises the percentage of people obtaining a level 4 qualification (equivalent to a bachelor's degree) to 65%. The table below indicates the potential impacts of pursuing this model:

## Focusing on high-level skills scenario results

<b>Productivity</b>	Output per worker: 4.4 % higher in 2020 than it would otherwise be	Productivity growth: 0.3 percentage point contribution to annual productivity growth.
<b>Employment</b>	Employment level: 335,000- 385,000 higher in 2020 than today.	Employment rate: 0.75-0.95 percentage points higher in 2020 than today.
<b>Net benefit</b>	Total over whole period analysed: £125-145 billion.	Average annual benefit: £4.4-4.6 billion
<b>Additional annual cost</b>	Total: £9 billion	Of which: Direct course provision £3 billion.
<b>Sensitivity</b>	Impact of 1% fall in wage returns every year.	Net benefit reduced to £65-85 billion, equivalent to an average annual benefit of £2.3-2.5 billion.

Source: Leitch (2005, p94).

This model would produce the largest impact on productivity of all the proposed models, adding 0.3% to annual economic growth. As the majority of people qualified to level 3 are in employment, then the affect on employment levels would be minimal, between 0.75- 0.95 percentage points by 2020. The net benefit is an annual average of £4.4- 4.6billion around 0.45% of GDP. A major problem with this model is the excessive costs of £9billion per year required to deliver this scenario, with direct course provision costing some £3billion, so consequently the benefit-cost ratio for this model is slightly lower than that for improving intermediate skills and broadly in line with tackling low skills (Leitch, 2005, p94). The next model seeks to extend the adult basic skills attainment by 2.5 times to 2020, which would decrease the number of people with below level 1 literacy skills by 2.7million and the number of people with below level 1 numeracy skills by 2.4 million by 2020:

## Improving Adult Basic skills Attainment Key Results

<b>Productivity</b>	Output per worker: 0.47% higher in 2020 than it would otherwise be.	Productivity growth: 0.03 percentage point contribution to annual productivity growth.
<b>Employment</b>	Employment level: 75, 000- 105, 000 higher in 2020 than today	Employment rate: 0.15-0.25 percentage points higher in 2020 than today
<b>Net Benefits</b>	Total over whole period: £50-70 billion	Average annual benefit: £1.8- 2.2 billion
<b>Annual Cost</b>	Total: £800 million	Of which: Direct course provision £200 million.

Source: Leitch (2005, p95).

This scenario adds 0.03 percentage points to the annual growth in output per worker. It also has a positive impact on employment, leading to 0.15-0.25 percentage points higher in 2020 than today, and as indicated earlier, is significantly cheaper at £800 million than 'other' models discussed. The model increases GDP by 0.2 % being £1.8- 2.2billion pounds. A derivative of this model, is the improving the attainment of young people, with particular reference to their basic skills. Under this scenario, by 2020 the number of individuals leaving school with less than level 1 literacy skills would decrease by two 2million to 3.6million by 2020 and numeracy skills also by 3.1 million to 13.9 million. The table below shows the results this model would obtain:

## Improving Basic skills of Yong People Key Results

<b>Productivity</b>	Output per worker: 0.48% higher in 2020 than it would otherwise be	Productivity growth: 0.03 percentage point contribution to annual productivity growth.
<b>Employment</b>	Employment level: 65,000- 95,000 higher in 2020 than today.	Employment rate: 0.15-0.25 percentage points higher in 2020 than today.
<b>Net benefit</b>	Total over whole period: £60-80 billion.	Average annual benefit £2.2- 2.4 billion.
<b>Annual Cost</b>	Total: £200 million.	Of which: Direct course provision: £200 million.

Source: Leitch (2005, p96).

## 8.2.2 Conclusion

Leitch (2005) provides an interesting set of differing scenarios that in isolation will produce a number of impacts not just on the economy generally, but on the building services engineering sector specifically. Different models will affect the quality of inflows of new craft trainees, technicians and graduates into the sector, and will also improve productivity in the sector indirectly if not directly. It is therefore suggested that out of this SNA, further work is undertaken based on these scenarios, to facilitate the effective lobbying of Government in relation to which model, or which mix of potential models might best facilitate the sector.

## 8.2.3 Further Education Means Business: DEL

The Further Education College Sector in Northern Ireland is facing significant structural change, which is likely to impact on the training of apprentices and other staff employed within the building services engineering sector within the province. Population projections for Northern Ireland are fuelling the need for change, as Northern Ireland faces 11% or 42,000 fewer children under 16 in 2011 and 15% or 58,000 fewer children by 2021. Over the same period, the number of people over fifty will increase dramatically, so that by 2011, there will be 18% or 85,000 more people over fifty and by 2021, this figure will be 39% or 187,000. The drop in the numbers of 16-19 year olds, and the increased competition facing the Northern Ireland colleges from schools et al means that the learning needs are going to change, and the EDF Action plan requires colleges to respond to these issues, by working with companies to increase technology transfer (FEMB, 2004, p18). The Entrepreneurial and Education Action Plan also recommends that Further Education in the province is linked up more to business, so that the curriculum offered and designed represents more the needs of industry (FEMB, 2004, p19).

Further Education Colleges in Northern Ireland are defined by the DEL as having a dominant role in vocational education and training for 16-19 year olds and therefore for initial entry into the employment market. Secondly, they provide an alternative route to higher education other than the traditional school route, both at 16-19 level and also through access and other programmes for adults. Thirdly, they provide higher education, mainly at sub degree level (HNC/HND/ Foundation Degree) and part-first degree, on a full and part time basis. Thirdly FE Colleges offer learners a second or further chance for education and training, and to gain various qualifications and provide training through New Deal, Jobskills and Learn Direct. FE Colleges also give support for those individuals requiring essential skills (literacy and numeracy). Fourthly, FE Colleges are involved increasingly with business and industry especially with SMEs in meeting their specific needs, and finally FE Colleges provide local communities with a wide range of interest, hobby and non-vocational courses (FEMB, 2004, p22).

The final shape of FE in Northern Ireland is beyond the scope of this report (but appears likely to involve the reduction of the Colleges for sixteen to six) however the new strategic objectives for the sector laid down in FE means business are effectively divided into three headings, the first of which is that FE will be a key driver of local, sub-regional and regional economic development through raising skills and qualification levels, responding to the needs of SMEs, ensuring that curriculum provision is relevant to the workforce of the provinces needs, developing entrepreneurial spirit, through providing opportunities for business creation, incubation and development and, working flexibly with other educational and economic partners and finally, keeping provision up to date with best current practice.

The second strategic objective is to assist social cohesion, and this will be achieved through working in collaboration with other partners within the community, offering an open door to provision at appropriate level with community partners, maintaining and enhancing their integrated ethos, recognising and valuing diversity and promoting equality of opportunities particularly among marginalised or disadvantaged groups. Finally FE Colleges will be required to provide support for community capacity building. Finally, FE Colleges are required to be a major promoter of lifelong learning by working with other providers to sustain a broad range of learning opportunities for adults, and providing students with the skills and qualifications necessary to progress to further learning, ensure provision is linked as far as possible to qualification outcomes either in units or in full, and finally develop flexible approaches to learning through the use of technologies, through partnership with other providers, and through responsiveness to local need (FEMB, 2004, p24).

These three strategic objectives are intended to form the basis of the Regional Delivery Plan (RDP) and these plans as well as the colleges own College Development Plans should be underpinned by the concepts of efficient and effective through ensuring value for money in all aspects of their work, and this involves the operating within agreed budgets. There is also a requirement of FE to ensure that the accountability is embedded in the college culture and collaborate with other providers in the efficient use of resources. There is also a need to ensure fairness and accessibility and ensure that enrolments, retention, achievements and progression are benchmarked against best practice (FEMB, 2004, p25).

Colleges are also required to encourage the individual's development of learning and skills by providing courses of the highest quality, providing effective support to the individual learner or employer, enhancing the professional development of staff and finally ensuring that all students are proficient in essential skills including ICT (FEMB, 2004, p25). Further requirements that incorporation of the Northern Ireland FE colleges section is making on colleges is that they should be moving towards enhanced collaboration between themselves, Schools, HEI's et al in the interests of employers and learners. There is also a requirement that they reduce duplication of curriculum and finally that the colleges will engage in enhanced planning to facilitate the development of the regional plan (FEMB, 2004, p36).

#### **8.2.4 Skills Strategy for Northern Ireland**

The Skills Strategy for Northern Ireland (2004) is a major document directing the skills agenda in the province and is designed to accompany the Government's economic vision alongside the Draft Priorities and Budget 2005-08. The issues related to skills in Northern Ireland include dealing with the impact of new skills and flexibilities demanded by increased globalisation, as Northern Ireland moves from an industrial to a more knowledge based economy. Secondly, working with the reality of a national and increasingly international labour market in which labour is mobile, and in people will migrate into and out of Northern Ireland to carry out work. Thirdly, there is a need to raise the general level of skills in the existing workforce, which will be achieved through sustained investment, reducing the scale of literacy and numeracy problems and ensuring that the educational system has significant strengths in the general curriculum and has strengths in applied skills. There is also a need to address the high level of economic inactivity, which is currently constraining the size of the workforce available for economic growth and also addresses the negative impact of skills deficiencies in the workforce on productivity and competitiveness (SSNI, 2004, p4).

The skills that the Northern Ireland Government wishes to consider as important for the future workforce of the province are the essential skills of literacy, numeracy, and information and communications technology. Other 'soft' skills considered important by the DEL in employability skills, which include the key skills of team working, problem solving and flexibility and work-based (occupational/ sector) skills, which include the skills and competences which have been established in the National Qualifications Framework and employer specific skills, which build upon the qualifications framework (SSNI, 2004, p4). The DEL also committed itself to developing an overarching strategy for skills which is intended to have a much clearer set of goals accompanied with an action plan to achieve them, if the challenges facing the economy of the province are to be addressed. This strategy is intended to be demand driven by the need of the economy in both the private and public sector, and a need for the economy in NI to become more productive. The DEL in this document however commits itself to deliver a model where the articulated skills needs of employers are the driving force behind the strategy (SSNI, 2004, p7).

The Skills Task Force for Northern Ireland are responsible for the delivery of a strategy that must meet the needs of the economy now and in the future through the delivery of a ladder of skills which needs also to meet the personal aspirations of individuals, and allows them to collect skills throughout their careers to achieve employability for life. The overall aim of the strategy will be to help progression up the skills ladder thus raising the skills of the whole workforce, raising productivity and increasing competitiveness, which it is hoped will enhance the employability of those currently excluded from the labour market. To put the skills ladder in place, the DEL has defined some priorities, which are to raise the profile of the demand (employer) side both existing and potential, improve the flow of labour market information and the impact of demand on supply. Essential to this process, is the improvement of the relevance, coherence, response and quality of current education and training provision as well as promoting the acquisition of skills with particular emphasis, initially, on those who have not yet achieved a level 2 qualification or require assistance with essential skills. Other priorities are to improve access to skills and sustainable employment; and make the supporting infrastructure easier to navigate, especially in the field of qualifications (SSNI, 2004, p8).

The Skills Agenda action plan requires the Skills Task Force to develop a Regional Framework for Employment and Skills Action, including an agreed set of regional skill priority areas. There will be a number of employer led workforce development forums at local level developed to advise the DEL on the local demand for skills. There will also be a collation and use of Labour Market Information and research will be increased in order to improve the identification of the demand side for skills. In addition, the training provision for 16-19 year olds will be re-configured' and apprenticeships will be developed and extended. The findings of the Further Education Review will be implemented including the revised curricular, planning and funding processes. The number of Foundation Degrees in areas of priority skills will be increased significantly, and essential skills will be extended to include computer literacy and will utilise the existing provision for ICT. There is also a commitment to introduce a first level 2 qualification for those aged over 19 will be introduced. There is also a commitment to undertake management and leadership skills in Northern Ireland companies, with organisations continuing to be developed. Welfare reform will be extended to help those on incapacity benefit, and those who have multiple barriers to entry or re-entry of the employment market. There will also be a revised qualification system, which covers vocational in place by 2007 and the financial implications of education and training will receive clarification and communicated to both individuals and employers (SSNI, 2004, p9).

### **8.2.5 Economic Vision for Northern Ireland**

Within this strategy document, there is a section which seeks to enunciate policies to ensure that the people of Northern Ireland have the right skills for future employment opportunities, as the economic vision has at its core the desire to improve skills to increase productivity, increase competitiveness and improve the sustainability of employment. To continue to maintain the provinces reputation as having a skilled workforce developed by an effective education system, the document points to the revised curriculum at primary school level, the post primary review, which is seeking to use a range of providers to bring vocational programmes to those still in secondary education, and who will benefit from them. Finally the report points to the continued upskilling of the existing workforce within the province as a benefit of the education system. The report however sets a number of key objectives in relation to skills for Northern Ireland, and include an increase in the skills, literacy and qualifications in Northern Ireland at all levels through from primary school to remedial measures through essential skills training for those who need it to enter or re-enter the workforce. It is intended that there will be an increase in the proportion of the workforce with high and intermediate level skills.

There is also a desire that managers will have the capability, competence and capacity to lead innovation, creativity and change and the leadership skills required to play a key role in the development of key workforce skills through apprenticeships and other recognised processes. There is also a commitment in the report to assist the disadvantaged and economically inactive to engage with skills acquisition and the labour market, and use the tax and benefit system to encourage the transfer of the inactive and unemployed to employment by more closely reflecting local labour market conditions. There is also an intention to achieve an improvement in the labour market information provided by employers and specific skills demand and standards in key sectors of the economy, and improve the standard of careers information and advice and guidance at all levels and ages. Finally the report intends to create confident and creative communities particularly within what were previously deprived and marginalised areas as a basis for engagement in skills acquisition and fully utilise the contribution of the voluntary and community sector (EVNI, 2005, p16).

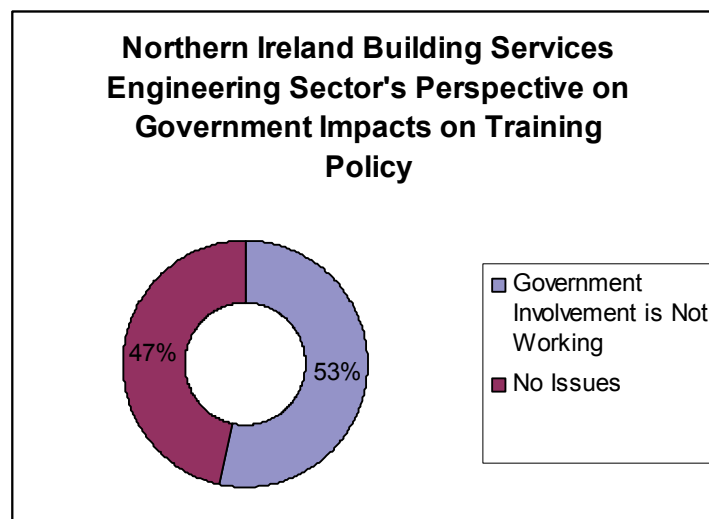
### **8.2.6 Economic Development Forum: Working Together for a Stronger Economy**

This economic document considers skills within the economic concept of human capital, with an objective to ensure that the Northern Ireland workforce is equipped with appropriate skills to support the current and future needs of the economy, with the key indicators being the proportion of the working age population qualified to national qualification framework/level 2 highest qualification, to level 3 and level four. To achieve increases in the qualifications of the workforce there are a number of supporting actions identified, which include reducing the percentage of the workforce with no qualifications, enhancing skill levels, particularly the level of ICT skills and skills in 'growth areas'. There is also an intention to improve the employability of disadvantaged groups and promoting leadership skills and encouraging individuals to reach their full potential through the use of role models/coaching/mentoring. Finally, there is a commitment to increase competence in foreign languages to meet business demands (WTSE, 2002, p19).

The report then extrapolates the key indicator of reducing the proportion of the working age population with no qualifications, through enhancing the skill levels particularly the level of ICT skills and skills in growth sectors. A final supporting action from this report is to improve the employability of disadvantaged groups. A further key indicator of the success of the strategy enunciated in this report is the level of essential skills for living training taking place to substantially reduce the number of young people and adults with literacy and numeracy problems, as well as reducing the percentage of the workforce through essential skills qualifications as having no qualifications at all and at the same time improving the employability of disadvantaged groups. There is also a commitment to fostering and increasing links between FE and schools to enable pupils to experience a range of skills sampling before leaving school and creating a more relevant curriculum which integrates creativity throughout. (WTSE, 2002, p20).

### 8.2.9 Northern Ireland Building Services Engineering Contractor views on the Government Impacts on Training Policy

The interviewees from the Northern Ireland building services engineering sector were asked what they thought about the government’s involvement in training policies for the sector it can be seen from the diagram below, the response was generally mixed:



The quotes below are indicative of the views encapsulated in the diagram above:

*I personally think that industry should determine its own destiny. I feel that Government should possibly deal with ... on the periphery. We as an industry should determine where we go, what we want, what we want to train, what type of training we want and let the industry decide the requirements that it needs, the influence of Government at this minute in time, and its 'bums and seats' attitude and 'we need as many people trained' is to the detriment of my industry and I think is a single factor which will destroy the industry. We need to take control and we as an industry need to determine for training apprentices, everything and take full control of what we want and require... (NISP01)*

*As far as grants are concerned, they're few and far between and sort of ... (NIMP02)*

*I suppose that's true. It's getting the funding correct so it is and putting it through and making sure ... one of the things about it is the ... it's making sure the guys, the people are qualified to the correct level and that they are brought through their whole apprenticeship right through till they come out of it. At the present time what's happening over here, there's a lot of ... which we feel very unhappy about, a lot of people are taking on and training which it's never seen to be finished. It will never be finished at the end of it and they go through ... there is so much funding only for 70 weeks and lots of employers, unscrupulous employers, take them on, use them for 70 weeks and jettison them again. What government should really be doing is just try to make it where there's a tied in system where the guy, when he's taken on, there's a commitment from both sides – by the employer and by the apprentice that takes it right ... so he comes out with a qualification at the end of it. And make sure that qualification is exactly what the industry requires and again part of that is to make sure the funding is right, making sure the funding is carried out in a correct way where it gets a guy through. In our particular case we feel strongly it should be a Level 3. So to make sure that funding goes through to take the person through to the Level 3 and not just to a Level 1 or a Level 2 and then he's allowed to drop out and disappear and never get properly qualified. (NILP02)*

*Beyond the annual review and audits that the external companies do there are no major changes that we've realised over this past period of time... (NISET01)*

*Well, I've had quite an experience in training, provision of training, over the last ten to fifteen years through my association with the CITB and more laterally the Electrical Training Trust. I personally am of the opinion that the government needs to appoint a single controlling body, like Summit Skills, to oversee the myriad of training organisation that exist to ensure that the employer and the employee probably legally have to undertake training to obtain a license to be in the industry. I would like to see more flexibility on adult education and continued apprentice education after the apprenticeship has completed. Particularly in relation to multi skill training where there is an evident skill available in the individual. (NIMET01)*

*My views on that would be that the policy, as it is now, is nowhere near what it was 10, 12, 15 years ago, or even when I was training as an apprentice. I think this is due, mainly, to the Government's approach in education in secondary schools, whereas, most of all the old woodwork rooms, metalwork rooms, etc, have been removed from those schools and they've been replaced with technologies, which really didn't ... they didn't give credibility to boys, or girls who had got manual skills, let's say, and I think Government policy in that is just went totally crazy, it's all towards paper qualifications and the, you know, I could quote examples, if you wish, like people who I know, who have become brilliant – one lad in particular, a brilliant jobby, that's totally away from my world of life, he had no interest in school, but I think that's part of the problem there. (NISHV01)*

*No we wouldn't be... No we wouldn't be well up on that... (NISHV02)*

*I find it difficult to see what role government in truth are playing and certainly in Northern Ireland with regard to that there. I think generally speaking the training of new entrants and the training of existing entrants is a bit hit and miss... (NILHV01)*

*Refrigeration training in Northern Ireland is nothing short of scams... There is a training facility for them but I find with experience that if the guys are good enough they do very well at it. If... the guys that are not good enough rather than putting the guys out and saying, "Listen, you're not going to make it here" they tend to keep on trying and trying and trying to get these guys through exams who at the end of the day are not... never going to be... (NIMACR01)*

*Well, from a point of view of... the only thing I can say is NVQ to me it's... it can work if at day one the employer has decided to take the chap on when he finishes, but... and to my own experience I find... not only from my own son's point of view... in a different discipline, which was carpentry... no, after his time was up and it came time to spend... to pay him he didn't... he wouldn't... they wanted him to leave and work for them but he wanted to get his NVQ. He says, you know, "I prefer to get my wee bit of paper", you know? And three times they offered him a job, albeit the money wasn't there. You know, they were offering him as little as £2 an hour, in some cases less. I said, you know [laughs], "Just you stick where you are. We'll get the wee bit of paper". But when it came to the last year where they were supposed to take him on and employ him they said, "Sorry, we've got no work for you. Bye, bye. You had your chance". So from that point of view NVQ doesn't work. City & Guilds yes, that was the system I went through when I started in a shipyard as an apprentice. They had day release and it was hands on and you learn your trade right through. To me that is the only way to do it. (NIMACR02)*

*We certainly have had to up our skills level to have an understanding of the requirements of for the new legislation that's coming through. (NILBSEC02)*

## **8.2.10 Conclusions**

As is the case in many of the English regions, funding of apprenticeships and other curriculum figured highly on the agenda of the sector within Northern Ireland. There are as the quotes illustrate, a number of other issues surrounding government involvement in training that are issues for the sector. SummitSkills believes that the views of the sector reveal a need for effective communication of issues relating to Government involvement in training to the sector, and therefore SummitSkills in collaboration with Partners and Stakeholders will continually seek to inform the sector of Government policy in relation to training through publications and industry groups.

## 9 Business factors impacting on the building services engineering sector

### 9.1 Theoretical Underpinning

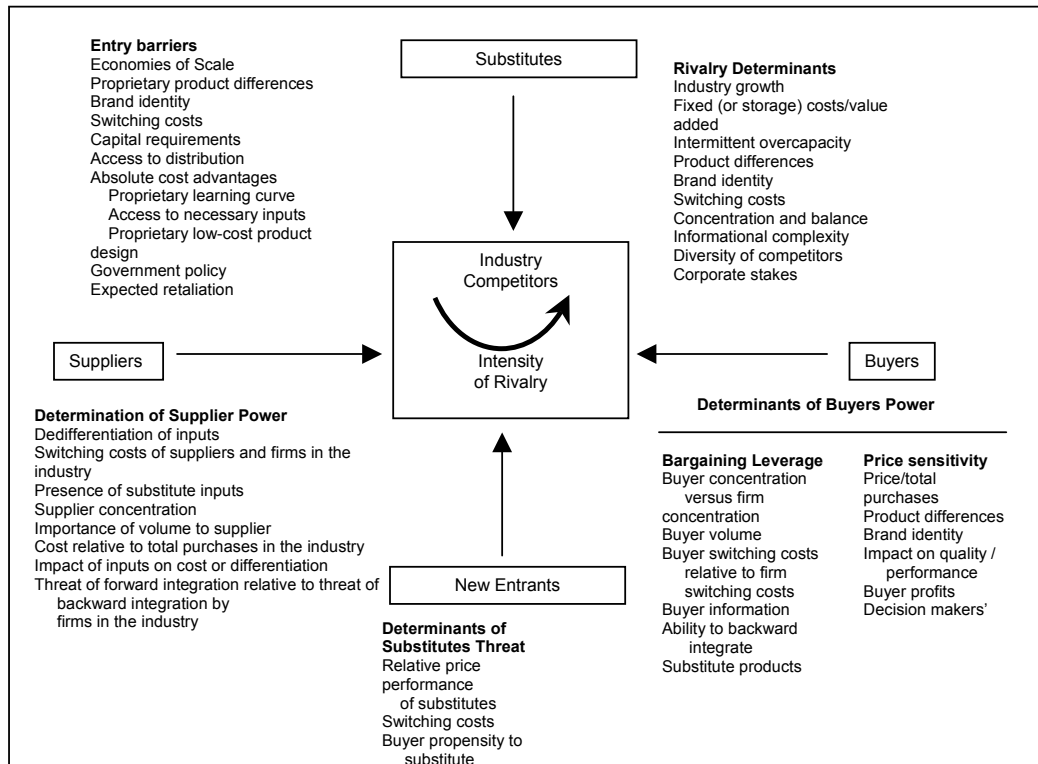
The following section of the Sector Needs Analysis seeks to identify a number of business factors that impact on the building services engineering sector. The Sector Needs Analysis background reading identified the works of the American Professor of Management Science Michael Porter, whose major published work has focused on competitive strategy and business strategy within industry, predominantly, but not exclusively within the United States.

Professor Porter has also undertaken macro-economic research for the Department of Trade and Industry on the macro-economic climate under which British industry and commerce is competing (DTI, 2003). Professor Porter's work is also cited in the background literature for the Sector Needs Analysis by SSDA. It therefore seemed appropriate and relevant to incorporate the elements of Porter's work into the theoretical model underpinning in the analysis of the business factors of the building services engineering sector. It seemed sensible for the SummitSkills Sector Needs Analysis to use an approved model by SSDA and DTI, as opposed to other similar models available within academia and business. The theoretical elements of the industry structure are shown in figure 1.

There are, however, objections that can be made to Porter's model being used for analysis of the building services engineering sector, which are important to discuss within this theoretical underpinning sector. First it might be argued that Porter's model relates more to the manufacturing industry, rather than services industries, which it is argued is quintessentially what the building services engineering sector is, as the core elements of the SummitSkills footprint are related to the installation of services within buildings rather than the manufacture (although there are manufacturers within the extended footprint, although these form only a minority of the whole footprint).

It is therefore argued that although Porter's six headings of industry structure (entry barriers, rivalry determinants, determination of supplier power, determinants of substitutes threat, bargaining leverage and price sensitivity) might not reflect totally a sector like the building services engineering sector, where standardisation of work is an anathema, with nearly every contract being in a different demographic place with a different labour requirement and different challenges, leading to every contract being quintessentially specialist in nature.

The information in figure 1 therefore may lack relevance to many within the sector, but it was felt would provide a useful theoretical base for reviewing the data and modelling the business behaviour of the sector. It may be that subsequent work produced by SummitSkills may choose to explore competing business models and select a different model that is believed more effectively to reflect the building services engineering sector. Porter's model does however enjoy widespread international recognition as a business model, and therefore is it is suggested a good starting point in analysing the sector.



## 9.2 Barriers to Entry / New Business Start Up

### 9.2.1 Introduction

Porter (1985) defines a number of entry barriers that apply to businesses seeking to enter a market. These are defined as: economies of scale, proprietary product differences, brand identity, switching costs, capital requirements, access to distribution, absolute cost advantages, Government policies (covered here and elsewhere) and expected retaliation (Porter, 1985, p6) (see table within the theoretical underpinning section of this report).

As has already been stated within this section of the Sector Needs Analysis, not all of these factors will play an equal or, indeed, any part in the business make up of the building services engineering sector. As a precursor to primary data analysis, it is important to identify each of these factors and define it from a theoretical perspective, before analysis of the primary data, to identify where within the theoretical model employers within the building services engineering sector are operating.

**Economies of Scale:** These refer to the declines in the unit cost of a product or operation that creates a product or services, as the absolute volume per period increases. Economies of scale therefore can act as a barrier to entry into some industries or at some levels in industries, due to the inability of new entrants to obtain cost advantage over existing organisations. Economies of scale can also be obtained in every area of the business (Porter, 1980, p7-9).

*Product Differentiation:* This is the established brand identification that existing companies have in the industry, and includes things such as customer loyalty. Establishing yourself as a player in the industry may involve expenditure of significant amounts of money on advertising etc, which may act as a barrier to entry into certain industries (Porter, 1980, p9).

*Switching Costs:* A further barrier to entry into an industry may be controlled by the costs of switching from an established supplier to a new entrant by a customer. This is not perceived to be an issue in relation to building services engineering contracts, due to the specialist and individual nature of the projects and the transferability of workforce (Porter, 190, p10; Porter, 1985).

*Capital Requirements:* Within the building services engineering sector, there are a number of companies able to undertake contracts of various sizes. Entry to larger scale construction work may involve the necessity for major capital investment in plant, labour, materials etc. Therefore this may be a barrier for entry to some at the larger end of the sector. Conversely, entry to the domestic market and for sole traders may not have the same capital restrictions on it (Porter, 1980, p9-10).

*Access to Distribution:* In relation to manufacturing, this relates to the ability for a new entrant into a business to set up distribution chains for their products. The nature of the building services engineering sector suggests that this will not be an issue for the sector (Porter, 1980, p10).

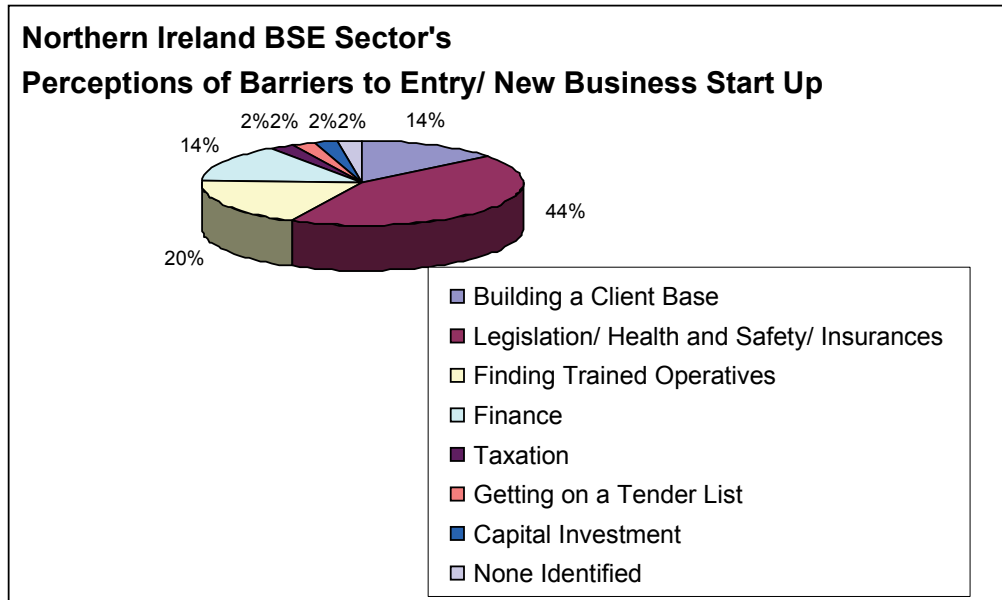
*Overall Cost Leadership:* Porter identifies that a company will engage in sustained capital investment and have good access to capital as well as having process engineering skills and an intense supervision of labour. Products designed by the company will be designed for ease in manufacture delivered to the consumer through a low cost distribution system. To obtain these factors requires a tight cost control, frequent detailed control reports to management. It is also important to create a structured organisation and responsibilities with incentives based on meeting strict quantitative targets (Porter, 1980, p40). As with other facets of Porter's work, as has already been stated, much of this theoretical basis may not replicate the operation of the building services engineering sector.

*Government Policy:* In relation to barriers to entry to a given sector then Governments may prohibit entry to a sector through licensing schemes, product standards, environmental and pollution control, British Standards and other statutory regulations (Porter, 1980, p13).

*Expected Retaliation:* This theory is based on the concept that a companies entering the sector and seeking to obtain a market share and company base will be taking business away from established firms within the sector. This may lead to the existing companies in the sector retaliating against the new entrant by way of a "price war" or other such move. Porter (1980) postulates that a new entrant can be forced to vacate a sector through sustained retaliatory action by existing companies in the sector due to the issues related above and the inability of the new entrant to support low, no or even loss making profitability situations for a significant period of time (Porter, 1980, p14).

## 9.2.2 Northern Ireland Building Services Perceptions of Barriers to Entry/ New Business Start Up

The companies within the Northern Ireland building services engineering sector have identified the following factors as being perspective barriers to entry to the sector and thus preventing new business start up:



## 9.2.3 Conclusions

The responses given by the Northern Ireland building services engineering sector are in keeping with responses given within the English regions and elsewhere within the UK. SummitSkills believes that many of the issues could be addressed through the development of bespoke training courses for the sector that would help to navigate new start companies through the many issues surrounding new business development. SummitSkills proposes to work with partners and stakeholders to develop or promote appropriate courses to the sector as needs be.

## 9.3 Rivalry as a Factor in Business Behaviour

### 9.3.1 Introduction

Much of Porter's theory of competition strategy and competition advantage is based around the concept of rivalry between firms within the various sectors. Porter (1985) identifies a number of factors within this theoretical concept of rivalry. These are: industry growth, fixed (or storage) costs/value added, intermittent overcapacity, product differences, brand identity, switching costs, concentration and balance, informal complexity, diversity of competitors, corporate stakes and exit barriers (Porter, 1985, p6).

As with previous parts within this section of the SNA, some of the theoretical underpinning of Porter's work may not approximate with the experiences of the

building services engineering sector, because of the specialist 'one-off' nature of that industry.

*Industry Growth:* Within the concept of industry growth, Porter (1980) subdivides this category into the following sub-headings: demographics, trends in needs, change in the relative position of substitutes, changes in the position of complementary products, penetration of the customer group and product change.

Demographics may affect a business in that a company has to plan for the needs of different birth rates and age groups and their specific tastes which will undoubtedly vary. In relation to the UK as has already been intimated within this SNA, there is an aging population that will determine and fuel demand for certain types of goods and services that a company must seek to anticipate and meet. Demographics drive trends, a company identifying demographic change must respond to these changes, with goods and services it anticipates (or can market to) the dominant groups in society.

A further issue (probably not relevant specifically to the building services engineering sector) is the change in relative position of substitute. Which suggests that if the cost of a substitute product falls, this makes it a more attractive market share; however this may be lost across the whole of the sector as a result of the substitute product falling. So for example when TV and Radio became popular, the attendances at live concerts diminished as a result.

Aligned with this concept (and again probably not relevant to the building services engineering sector) is the concept of changes in complementary products, which in theory a customer can switch to due to changes in the original product.

Penetration of the customer group is also a sub-category of industry growth, and provides that eventually potential for new clients for a good or service ends, and the business is selling to repeat customers, with the eventual potential for 'levelling off'. It is suggested that again, this concept has limited applicability to the building services engineering sector.

Finally, there is the concept of product change, which provides that by changing its products, a company can achieve new penetration and seek to attract new custom from competitors etc (Porter, 1980, p164-169).

*High Fixed or Storage Costs:* The presence within a sector of high fixed costs creates strong pressures for all firms to fill capacity, which means that when there is excess capacity within the sector then rapid price cutting takes place to remove this capacity. These costs or difficulties of storage can also lead to price reductions to remove surplus capacity rather than storage, where storage costs are prohibitive (Porter, 1980, p18-19). These concepts have limited relevance to the building services engineering sector due to the manufacturing bias of Porter's concepts.

*Intermittent overcapacity:* See notes above about overcapacity, companies may remove overcapacity by reducing prices accordingly, or store existing capacity if it anticipates an upturn in the market.

*Brand Identity:* Within Porter's work, brand identity with customers is a crucial key to competitive advantage as it can act as a barrier for other firms entering the sector, and as a signifier of quality within a sector encouraging repeated purchase etc. Certain brand or company names can become synonymous with a product, for

example Hoover. Within the building services engineering sector, brand identity may not be as strong as in manufacturing, although certain large companies may have some brand identification within the sector (Porter, 1980; Porter, 1985).

*Switching Costs:* These are costs associated with a customer switching from the utilisation of one produce to that of another product produced by a different manufacturer. This concept is it is suggested not readily transferable to the building services engineering sector (Porter, 1980; Porter, 1985).

*Concentration and Balance:* Porter (1985) argues that a view of industrial profitability is that profits are a function of the balance between supply and demand. If demand is higher than supply, then high profitability results, whereas ergo if supply exceeds demand, then profits fall and companies have to respond to new market conditions accordingly. Profitability is therefore affected constantly in a number of sectors, as firms move in and out, new products are developed etc, and companies respond accordingly. The more concentrated the sector and the smaller the inflows and outflows from the market within that sector, then the more balanced the market is, and the potential for sustained profitability is increased (Porter, 1985, p10). This concept is however suggested of limited application to the building services engineering sector as it relates predominantly to a manufacturing model, and not the specialist nature of the building services engineering sector.

*Informational Complexity:* The more complex the market that a sector has, the more that information about its functioning becomes diluted, making it more difficult for competitors within the sector to respond adequately to changes made by competitors. This in theory makes retaliation or response more difficult and complex (Porter, 1980; Porter, 1985; Heylighen, 2002).

*Diversity of Competitors:* The nature of the companies making up a sector will determine how individual companies in that sector will respond. The more diverse an organisation, the more that emphasis can be changed around its business activities to respond to challenges, to shift emphasis towards more profitable markets, to engage in a price war, to withdraw from the sector etc. The more diverse the sector, the more likely it is that other firms within the sector will be able to accurately identify the moves of firms within the sector, which in turn may make the sector unstable, as Porter (1980) suggests that sectors are more stable, where the companies within them 'know the rules' (Porter, 1980, p19; Porter, 1985).

*Corporate Stakes:* Rivalry in a sector can become even more volatile if a number of companies within it have high stakes in achieving success there, and there is a willingness on the part of some of the companies to sustain reduced profits or take even losses, to establish market share (Porter, 1980, p20).

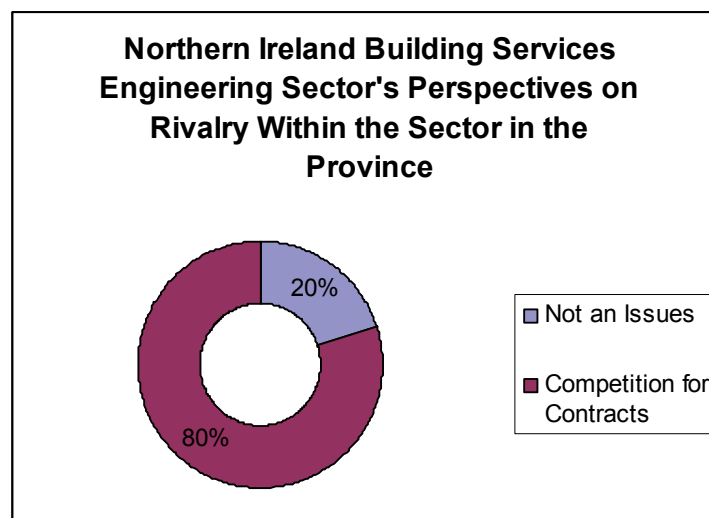
*High Exit Barriers:* Porter (1980) defines exit barriers, as being economic, strategic and emotional factors that keep companies in businesses even though they are receiving low or even negative returns on investment. Barriers to exit from a particular sector include:

- **Specialised Assets:** These are assets that are highly specialised to that particular industry and location and therefore have a limited sell-on market, with low liquidation values or high costs of transfer or conversion.
- **Fixed Costs of Exit:** These include things like honouring labour agreements with trade unions, resettlement costs, maintaining capacity for spare parts for existing sales (to fail to do this might damage the company reputation in other markets) etc.

- **Strategic Interrelationships:** This sub-heading covers things like image, marketing ability, access to financial markets and shared facilities which attach a high value to being in the business.
- **Emotional Barriers:** These are the 'soft' emotional reasons why a company might not leave a particular sector, and may relate to loyalty to staff, traditions of the company, pride and a host of other similar type reasons.
- **Government and Social Restrictions:** These issues involve Government denial or discouragement to the company exiting the sector due to concern for job losses and economic effects, and a particular example of this would be the constant support (terminated in 2005) to GM Rover in Longbridge, Birmingham in the West Midlands (Porter, 1980, p20-21).

### 9.3.2 Northern Ireland Views on Rivalry as a factor in Business Behaviour

The rivalry of the market place may affect the productivity and performance of the firms within the market according to Porter, and affect their behaviours. The diagram below would appear to suggest that the sector is experiencing a significant degree of rivalry greater generally it would appear than on the mainline:



The quotes below are indicative of the statements below:

*Fierce rivalry. It's driving the market down. The prices are scandalously low for what we're doing and what we're buying. At the end of the day it's only the client benefits, no-one else. (NISP02)*

*Yeah, the problem in Northern Ireland lately when ...Gas came in, every plumber that was out there went out on his own and called himself Joe Bloggs Plumbing and Heating. The ...Gas anything has dried up over here now, the conversions and that, and the plumbing firms out there now pushing under the smaller sector, they're pushing the sort of small plumbers into the medium sector and the whole thing is just crazy out the at the minute. Crazy. (NIMP02)*

*Rivalry at the present time is very, very intense – it really is competition and partially it's good in one way because obviously it keeps ... for clients etc. to get a cost effective job. On the other hand, because it's currently so intense it has to drive down the quality of what the end product is because people ... the pressures people are forced to do work for, both on the consultancy and the contracting side of things, they can't give the service that is required. So it's a case of then looking at ways of taking short cuts etc. so quality has to be affected somewhere along the line. (NILP01)*

*It is, yes I mean there's very keen and healthy competition. (NILP02)*

*It's extreme rivalry... Very, very tight. Too many... really, too many companies for a small... a very small piece of cake. (NIMET02)*

*I don't see rivalry ... I would interpret rivalry as confrontation. I don't see that. There is an element, which we have experienced recently, of people chasing turnover in business and losing the focus of profitability and we, as a business, we would never go down that route. We have never ... we don't really see our competitors as rivals, because we see them as going out, offering a service and if they're prepared to do it at a less profit than we are, that's their choice, that's their prerogative, but our business ... I'm in business, not totally to make profit, but I know I'm wise enough to realise that my businesses won't survive if it doesn't make profit. (NISHV01)*

*It's very, very similar to the cold war... It's dirty rivalry... Yes and its evident there... They could try and sink and bring you down as quick as look at you. (NISHV02)*

*Well it's totally cut throat for the moment. That's peculiar to the circumstances here at the present time. We don't have a very vibrant market here. I mean there are a few large projects in with architects at the present time, but there is no influx of construction work here in Northern Ireland. It could be something to do with our parliament not sitting or whatever, but certainly there's no money being released into construction to sustain the number of people that are in it and that's a fact. So therefore this tends to drive prices down. (NIMHV02)*

*There's a lot of rivalry yeah. Business is very tight and it means your margins are cut. (NISACR01)*

*The major problem is that... is pricing and obviously some of the bigger... our bigger competitors have access to more keener prices and they can offer a better pricing structure. But we go down the road... the price doesn't really matter as long as we can provide the service to look after... and the back-up. (NIMACR01)*

*It is very keen. What we find when we take on the full facilities of a building and we take it over from some other companies you find that they take the contracts at a very low cost to get in but they carry out all of the active calls but a lot of the maintenance is cut back on. (NILACR01)*

*We normally go for the larger tenders. The larger... how would you say it, like larger buildings and things... we don't basically look... it's cut throat if you're going for a corner shop or something... it's cut throat. The larger one where it is a consultant driven, main contractors, leading main contractors, do have their preferences, I suppose. (NILACR02)*

*There's strong rivalry. It's a very small part Northern Ireland and if you're going to go anywhere in the future you'll have to break out. It's a very small country. (NISBSEC01)*

*Well, I suppose we all have to stand up and fight for ourselves. I think what we find it normally, my experience is that most consultants have a tendency to work for the same type of clients repetitively, you build up a client base. And 90% of our work rotates round repetitive work for those people. We are, like everyone else, we always look for new alternative methods of work. But I would say 90% of our work is a client base we've built up. (NISBSEC02)*

*Well, we're all competing for the same work, so there certainly is rivalry. There is... even in terms of staffing there is a certain merry-go-round that... where staff have moved from one consultancy to another. So certainly there... I mean, there are some other consultants that we are very, very friendly with and have partnered with in the past. That's... and that would be ongoing. But I think... (NIMBSEC01)*

*There is quite a bit of competition and there's quite a few players in the market, as a larger consultancy obviously we have we have quite a substantial overhead which needs to be covered for and catered in our fee bids. On certain projects we are dealing and competing against you know one or two man bands who have a much more linear overhead. (NILBSEC02.)*

### 9.3.3 Conclusions

The Northern Ireland building services engineering sector differs from its counterparts within England in respect of the fact that there appears to be no concept of partnering whatsoever within the sector or any other more negotiated methods of building procurement or team working between companies to bid for bigger contracts for example, and competition remains fierce. SummitSkills believes that the kind of fierce competition and rivalry described by the Northern Ireland companies within the sector might actually be detrimental to the actual performance of the sector generally. SummitSkills therefore in association with partners and stakeholders proposes to look to develop be-spoke training courses encouraging partnering and other less adversarial methods of building procurement both for the sector, and for clients of the sector. SummitSkills also believes that the existing curriculum for both existing and new entrant workers should take cognisance of the need for new procurement techniques such as partnering and SummitSkills proposes to work with partners and stakeholder to seek to integrate these new ideas into the curriculum.

## **9.4 Bargaining Power within the Building Services Engineering Sector**

### **9.4.1 Introduction**

Porter (1985) looks at the concepts of bargaining power from the position of the buyer of a good and service from a given company, and the position of a supplier of goods or services to that company. The two concepts, whilst having some similarities, also have some differences and so are treated separately within the literature section of this SNA. As with all of Porter's (1985) work, there are some areas of the theoretical model that do not adapt well to the specialist building services engineering sector, and these are indicated within the text.

### **9.4.2 Bargaining Power of Buyers**

*Buyer Concentration versus Firm Concentration:* Porter (1980) maintains that buyers compete with industry by forcing down prices, bargaining for higher quality or more services, and where possible, playing competitors off against one another, which all impact on the sector's profitability. Porter's (1980) theory works if a number of factors are maintained, one of which is that a buyers group is powerful if it is concentrated or purchases large volumes relative to seller sales. Thus if a large proportion of sales are purchased by a given buyer, then these raise the importance of the buyers business, and would make threats of switching more potent (Porter, 1980, p24).

*Buyer Volume:* Where the product that the buyer purchases from the sector represents a significant fraction of the buyer's costs or purchases then the buyers are likely to be very price conscious, and will shop around for the best deal. This is likely to not be so much the case where the fraction is lower (Porter, 1980, p25).

*Buyer Switching Costs:* Where products that the buyer purchases from industry are standard or undifferentiated and can be purchased from a number of suppliers then this makes it easier for buyers to shop around. Where switching costs are low, then there is always the potential that a buyer may switch and therefore that buyer is in a stronger position in relation to potential sellers. A final driver to switching is the context of where the profits within the industry are low, and the buyer will be seeking to raise the profitability of their product by reducing the costs of component parts of the product for example (Porter, 1980, p25).

*Buyer Information:* As with other sub-sections within this part of the SNA, the more information that there is available to the buyer, the more likely it is that the buyer will be able to negotiate a better deal for themselves with the potential suppliers within the sector (Porter, 1980, p26).

*Ability to Backward Integrate:* This concept is where a major buyer can threaten a supplier that they will set up their own company producing the suppliers' product, rather than purchasing from the supplier. This technique is popular within the automotive industry, but probably has less relevance to the building services engineering sector (Porter, 1980, p25).

*Substitute Products:* In a market where substitute products are available, then this gives the buyer the scope to shop around to find the best deal and threaten potential

suppliers with substitution as a mechanism to force down price (Porter, 1985; Porter, 1980).

### 9.4.3 Bargaining Power of Suppliers

*Dedifferentiation of inputs and Switching costs of suppliers and firms in the industry:* Where the supplier group's products are differentiated or it has built up switching costs, and can move to address the needs of other buyers, with the effect that this prevents buyers from playing one supplier off against another (Porter, 1980, p28).

*Presence of Substitute Inputs:* Where suppliers are not obliged to contend with other substitute products for sale to the sector, then this prevents buyers from having power to negotiate on price by threatening to move to substitutes (Porter, 1980, p27).

*Supplier Concentration:* Where the suppliers sector is dominated by a few companies and is more concentrated than the sector to which it is selling, and then the sellers will usually be able to exert considerable influence in prices, quality and terms (Porter, 1980, p27).

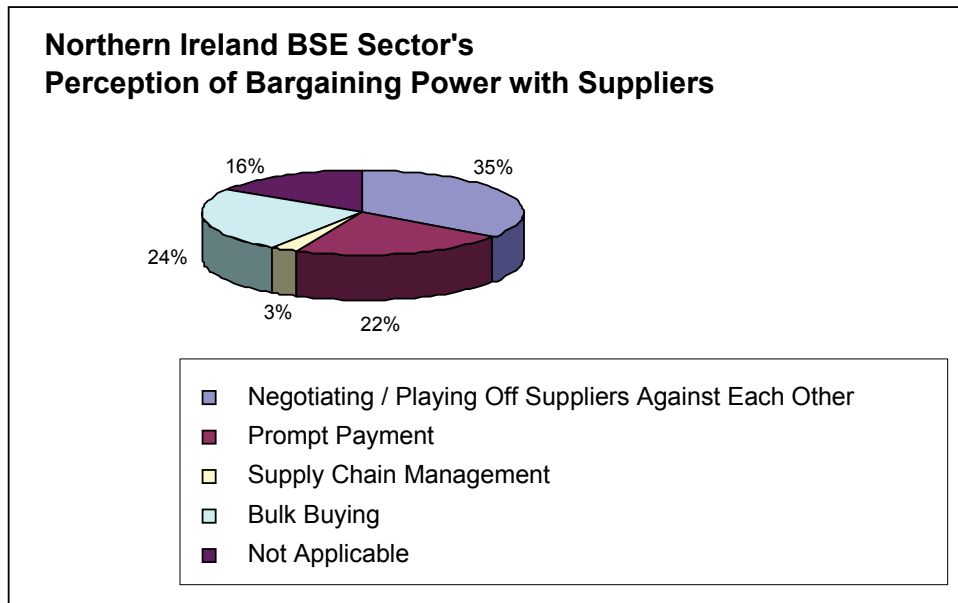
*Costs relative to total purchases in the industry:* Where the buying sector is not an important customer of the supplier group, and suppliers sell a range of different products to a range of different groups, then supplier are likely to exert more power than if the sector is a key one for the suppliers (Porter, 1980, p27).

*Impact of inputs on cost or differentiation:* Where the suppliers' product is an important input to the buyer's business. Then this proportionally raises the suppliers' power to determine the terms of the sale (Porter, 1980, p28).

*Threat of Forward Integration relative to threat of backward integration by firms in the industry:* Where the supplier group poses a credible threat of forward integration and beginning to manufacture the same products or services as the buyers, then this threat will be a real issue in suppliers' controlling the terms of business under which the suppliers supply to the buyers (Porter, 1980, p28).

### 9.4.4 Northern Ireland Perception of Bargaining Power within the Building Services Engineering Sector

The building services engineering sector has identified a number of issues relating to the bargaining power of the sector in relation materials suppliers and clients. The following diagram indicates the views of the companies within the sector in the province in relation to materials suppliers:

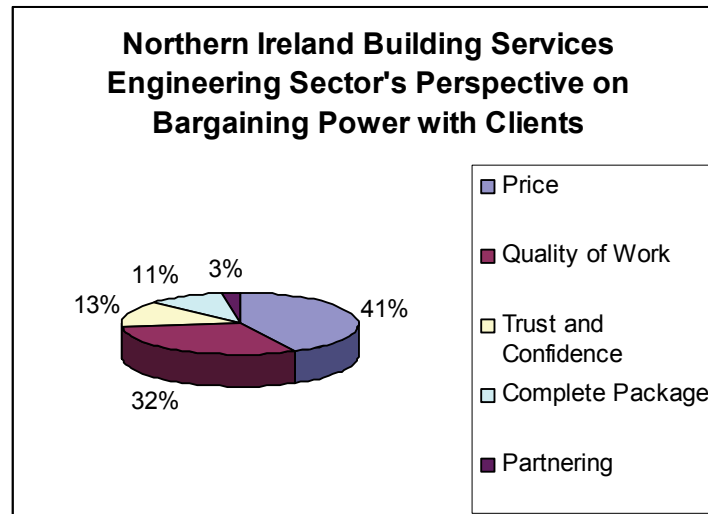


The quotes below are indicative of the views of the sector encapsulated within the diagram above:

*Bargaining power. Northern Ireland's slightly different than other areas because we tend to have our own sort of costs set up. With the introduction of the ... Centre over here, it has certainly taken up the Northern Ireland market, but most of our ... In our experience, certainly our figures are tied down very tight. There's not a lot of bargaining power out there, with these margins. (NIMP02)*

*With material suppliers it's the same as anywhere else. If you're buying more... the more you buy the better... the bigger the stick you have to win... to try and get better prices and that's basically what we use. We try to use one supplier against the other to try and get the best prices. (NIMACR01)*

As can be seen from the diagram above, the traditional methods of materials procurement of trading suppliers off against each other and bulk purchasing can be seen to be still predominant in the sector. The next question sought to analyse the views of the sector in relation to the bargaining power of the companies with their clients. The diagram which follows indicates the various opinions of the companies interviewed to the question below:



The quotes below are indicative of the views of the client encapsulated within the diagram above:

*I think that people have a different attitude now to what they had previously. I think that mainly cost comes into it, without taking into consideration what the end result will be and maybe it will be more costly. (NIMP01)*

*None, it's price led... Well, they do touch on it and yes if you're pricing a tender on the back of something you've already done, on the back of a job you've completed, on the back of work you've done successfully on the back of a good job, that's fine. But once that tender's actually returned the determining factor is always cost, irrespective of statements about quality and ability and trained operatives. (NILP01)*

*That... it's... we've always known it's a buyer's market. Particularly here in the North West of Northern Ireland, we're within a thirty or a forty mile catchment area, you may have two or three times the number of electrical contracting companies than you would have in a comparable area somewhere else. So, effectively the clients know that by putting out more enquiries they can probably get better value for money. And that may be a false way of saying it, they're going to get a cheaper job, not necessarily value for money. (NISET01)*

*We feel that the biggest thing in this area would be the under pricing issues driven by the use of cheaper, unskilled labour in many cases. (NISET02)*

*Well, I partly covered this in the previous part of this question on bargaining power. But cheap competition from companies not paying the national JIB wage rate is a major factor. Not just for apprentices but also for electricians and approved electricians throughout the industry in the north of Ireland. We're also finding that there's been an increase recently over the last twelve, eighteen months of self employed electricians and labour only electrical contractors. And this is having a major impact on our ability to deal with clients and provide*

*them with a good service and competitive price. Sadly most clients are driven to take the cheapest option, particularly through the builder in a domestic contract situation. (NIMET01)*

*Well, I would always... you know, as a company here we would pride ourselves on quality issues. Getting the job done on budget, on time. We've found in the past it has been a good bargaining power. But more recent, cheapest always gets. (NIMET02)*

*Well as regards to cost, that always affects your bargaining power because of our commitment to training and our commitment to health and safety. This adds considerably to our overheads. (NILET02)*

*With our client base, well, I mean history of the past and good performance and quality provision would be what we're always trying to sell to our client base and I suppose the success of that is the repeat business we do tend to get from them. (NIMHV01)*

*Well, we try to get them obviously a good competitive price that they're happy... but at the end of the day we... our biggest bargaining power, especially in the area we live in, is that we can offer a very reliable back-up service, which is very important in the refrigeration industry. (NIMACR01)*

*Well, bargaining power always comes down to the cost quoted or the price quoted, the percentage level. There is quite a degree of... there's quite a spectrum, let's put it that way, where sometimes you don't have to bargain at all because the client will know what they want, they will know the cost of that, and then you've got other clients where they don't really understand the... what it is they're looking for and can't understand why they have to pay for it [laughs]. But, I mean, it always... it does... (NIMBSEC02)*

#### **9.4.5 Conclusions**

The building services engineering sector within Northern Ireland remains very traditional in relation to the procurement of materials for the sector, with there being only 3% of companies surveyed using supply chain management techniques for materials procurement. SummitSkills believes that supply chain management theories in keeping with Porter's view on competitive advantage are a major way that companies can obtain competitive advantage and improved service, as well as obtaining cost savings and relationship buy in from the materials suppliers. SummitSkills proposes to work with both partners and stakeholders within the province to provide in scope company training for the sector to facilitate the development of the supply chain management techniques for utilisation within the sector, as well as seeking to incorporate the theory of supply chain management into the qualification curriculum of the sector both for new entrants and existing workers seeking to enter the sector at all levels of entry including craft entry.

## 10 Business Enterprise

### 10.1 Capital Investment

#### 10.1.1 Introduction

The UK Government, and all the devolved nation governments, is committed to raising the long-term rate of productivity growth of the UK economy, at the same time as reducing the productivity gap between the UK PLC and its competitors within the world. The Government perceives that increasing the amount of investment in the capital infrastructure will deliver higher living standards for citizens within the UK, while also improving public services. The Government investment plans particularly within housing and transport impact directly on organisations within the SummitSkills footprint, as public money is expended on public sector construction projects (HM Treasury, 2002, p3).

Porter (1990) argues that national competitive advantage in relation to investment is based on the willingness and ability of a nation and the companies that work within it to invest aggressively. The justification and motivation for investment is primarily to enable them to construct modern, efficient and large scale facilities equipped with the best technology to invest on the global markets and thus generate incoming wealth. Another motivator for a firm to invest heavily is where there is intense domestic rivalry in the industries where the firm is competing, and where investment may lead to reductions in cost, or alternative benefits of improved product quality, or the introduction of new products and/or technologies. Within this context, the presence of corporate goals that support investment in technology and capital assets is also an important condition, as is the need for firms to engage in risk taking (Porter, 1990 p549).

The presence of knowledge factors such as universities and colleges adds value to the model as they provide low cost, but more advanced functions of training and educating the workforce. Which makes the workforce more productive while not increasing their wages (at least in the short term) and therefore is a justifying factor in investment in education and skills.

Porter (1990) therefore concludes that the more sophisticated and better assimilated technology, educational and modern facilities are then the more efficient will be the UK's productivity performance (Porter, 1990, p549). The use of investment may also be used by some companies within an industry, to reduce the entry possibilities to the industry. So for example in relation to the building services engineering sector, large contactors may through the use of specialist plant and machinery and a pool of highly talented operatives prevent new entry to the industry. As firms needing to purchase or hire specialist plant and machinery and skilled operatives might be unable to compete on the grounds of cost or quality with established companies within the market (Porter, 1990, p549).

Within this section of the SNA, it is also proposed to look at how the employers in the building services engineering sector might use the investment as part of a competition strategy within their particular industry. The theory announced by Porter (1980) is that firms may use investment to restrict entry to a profession, by increasing efficiency and reducing costs, making new business start up prohibitive. The construction industry (which includes the building services engineering sector) is prone to economic cyclical processes, and is often the first area of the economy to go

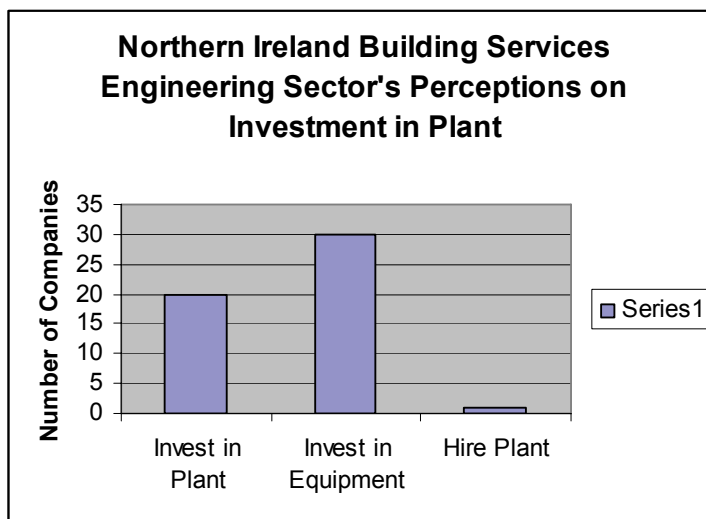
into recession, and the last to come out, as clients responding to their own market pressures reduce their requirement for new builds.

The investment in plant and machinery if effectively used; may produce labour cost savings, which a building engineering services company may use to fight for survival while waiting for the economy nationally to improve, and for profit margins to rise. In a depressed economy where there is insufficient work to go around, astute investment in plant, machinery and skills may facilitate survival (Porter, 1980; Porter, 1985).

In this section of the SSA, it is proposed to look at the views of the contractors within the building services engineering sector to analysis the development of these concepts as a potential part of their business strategy.

### 10.1.2 Northern Ireland Building Services Engineering Contractors' View on Capital Investment

The traditional view of the sector was that building services engineering sector companies hired plant for their diverse contracts. Porter in his theory on competitive advantage identifies considerable advantages that the purchase of capital equipment can accrue to a company in relation to productivity increases, and although this may be more pertinent to manufacturing than an installation services industry, SummitSkills believes that the sector can benefit from the purchase of plant and equipment. Within Northern Ireland as well as in the rest of the UK, there does appear to be a significant increase in the amount of companies within the sector that are investing plant and equipment as shown from the diagram below:



The quotes below are indicative of the views of the companies encapsulated in the diagram above:

*Yes we do spend a lot of money so we do on equipment for the guys, machines, equipment so on and so forth and also within the technological things in the office – computers and so on and so forth and software. (NILP02)*

*Originally we had considerable investment in plant, scissors lift, [boom] lift, fork lift. However, we've minimised this over the last several years due to the ever increasing cost of maintaining plant. Equally, the government doesn't provide any income tax rebate for the purchase of major plant, scaffolding and elevation equipment. And I think the government needs to investigate this. Originally some fifteen, twenty years ago, you could for, tax rebate purposes, purchase equipment and you had assistance with regards to that. I think the government needs to look at some way of assisting rebates on income tax and VAT, not only in health and safety but also on the purchase of plant and equipment. (NIMET01)*

*Yeah, of course. I mean it's a constant thing. We can't function without plant and equipment and in our fabrication workshop there's a spend required there very shortly to update a lot of machinery, so it's a constant thing. (NIMHV01)*

*Yes, we run a year on year investment in renewing plant, repairing plant and increasing our capacity with regard to plant. (NILHV02)*

### **10.1.3 Conclusions**

SummitSkills believes that capital investment in plant and equipment is a major way for the sector to improve its productivity. SummitSkills believes that the virtues of plant and how to engage in plant management and calculating depreciation costs on plant are key to maintaining the sector's productivity. SummitSkills will seek to work where required within the sector with partners and stakeholders to provide a spoke course in company to facilitate the development of good plant purchase and maintenance strategies. SummitSkills also believes that the theoretical basis behind capital investment in plant and equipment and its relationship to productivity improvement should be incorporated into existing qualifications and curriculum at all levels of training. SummitSkills will seek to work with partners and stakeholders to incorporate the concepts of capital investment into the curriculum at all levels including craft.

## **10.2 Research and Development**

### **10.2.1 Introduction**

Research is a major factor in the production of new products and services for the British economy. The development of the knowledge economy has led to an increased awareness of the role of research in the development and maintenance of Britain's economic position. Porter (1990) although somewhat dated now identifies that although the UK did invest heavily in research, most of it was orientated towards pure science and especially to the defence industry. In 1987 the UK Government spent most 50% of its money on research on defence, compared to 12% in Germany, 5% Japan and 34% France (Porter, 1990, p498).

During the late 1980s and 1990s public investment in research was significantly reduced due to the then Government's policy of reducing Government expenditure and transferring responsibility for some functions from the public to the private sector (Porter, 1990, p498). In the private sector over the same period British companies

tended to be aggressive investors in research in specific industries such as chemicals and pharmaceuticals. The performance of private industry over the same time period in research was below as a percentage what was invested by the UK's main industrial comparators, so in 1986, it was 1.19%, compared to Japan (2.19%) Germany (1.6%) and Sweden (1.71%). When defence research is removed the total figures were equally poor during this time, with the UK (1.8%), Japan (2.8%), and Germany (2.6%), with other advanced nations recording similar figures (Porter, 1990, p498).

The end of the cold war and the desire by subsequent Governments to address the issues of the knowledge economy means that the defence research budget has remained overall much the same however spending on other research and development has increased between 1993 and 2003, and this is identified below:

	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03
<b>Science budget R&amp;D</b>	1,135	1,174	1,240	1,261	1,279	1,280	1,339	1,459	1,649	1,870
<b>HE Funding Council R&amp;D</b>	968	1,017	1,018	1,028	1,033	1,085	1,157	1,276	1,474	1,626
<b>Science and Engineering Base R&amp;D</b>	2,103	2,191	2,257	2,289	2,312	2,365	2,496	2,735	3,122	3,496
<b>Civil Departments R&amp;D</b>	1,021	978	1,315	1,327	1,282	1,246	1,351	1,474	1595	1,849
<b>Total Civil R&amp;D</b>	3,124	3,169	3,572	3,616	3,594	3,611	3,847	4,209	4,717	5,345
<b>Total Defence R&amp;D</b>	2,279	2,032	2,070	2,234	2,314	2,140	2,272	2,240	2,057	2,734
<b>Indicative UK contribution to the EU R&amp;D budget</b>	281	286	339	358	340	375	328	399	393	458
<b>Total</b>	5,683	5,487	5,981	6,207	6,248	6,126	6,447	6,848	7,167	8,538

Source: Universities UK (2005)

The Government's bias to science is clearly stated, with the Government funding of research in universities being now allocated through a number of research councils, of which there are eight in total, with the Arts and Humanities Research Council (AHRC), the Biotechnological & Biological Sciences Research Council (BBSRC), the Council for Central Laboratory of the Research Councils (CCLRC), the Engineering and Physical Sciences Research Council (EPSRC), the Economic and Social Research Council (ESRC), the Medical Research Council (MRC), the Natural Environment Research Council (NERC) and the Particle Physics & Astronomy Research Council (PPARC).

It is argued that the names of these councils suggest that there is still a high scientific bias in relation to Government-funded research. OECD (2005) in Universities UK (2005) show that for gross domestic expenditure on research and development for G7 Countries expressed as a percentage of Gross Domestic Product (GDP), then the United Kingdom is in the lower half of this group in relation to research expressed as a percentage of GDP at 1.9%, with only Canada (1.85%) and Italy (1.07%) being below the UK. France (2.2%), Germany (2.5%), United States (2.82%) and Japan (3.09%) all invest significantly more than the UK in research as a percentage of GDP (Universities UK, 2005).

A method of measuring academic research success and quality is through the number of publications that a country has. From this it is possible to determine in a business sense, the number of potential patents that might come out of the research.

Because scientific research is most likely to lead to patents, then particular interest is given to citations and publications within that field. Switzerland with 1,757 publications per million of population is the leader in this field, followed by Sweden (1598), Israel (1334), Denmark (1332), Finland (1309), Netherlands (1021) and the United Kingdom (929). The United Kingdom does however outperform the United States (774), Germany (731), France (712), Spain (567), Japan (550) and Italy (545) (European Commission, 2003 in Universities UK, 2005).

The dispersion of research funding and activity varies around the UK and the table below shows the estimated regional breakdown of intramural (within the walls) research and development expenditure in business, Government and the HE sectors for the nine English regions and the four devolved nations:

	R&D performed within business	R&D performed within Government	R& D performed within HEIs
<b>United Kingdom</b>	13,110	1,752	4,413
<b>England</b>	12,138	1,459	3,568
<b>North East</b>	128	6	159
<b>North West</b>	1,661	67	354
<b>Yorkshire and Humber</b>	357	62	340
<b>East Midlands</b>	1,063	65	234
<b>West Midlands</b>	695	50	221
<b>Eastern</b>	2,741	286	402
<b>London</b>	950	235	1,059
<b>South East</b>	3,268	459	608
<b>South West</b>	1,274	228	191
<b>Wales</b>	182	41	180
<b>Scotland</b>	640	238	581
<b>Northern Ireland</b>	149	15	84

Source: Universities UK (2005)

There must be some concern about the research performance of the devolved nations in relation to research expenditure, as they are overtaken by many of the English regions in research and development investment, and this may impact on their ability to attract inward investment in relation to the knowledge economy (Porter, 1990).

## 10.2.2 Rethinking Construction Innovation and Research

In a report with the same name as this sub-section, the DTLR and the DTI commissioned Sir John Fairclough to look at the current state of research within the construction industry, which includes the building services engineering sector. Sir John confirmed the Government's acceptance of research as being a driver for innovation within the construction and all other industries.

Sir John devised three headings of responsibility for the Government to address with the construction industry, which would stimulate an increased amount of affective research within the construction and building services engineering sectors. These are:

- First the Government is to act as a regulator by establishing a framework that anticipates emerging needs, but protects a minimum building standard. Government is tasked with the full funding of this heading.
- Government is also required to act as a sponsor for the industry, while not dictating the research agenda to the industry. Sir John encouraged the industry to provide leadership for driving forward a specific vision and definition of industrial research needs.

- Finally, the Government must act as a client for research within the construction industry, to stimulate innovative research in relation to best value and fitness for purpose in public buildings for example, while industry maintained the strategic framework (Fairclough, 2002, p6).

As indicated above, the construction would not appear to be a great consumer of research given its relative size in relation to other industries. Public funding over ten years has been between £50- £70million pounds in ten years for construction related research, which should be assessed against a construction procurement of £25billion pound construction procurement. These statistics provide a stark indication of the total under researched funded nature of the construction industry. The dispersion of research funding appears to come primarily from the following sources: DTI (£15-18m), DTLR (£6m), and EPSRC (£25m). The EPSRC has established three construction centres of excellence at the old universities of Loughborough, Reading and Salford (Fairclough, 2002, p11).

Other potential sources for building services engineering research include the ESRC (for social projects akin to construction), Highways Agency, Environment Agency and the Housing Corporation. Charitable trusts where applications may also be made include the Ove Arup Foundation, the Foundation for the Built Environment, the Joseph Rowntree Foundation and the Tyndall Centre on Climate Change for example (Fairclough, 2002, p12). Fairclough (2002) could not find any indication of EU funding for research, but there is no impediment for bids to be made for research funding to the EU (Fairclough, 2002, p12).

The traditional vehicle for research capacity within the UK is the HEI University sector, however Fairclough (2002) found significant evidence to suggest that the construction industry and the university sector are “poorly coupled”. However Fairclough (2002) did find evidence that through EPSRC’s Innovative Manufacturing Initiative, the coupling is improving, with more ‘enlightened’ industrial companies within the construction sector now working with construction departments. The choice of the word ‘enlightened’ by Fairclough (2002) suggests that there is still a resistance to research by the industry, and there is also a remaining lack of trust in ‘academics’ experienced by industry (Fairclough, 2002, p13).

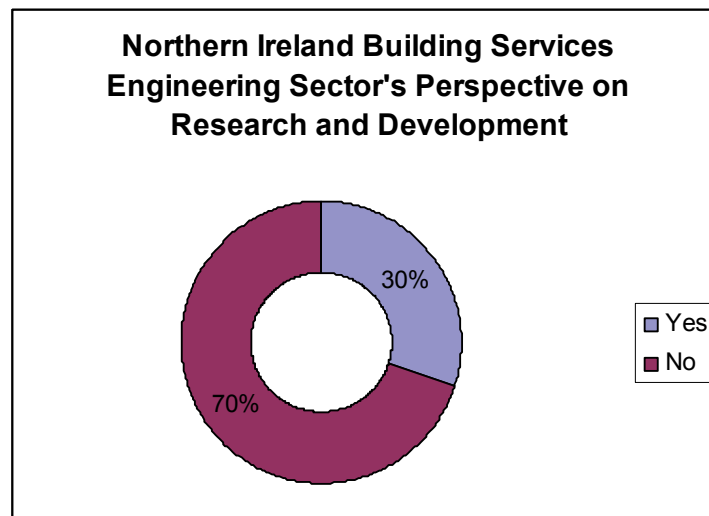
Within the private sector research establishments, then 64% of the former DETR construction research and development research funding for construction goes to the Building Research Establishment (BRE). Other recipients of research funding include the Building Services Research and Information Association (BSRIA) 4%, Construction Industry Research and Information Association (CIRIA) 4%; Timber Research and Development Association (TRADA) 3%, HR Wallingford 3%, Steel Construction Institute (SCI) 2% (Fairclough, 2002, p12). Private in company research carried out by construction contractors’ amounts to some £40million per annum. Fairclough (2002) concludes that this is in part due to the low skill base in-house of construction companies in relation to research, coupled with a possible general disinterest in research has lead to a long term failure by the sector to provide a coherent planned research strategy (Fairclough, 2002, p16).

A potentially major obstruction to the development of joined up inter-disciplinary research within the construction industry is, in part, due to the distinct character and traditional autonomy of the professional institutions which represent construction within the building services engineering sector, which Fairclough (2002) concludes is due to their jealous guarding of their traditional autonomy. Fairclough (2002) concludes that professional accreditation by the professional institutes needs to move towards fostering and promoting rather than inhibiting the development of

interdisciplinary skills, which in turn will promote inter-disciplinary research (Fairclough, 2002, p17).

### 10.2.3 Northern Ireland Research and Development - the contractors' view

As can be seen from the literature, research and development is not a function that the building services engineering sector within the UK generally sees itself as being involved in and as suggested in the literature, the sector is seen as being under researched generally. Porter in his theory of competitive advantage sees research as being important in the development of new goods and services and as a way that firms can achieve competitive advantage through innovative practices. Although Porters theory may be said to be more manufacturing based than installation services based, SummitSkills believes that the sector could experience many benefits in productivity and efficiency from engaging in research and development:



The quotes below are indicative of the views of the companies encapsulated within the diagram below:

*It does, insomuch as that they have associating members who are in the manufacturing business and those people come in contact with the members of the... That's right. And that... yes it does, and they... well, at their AGM's etc. etc., they do have them there and they get their presentation and I would say that is favourably accepted. (NIMP01)*

*We have a Scientific Department and we have R&D on process control. (NILET01)*

*Well the research we are carrying out into alternative systems like wind and solar power, the research is being done in house by one of our own engineers, but we don't do any development. (NILET02)*

*We haven't been involved in research and development, although at this minute in time, we are currently looking into some development*

*and research and with environmental energy and sustainable energy, we are talking to a company in England – don't name them... Well we're talking to a company, ..., who have been involved in bio-mass boilers and that we're looking very seriously at going down this road, so's we can utilise the bio-product, heat, that's produced from the generators for, maybe, heating systems and see how we could utilise that into an entire scheme. This is, maybe, something that could be looked at for some office developments, or even for small factory developments, or that type, where they would be using a high input of electricity. The by-product of the heat off the generator could be used to maybe heat, or to provide partial heating, or something and we are looking at that at the minute. It's only something we've got into and the person looking after it in our environment is my son, who works with me in the business, and he's just completed, or is completing his degree in ... University in Environmental Engineering. (NISHV01)*

*Yes, our commercial director leads the two contracts managers in reviewing technical opportunities that exist with new materials within the marketplace. (NILHV02)*

*Not really, no. No, we would just go with the market and whatever site they're in. If something catches our eye we'd find out about it and get a bit of instruction on it and see... if it looks as if it's something that's going to come in, you know, then we'd go to seminars or we'd go on this, yeah. (NIMACR02)*

*We do, we have recently in one of our Scottish offices started a small sector for RND, within that there are a technical librarian and a few specialists on sustainable building physics that sort of thing as well as the our own skill base in each individual office. (NILBSEC01)*

*Well we are constantly having to look at ... because IT is one of the big things where we can make savings and seem to make ourselves work more efficiently. So we're always looking at it. Now we haven't anything specific at the present time which we're doing. The recent thing was I think the blackberry so all the guys can get mobile emails etc to them. But we're also ... one of these things we are constantly trying to keep our eye on about new IT software. (NILP01)*

*Yes indeed. We've had a CAD system since 1994. We continue to enhance and develop on our CAD system. We have design packages for the computer systems. And just recently we've carried out a major upgrade to our CAD system with new software, new hardware, new colour printer and new design systems. We keep constantly reviewing and innovating to enable us to compete with our rivals and provide a better system to architects and consultants. So new technology is important and vital. We've also just recently installed a tracker GPS system on all our vehicles which gives us a readout of fuel, miles, locations, provides us with a management control system. This has been welcomed by a number of our customers. (NIMET02)*

## 10.2.4 Conclusions

SummitSkills believes that although the Northern Ireland building services engineering sector is performing better than the sector in other parts of the UK, SummitSkills believes that there is a need for the sector to develop more research capacity within the province, particularly in relation to the universities where there is capacity in environmental technologies. SummitSkills believes that it can act in a brokerage role in relation to creating partnerships between the sector and HEIs in the province to undertake commercialised and effective research to improve the productivity of the sector.

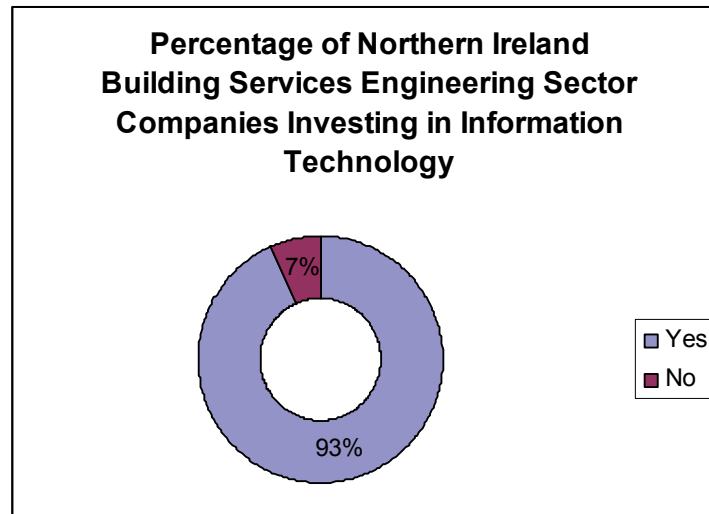
## 10.3 New Information Technology Implementation

### 10.3.1 Introduction

The essence of Porter's (1985) competitive advantage hypothesis in relation to information technology implementation (written of course at a time when the information technology revolution was in its infancy) is that information technology is a catalyst for bringing together disparate parts of the business. The advent of wireless technology has allowed the construction industry (including the building services engineering sector) to potentially link various sites to the head office for management purposes; control more accurately the ordering and delivery of materials to site as well as facilitating better communication between personnel. The creation of the knowledge economy will it is suggested increase the necessity for technological development, as the knowledge creation through design may be situated not only in a different part of the UK, but might even be situated in the USA or other part of the world. Given this agenda, it is therefore important to assess the current information technology usage within the building services engineering sector, with a view to identifying whether there are any identifiable training needs

### 10.3.2 Northern Ireland New Information Technology - the Contractors' View

Porter identifies investment in new technology as being a key factor in raising productivity levels through increased efficiency. As in the rest of the UK, the Northern Ireland building services engineering sector would appear to be investing heavily in new technologies to make the sector more effective. The following diagram indicates the percentage of companies who are investing in information technology within the province:



The quotes below are indicative of the views of the companies encapsulated within the diagram above:

*Essentially we have. You know, we've got a completely networked ... Over the space of two years, three years ago, totally networked IT system within the building and we continue to improve in that there particularly with regard to facilities, further with, you know, plotting drawings, the interface between engineers, on sites is the next step. However, unfortunately, it has not created the intent of a paperless society, as one can see around here at the moment really. [Laughs] (NILP01)*

*Yes indeed. We've had a CAD system since 1994. We continue to enhance and develop on our CAD system. We have design packages for the computer systems. And just recently we've carried out a major upgrade to our CAD system with new software, new hardware, new colour printer and new design systems. We keep constantly reviewing and innovating to enable us to compete with our rivals and provide a better system to architects and consultants. So new technology is important and vital. We've also just recently installed a tracker GPS system on all our vehicles which gives us a readout of fuel, miles, locations, provides us with a management control system. This has been welcomed by a number of our customers. (NIMET02)*

*Essentially we have. You know, we've got a completely networked ... Over the space of two years, three years ago, totally networked IT system within the building and we continue to improve in that there particularly with regard to facilities, further with, you know, plotting drawings, the interface between engineers, on sites is the next step. However, unfortunately, it has not created the intent of a paperless society, as one can see around here at the moment really. [Laughs] (NILHV01)*

*Mostly computers, electronics, dial-in systems for refrigeration and stuff. (NISACR01)*

*It depends on what it is. At this present minute no, but if something comes out, new drawing packages or things like that'll help. (NISBSEC01)*

*Yes, we are always keen to stay ahead. In many cases when we're trying to describe to clients what they should be putting in their buildings, they often ask us we would use it ourselves, for example our office uses heat pumps to heat the space so we're trying to lead by example. (NILBSEC01)*

### **10.3.2 Conclusions**

Information technology is important in the development of efficiency gains and productivity within the sector and Northern Ireland would appear to be performing well in this area. SummitSkills believes that the sector within the province would benefit from continual be-spoke courses identifying IT developments and indicating how these would benefit the sector. Although not highlighted in Northern Ireland in this section, there has been some concern in England that investment in IT may not be producing the productivity and efficiency gains anticipated due to the IT basic skills deficiencies particularly in relation to older workers. SummitSkills believes that this may be a real issue in relation to basic skills information technology needs and therefore will seek to work with partners and stakeholders to make sure that there are be spoke courses for the sector on the effective use by operatives of all grades of the emerging technologies, to facilitate the sector's companies in the province to maximise the productivity gains emanating from the technology.

## **10.4 Enterprise and the function of the Entrepreneur in the Building Services Sector**

### **10.4.1 Introduction**

Entrepreneurship is a key part of the economic development strategies of all the devolved nations and English regional assemblies. The United Kingdom is currently classed as a high income low growth economy, which is in need of entrepreneurial business development, if the UK is going to retain and increase the wealth, prosperity and standards of living within the countries (GEMER, 2005, p15).

Currently, the United Kingdom has an early-stage entrepreneurial activity by country of approximately 6.2%, which is higher than Japan (2.2%) and Italy (4.9%), Germany (5.1%) and France (5.2%), but significantly behind the major Asian and up and coming Latin American economies that are predicted to dominate world markets later in the twenty-first century, with China (13.7%) and Brazil (11.3%) (GEMER, 2005, p18).

Entrepreneurial activity is believed by academics to be stimulated / derived from a variety of physiological factors that relate to age, gender, work status, education, income and access to finance. All these factors are important in relation to the decision by an individual to start a business, and some of these concepts within this SNA overlap other sectors, such as business start up (GEMER, 2005, p32).

The evidence also shows that in general more men than women are likely to want to start businesses. The gender gap varies between countries and is most pronounced in high income countries (of which the UK is one) than middle income countries. This disparity may be explained by the fact that in these middle income countries access for women to traditional labour markets is reduced forcing women to seek more entrepreneurial solutions. By the same token in richer countries women may be put off becoming entrepreneurs as larger companies and public employers can offer healthcare and childcare benefits, which may influence women not to engage in entrepreneurial activity (GEMER, 2005, p34).

Given the reluctance of the building services engineering sector to engage with women (see the diversity section of this SNA) and the identifiable markets for women, single women and vulnerable groups, it seems likely that much entrepreneurial activity from women could occur through the development of niche market woman only building services engineering sector companies.

A key driver of entrepreneurial activity is venture capital, as the investment in ideas to generate new businesses is a major stimulus to entrepreneurial activity. The performance of the UK in classic venture capital as an investment percentage of GDP is below the international mean of 0.125% at 0.105% approximately. This performance is above Germany, Italy and Spain, but below Ireland, France, Denmark, Netherlands, Norway, Belgium and Sweden, and internationally significantly behind the USA. If the hypothesis is accepted that globalisation is moving the world economy into a high-tech knowledge based mode, then the expenditure of less than 0.02% of classic high-tech venture capital investment in Europe and the United States as a percentage of GDP shows that the United Kingdom in 2004 was near the bottom of the league above only Spain, Italy and Greece, and dwarfed by the USA, which invests over 0.16% of GDP on high-tech capital investment (GEMER, 2005, p49-50).

In 2004, the Classic Venture Capital Investment per Company for Europe was £3000, however the UK was below this average at approximately £2800, but again dwarfed by the USA whose investment was approximately £8800 (GEMER, 2005, p51).

Entrepreneurial activity in the UK has been researched in relation to the G7 countries and the tabulated data is shown below:

	2001	2002	2003	2004	2005
I expect to start a business in the next three years.	No Data	4.6	6.2	9.5	8.7
I know someone who started a business in the last two years.	27.0	23.0	24.6	27.7	27.7
There will be a good opportunities to start a business in my area in the next six months.	18.2	22.3	35.2	35.9	38.5
I have the skills, knowledge and experience to start a business.	40.2	42.9	48.4	51.7	50.7
Fear of failure would prevent me from starting a business.	30.1	34.0	33.6	32.9	34.2
Starting a business is a good career choice.	No Data	No Data	51.2	54.1	54.3
Entrepreneurs have a high status in society.	No Data	No Data	71.0	71.7	71.7
Media coverage of entrepreneurship is good.	No Data	No Data	56.2	55.7	54.4

Source: GEMER, 2005, p19)

The table above shows that entrepreneurial activity has remained stable since 2001, but worryingly the fear of business failure has risen, and this may be a factor in not bringing through to fruition an increasing awareness of the positive entrepreneurial factors found elsewhere in the research, as the proportion of the working age population who are expecting to start a business since 2001 has nearly doubled, and

those people who think that they have the right skills to start a business has risen 10% (GEMER, 2005, p18).

Entrepreneurial activity across the devolved nations and regions of the UK shows a variable picture, with only the South West and Yorkshire and Humberside seeing consistent increases over the whole of the period between 2003 and 2005. The table below contains a comparative analysis of the devolved nations and regions in relation to standard questions on entrepreneurial activity:

	I am trying to start a new business			I am trying to start a new business for my employer			I am currently the owner of a business I help manage			I have closed down a business in the last 12 months		
	'03	'04	'05	03	04	05	03	04	05	03	04	05
EM	3.4	4.3	3.5	2.1	2.4	1.8	12.5	12.2	9.7	3.5	1.8	2.0
EE	5.2	2.8	3.4	2.1	1.4	1.6	13.4	13.7	11.6	2.6	2.0	1.5
Ldn	8.3	6.2	5.1	2.4	1.9	1.6	14.1	11	11.8	2.1	2.1	2.9
NE	3.3	2.4	2.5	2.0	1.8	0.5	9.4	7.5	6.6	0.5	0.8	1.9
NW	4.3	3.1	3.0	1.6	1.9	0.9	10.0	10.0	8.0	2.1	1.1	1.4
NI	4.6	4.4	3.4	2.0	2.2	0.9	11.7	9.1	8.7	1.3	2.2	1.5
Scot	4.1	4.0	3.6	1.9	2.0	1.0	10.6	10.2	9.2	1.3	1.6	1.6
SE	5.4	5.4	3.9	2.4	2.1	1.4	15.3	11.3	11.8	2.4	2.3	2.1
SW	5.0	4.5	3.9	2.6	2.5	0.9	14.7	13.2	14.0	2.4	2.5	2.1
Wales	5.1	4.4	3.6	2.5	1.8	1.3	13.1	8.6	9.9	2.5	1.5	1.8
WM	4.7	3.0	3.4	2.8	2.1	0.9	13.4	11.2	11.2	1.7	2.4	1.6
Y&H	3.7	3.5	3.7	2.2	1.2	1.3	10.3	8.5	10.1	1.9	1.7	1.6

Source: GEMER, 2005, p22.

The table above shows that the proportion of individuals who stated that they were either trying to start a new business for themselves or their employer or were owner managers of their own business has declined in most regions between 2003 and 2005, although in many case these changes were not significant. Secondly, the business closure rates had declined slightly but not significantly in most UK regions over the same time period, with the exceptions being London, the North East, Northern Ireland, Scotland and Wales (GEMER, 2005, p23). Within the same research, the responses to perceptual and attitudinal questions are given in the table below:

	I know someone who started a business in the last two years		There will be good opportunities to start a business in my area in the next six months		I have the skills, knowledge and experience to start a business		Fear of failure would prevent me starting a business	
	04	05	04	05	04	05	04	05
EM	27.9	26.0	37.4	38.8	49.9	52.2	34.4	36.3
EE	29.9	26.9	37.1	41.5	52.4	52.4	34.4	37.5
Ldn	29.3	32.1	35.3	44.5	56.7	52.6	33.6	35.7
NE	21.3	25.1	29.0	35.2	43.1	49.5	35.2	31.2
NW	20.8	25.2	36.5	31.1	47.5	49.6	36.1	31.9
NI	25.3	27.9	34.5	36.0	43.7	44.4	42.0	41.5
Scot	29.0	26.3	36.5	31.5	49.7	45.9	37.1	33.8
SE	28.3	28.8	38.5	40.5	49.7	51.1	31.7	35.5
SW	27.3	25.8	33.9	41.0	48.7	55.1	30.0	32.5
Wales	24.5	25.7	35.6	34.6	49.6	49.6	35.7	32.4
WM	28.6	30.4	34.9	40.4	51.9	53.5	33.4	32.2
Y & H	21.9	27.4	35.9	36.2	46.9	50.3	33.6	34.5
UK	27.6	27.7	35.9	38.5	51.7	50.7	32.9	34.2

Source: GEMER, 2005, p25.

The table above suggests a number of factors which may be influencing regional performance:

- there has been a significant increase in the number of people who say that they know someone who started a business in the last two years in North

East, North West and Yorkshire and Humberside, which from a lower base is bringing these regions much closer to the national average.

- opportunity perception is generally higher in London and the Southern regions than in the North or West.
- skills self-perception also varies geographically, with the southern regions and the Midlands having a higher skills perception than the north and west of the UK.
- Northern Ireland has a particular high fear of failure (GEMER, 2005, p26).

Attitudes to entrepreneurship by age is shown in the table below, and suggest that the 18-24 year old age group are the most likely of any group to start a business, although there is evidence to suggest that the entrepreneurial intention declines with age, but action peaks in the middle working age group. Secondly 18-24 year olds and 25-34 year olds are more likely to know an entrepreneur than older groups, although all groups have a fear of failure with the exception of the 55-64 group. The 18-24 group see entrepreneurs in the most positive light although this group is also not likely to have the necessary skills to start up their own business, with the most positive combination of perceived skills and opportunities being found in the 35-44 year old age group (GEMER, 2005, p32-33).

Age Group	18-24	25-34	35-44	45-54	55-64
I expect to start a business in the next three years.	13.4	10.7	9.3	6.8	4.0
I know someone who started a business in the last two years.	32.8	32.5	29.2	24.3	19.2
There will be good opportunities to start a business in my area in the next six months.	35.9	41.6	43.3	36.	32.8
I have skills, knowledge and experience to start a business.	38.7	51.2	53.7	55.0	50.9
Fear of failure would prevent me from starting a business.	33.5	36.5	36.9	34.4	28.0
Entrepreneurs are a good career choice.	69.7	58.8	52.2	46.6	45.7
Entrepreneurs have a high status in society.	81.5	71.6	70.3	69.9	67.2
Entrepreneurship has good media coverage.	48.0	53.2	56.1	55.7	57.6

Source: GEMER (2005, p32).

Educational attainment also appears to have an influence on entrepreneurial activity, which may have some significance to the building services engineering sector, where the majority of firms are craft based and therefore may have traditionally lower academic attainment levels in their founders than other professions, industries or sectors. This phenomenon may in some cases act adversely against entrepreneurial activity in the sector, although this may be offset to some extent by the traditions of self-employment prevalent within the sector.

	18-24	25-34	35-44	45-54	55-64
<b>Doctorate</b>	0	7.7	12.7	9.7	11.1
<b>Masters</b>	14.9	6.5	10.3	13.1	13.8
<b>Bachelors</b>	7.2	7.7	10.2	5.9	5.1
<b>'A' Level or equivalent</b>	4.6	5.5	6.4	6.8	3.0
<b>GCSE or equivalent.</b>	1.7	6.5	6.5	4.8	2.9
<b>Vocational</b>	6.0	9.8	7.6	3.6	3.0
<b>No formal Qualifications</b>	7.9	7.6	4.9	1.8	1.3

Source: GEMER (2005, p34).

The data above suggests that for those with postgraduate qualifications, older people (35+) are generally more likely to be entrepreneurs than their younger counterparts, with a noted exception being those aged 18-24 with a master's qualification. For those with undergraduate qualifications, it is the 35-44 year old age group that is noticeably more entrepreneurial, and there are similar patterns for 'A' level and GCSE level qualifications. The data suggests that those individuals that have vocational qualifications then entrepreneurial activity peaks in the 25-34 year age group, and when those with no formal qualifications then entrepreneurial activity declines with age (GMER, 2005, p34).

In relation to the barriers to entrepreneurship, then the table below shows the barriers to entrepreneurship by gender 2005. These findings may go some way to pointing to why men are more engaged in entrepreneurial activity than women, although the fear of debt and chance of failure appear to afflict men more than women.

	Male	Female	Total UK
<b>Fear of Debt</b>	15.0	13.8	14.3
<b>Getting finance for business.</b>	50.3	52.1	51.3
<b>Lack of interest.</b>	12.2	14.6	13.5
<b>Not having an idea</b>	8.7	7.4	8.0
<b>Lack of skills/knowledge</b>	11.0	10.4	10.7
<b>Time Commitment</b>	7.2	11.9	9.8
<b>Chance of failure</b>	6.5	5.5	5.9
<b>Age</b>	7.3	9.4	8.5
<b>Health</b>	3.0	2.9	3.0
<b>Lack of confidence</b>	0.8	1.2	1.0
<b>Lack of promotion skills</b>	0.8	0.4	0.6

GMER (2005, p47).

## 10.4.2 Education for Entrepreneurship

Having defined a need in relation to the need for the UK to develop its entrepreneurial base, and identified some of the issues surrounding entrepreneurialism, the question must be posed as to what form or shape the entrepreneurial education and training will take.

There is an acceptance among academics that there is no real knowledge of what entrepreneurship really is, with policy being generally unclear about what outputs are to be created where such education is promoted. Pittaway and Cope (2006) suggest that even if these issues were resolved, then to obtain successful pedagogy it still would have to be resolved what works in entrepreneurship and to what end (Pittaway & Cope, 2006, p26). Pittaway and Cope (2006) however conclude that a holistic approach to education and training in entrepreneurship may need to be developed that can represent a multiple level of analysis starting with the base questions about the nature of entrepreneurship coming out of Government policy and other sociological constructs and what entrepreneurship is, and what is it trying to do, and these questions in relation to institutional autonomy within higher education may lead to a fragmented and philosophically diverse pedagogy, rather than a uniformity of aim and context (Pittaway & Cope, 2006, p11).

As Kirby (2006) points out, the concept of the 'Entrepreneurial University' is not unknown in other nations, and is seen by Williams (2002) as being a product of neo-liberal Thatcherism and the marketisation of education. Although the discourse in relation to the UK HEI marketisation discourse may not be as developed in this context for example within the United States, there is a requirement on universities to work towards commercialisation of research to a greater extent than has been the case previously (Williams, 2002; Kirby, 2006, p3).

Wilson and Stokes (2006) express concern about the teaching of entrepreneurship within HEIs. First they argue that HEIs are running the risk of raising the expectation of learners as to what they can achieve through learning entrepreneurial skills within the safe environment of the HEI. They conclude that this creates an 'overly agential model of entrepreneurship' which focuses primarily on the development of entrepreneurial behaviours, attributes and skills, which has a tendency towards

voluntarism where there is the creation of a social phenomena are explained mainly in terms of the results of meaningful behaviours.

This however contrasts with what might be described as a deterministic model of entrepreneurial education that present the concept of entrepreneurship as being a social object that possesses a life of its own, external to the individual.

Wilson and Stokes (2006) conclude that entrepreneurship educators need to remain sensitive to what happens when it is not in the power of students to achieve the successes that may otherwise be presented. As suggested within their reach, if only they take the first step then in a sense this therefore acts as a sound board against the 'airport bookstall' titles emanating usually from the United States offering the elixir of entrepreneurial success (Wilson and Stokes, 2006, p4).

Wilson and Stokes (2006) argue that entrepreneurial education is at a cross roads and is contextualised within two distinct constructs, being the pragmatic and the conceptual. The pragmatic model focuses on entrepreneurial and enterprising behaviour, skills and attributes in individuals, which are developed across an ever-wider variety of contexts. This is challenged by the conceptual model, which seeks to place attention on developing through research a better conceptualisation on what entrepreneurship actually is, as there remains within education some debate about the philosophical and sociological nature of what entrepreneurship is. Wilson and Stokes (2006) conclude:

*“Although we do know that pro-active, enterprising behaviours are a necessary condition of successful entrepreneurship, we don't know about many aspects of causality and the impact of entrepreneurial education. It is also balanced in terms of offering causal explanations for entrepreneurship that are neither overly voluntarist nor determinist”*  
(Wilson and Stokes, 2006, p5).

A very interesting point raised in the work of Wilson and Stokes (2006) is the nature of entrepreneurial behaviour as being anti-positivistic, and thus interpretative of the environment in which it is situated, acknowledging no natural laws or positivistic reality, but a shifting kaleidoscope of unrelated events. This contrasts sharply with traditional management teaching and training, which relies heavily on the positivistic paradigm of absolute truth and reality within a determinable and measurable context. Johnnisson (1992) concludes that within entrepreneurial education causal laws cannot be derived from observation alone as entrepreneurship varies with every entrepreneur. Fiet (2000) argues that current entrepreneurial education encourages the accumulation of partial theories, and Marx (1973) speaks of entrepreneurship as being about chaotic conceptions (see also Vesper, 2004; Steyaert and Hjorth, 2003).

The dichotomy at the heart of entrepreneurial education is that it tends to perpetuate certainties, and struggles with the concepts of uncertainty (the post-modern interpretative anti-positivistic paradigm) which may be an oxy-moron to the essence of what being an entrepreneur is all about, if it is accepted that creativity takes place within a medium of uncertainty.

Wilson and Stokes (2006) seek to contextualise this conception by drawing an ontological distinction between the entrepreneur, the entrepreneurial firm and entrepreneurial behaviours i.e. behaviour that is entrepreneurial in nature, but not contextualised within the entrepreneurial framework

*“An entrepreneur is an agent constituted by an individual human being. As we have noted, human beings have behaviours, attributes and skills which can be developed through learning (i.e. entrepreneurial education). However entrepreneurship – as the introduction of new economic activity (Sarasvathy, 1999), or the creation of new organisations to create and extract value (Jack and Anderson, 1999) involves both agential actions and social structures in the relations between agents. These social processes cannot be reduced to human behaviour alone (i.e. the voluntarist position is untenable). Although pragmatic ‘behaviouralist’ models of entrepreneurship education are appealing, they are only part of the story. Entrepreneurship and entrepreneur are used interchangeably and they are of course, inseparable concepts. However they are also concerned with different aspects of a phenomenon. When we talk about entrepreneurs we are usually interested in their particular behaviours, attributes and skills...When we talk about entrepreneurship we have a process in mind such as the introduction of new economic activity.” (Wilson and Stokes, 2006, p8).*

The table below seeks to define the two differences between the pragmatic and the conceptual concepts of entrepreneurial education, and the different approaches (paradigm locations) that are adopted in each.

	<b>Pragmatic Model (What we think we do know about entrepreneurship)</b>	<b>Conceptual (What we don't know about entrepreneurship)</b>
Behaviours	<ul style="list-style-type: none"> <li>Central importance of enterprising/ entrepreneurial behaviours, attributes and skills (Gibb, 2005)</li> </ul>	<ul style="list-style-type: none"> <li>The strategic relationship between these behaviours, attributes and skills in any given context and process.</li> </ul>
Context	<ul style="list-style-type: none"> <li>Market-based-generic knowledge about business creation.</li> <li>Non-market-based contexts- generic knowledge applying to social entrepreneurship.</li> </ul>	<ul style="list-style-type: none"> <li>Market and non-market based- specific contexts and transferability of knowledge about these.</li> </ul>
Process	<ul style="list-style-type: none"> <li>Creative ideas development.</li> <li>Development of new venture strategy/ writing of business plan (i.e. focus on ‘nuts and bolts’ of setting up and then managing a new business.</li> </ul>	<ul style="list-style-type: none"> <li>Strategies for successful businesses and other ventures.</li> <li>Strategies for including innovation at micro and macro levels.</li> </ul>

Source: Wilson and Stokes (2006, p11).

Lourenco and Jones (2006) have also sought to define teaching and learning paradigms to determine those which are most effective to entrepreneurial education and training, comparing the traditional (didactic) approach, and the developing enterprise model of entrepreneurial teaching developed in some HEIs which, as can be seen from the table below, is more simulation-based in nature:

	<b>Traditional Paradigm (traditional mode)</b>	<b>New Paradigm (enterprise mode)</b>
Knowledge	Instructed to Learners	Constructed by learners.
Learners (e.g. students, participants)	Receive Knowledge and contain knowledge	Constructors, discoverers and creator of knowledge.
Institutions (e.g. Colleges, Universities, faculty)	Classify and Sort Learners	Develop learners’ competencies and talents.
Relationships	Impersonal relationship among learners and between institutions and learners	Personal interactions among learners and between institutions and students.
Activity Type	Individualistic- static	Mixture of individualistic and interactive learning activities- dynamic.
Learning Style	Mono-style	Multiple style (e.g. visual, auditory and kinesthetic)
Example of teaching method	Lecturing, reading, question and answer session, advice and feedback, etc.	Activities, presentations, simulation, role playing, scenario, games etc.
Assumptions	Teaching and learning is through ‘top-down instructive approach (Theory focus) - transmissive methodology.	Teaching and learning is through ‘bottom-up’ constructive approach (learn by doing)- transformative methodology

Source: Lourenco and Jones (2006, p8).

### **10.4.3 What is the Relevance of this Debate for the building services engineering sector?**

There are a couple of points that the debate raises for the building services engineering sector. The first has been stated already above, namely that entrepreneurial activity is more probably generated through self-employment from the craft level rather than from graduate/post graduate individuals (with the exception of building services engineering consultancies obviously) described in the discourse above. Therefore if the concepts of organisational entrepreneurship and individual entrepreneur are to make an impact on the sector, it is argued that they must be integrated within the craft level qualifications or indeed as part of key skills development of new entrants to the sector.

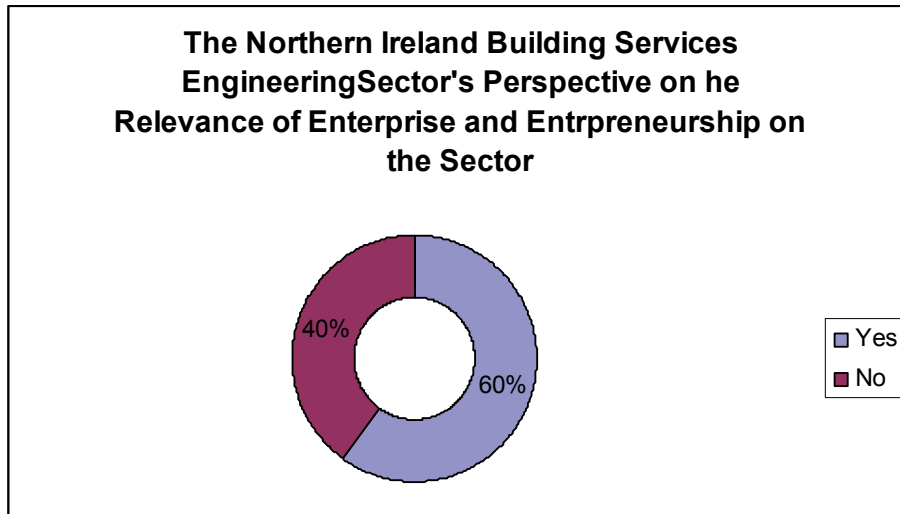
The new paradigm role of teaching, which is becoming more popular for entrepreneurial education would it is argued be suitable for incorporation within (or taught alongside but completely integrated) the key skills elements of the apprenticeship. The use of more interactive scenario and role-play activities will, it is argued, stimulate the development of the requisite key skills of team working identified by employers within the building services engineering sector as being lacking in their new entrants.

The nature of competence and the teaching and learning styles involved in educating and training craft operatives does, it is argued, lend itself to the pragmatic model of entrepreneurial education, being outcome-focused, rather than concentrating on the philosophical constructs that the conceptual model may incorporate to explore entrepreneurship and the entrepreneur. Although this may leave the learner with a range of entrepreneurship and management tools rather than a true concept of the role of the entrepreneur working within the 'chaos' of advanced creativity.

Given the sections on diversity, globalisation, retirement and natural wastage, and the general economic climate that the sector finds itself in, described within this SNA, it is argued that it is imperative that the sector moves towards a more added value model of service delivery. Through entrepreneurship education and training, and new business start-up, more women and ethnic minorities can be developed within the sector than is currently the case, thus increasing and developing competition, identifying and capitalising on developing 'niche markets' and ultimately addressing skills shortages and skills gaps as part of a holistic approach to the challenges that the building services engineering sector faces.

### 10.4.4 Northern Ireland Building Services Engineering Companies' Perspective

Enterprise and the entrepreneurial society has been identified as a major factor in the development of Great Britain PLC and of the Northern Ireland economy, as it moves to a post industrial state. The diagram below indicates that the concept of the entrepreneur and enterprise received a mixed though overall positive response from the sector in the province:



The quotes below are indicative of the views of the interview companies encapsulated in the diagram above:

*Gosh well obviously you have to have the entrepreneur because that's what generates things, that's what gets things going. People has the flair to get up and stick their head above the parapet and to see something new and then to go out and start it off. So I think, yes, that's what needs to change in industry and needs to improve and leads to things going forward in the industry. Ourselves, we have recently seen that we are trying to do something ourselves because we have seen as part of the renewable energy thing. So we are trying to forge something, go through on it – ourselves. How do you think it might be more? I don't know if there is any way you can just do a generalisation of it as such. (NILP01)*

*That's a trade secret... For security reasons I'm not answering that one. Seriously, it's ... Yes, I mean ... Group was formed in 1998 and we believed at that time that we had to broaden our base to ensure survival. The company now undertakes property development, facilities management, plant maintenance, fabrication, kitchens, building maintenance, etc, so I mean we have broadened our base tremendously in the last eight years. We believe it will help us cope when there's a downturn on one side, that perhaps there'll be a busy period on some of the others. (NIMHV01)*

*To tell you the truth I think we get caught up in doing the job and certainly at the minute... like I'm up and half six every morning and we're working through to about ten o'clock every night, just to process what's happening at the minute and I'm not complaining about that, that's what I've been looking for, and it's taken me nearly five years to build up to that stage and... but I don't intend to work like that for ever... But you know, speaking to people in other companies, and larger companies, they... as I say I think they are... they've enough on their plate just doing what they're doing and the company... the businesses are growing naturally... Yeah, we're not coming up with you know... the bright idea, let's go off and develop this or open up this... I think they're... which is sort of... that was my incentive at the start when I started the business and how can we do this and where can we get an opening there... you know, you're always trying to find you know, your USP, your unique selling point and I sort of tried different things, but as I say, once the business does start coming in... your core business which for me is air conditioning, all that stuff gets put on the back burner. (NISACR02)*

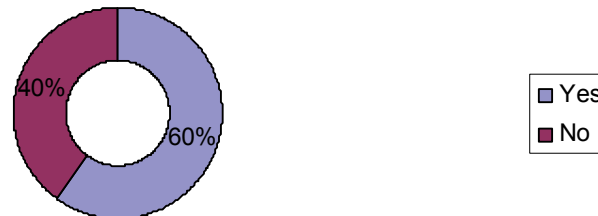
*We would be rather more old value traditionalist here. We're a long established company and probably follow different lines. I suspect if younger people were coming into the business they would probably take a different approach. (NISBSEC02)*

*I think it will be a growing thing. I think we're not particularly good at it at the moment, but I think... I would tackle that one from the concept of partnering where we would work, say, with a developer, a contractor and so on and be in at the very, very start of some development. That has not been something that I think Building Services firms have been used to be doing in the past. (NIMBSEC02)*

*Certainly you know from our point of view we are very involved with business development, we have a small marketing team who deal with our marketing material we are constantly learning to get into new areas and looking to try analyse sectors to see is there something we should be doing and is there someone we should be talking to. (NILBSEC01)*

The next question sought to elicit whether the companies within the sector felt that they had the requisite skills to develop an enterprise company or exhibit entrepreneurial characteristics within their company. The results are again mixed, although predominantly the sector within the province felt that they did have the requisite skills as evidenced by the following diagram:

**Northern Ireland Building Services Engineering  
Sector's Perception of Whether their  
Organisations have the Requisite Skills to Create  
an Enterprise/ Entrepreneurial Culture Within their  
Organisation**



The quotes below are indicative of the views expressed within the diagram above:

*I think it is because we would be doing this by ourselves and pushing this forward ourselves with no back up from anyone or anything...We're pushing this forward all the time.. We're pushing this forward ourselves. (NISHV02)*

*We do. We're very forward thinking. But we're not naïve enough to believe that if we suddenly decide we're going to do air conditioning that one of our boiler services engineers will be able to service an air conditioning unit. We are aware of the service and continuing requirements that there are in all of the engineering sectors. That there's an ever changing technical environment out there which requires the relevant people to go out and do it with the relevant skills to go out and complete the tasks to a satisfactory level. We continually review. We have a training needs analysis which we complete on a six monthly basis. Which identifies in a matrix form all of our employees, the skill levels which they have, and the future skill levels which they may require. That isn't then limited to just what we do in house. And as I say, we are now... very, very recently have embarked upon bringing building services personnel which has required an upgrade again...And has introduced a whole number of skills that until very recently we were blissfully unaware of. But by the nature of what we do and the nature of what we intend to do the skill levels are out there, the training providers are out there and if we haven't got the skills in house and we need them then we very much believe in getting them on board. Either by employing the people with the right skills or up training personnel that we already have, that have the ability to learn the new skills...Again it's been one of our policies from when we started the organisation. That we provide service and I hate to come back and saying the same thing again, but quality of service is ultimately important. And there's no point in sending a plumber to fix a light, you know. You need to send the properly equipped and trained engineer to deal with the job adequately. Or else we get left behind. (NIMHV01)*

*Yes, I do believe that there and I think we've demonstrated that over a period of time whereby the business did start in Northern Ireland, has developed over a period of years to Southern Ireland, to all parts of England and Scotland, and over the past 20 years we've been out in international markets, i.e. anything outside of the UK and Ireland, and that continues. We continue to explore other markets that we haven't been there before, but we've worked across the whole of Europe and into the Middle East, and the fact we are looking at beyond that there with the developing nations including China and India. Whether we go there will be a decision made at the relevant point in time, so the skills are there. They've been demonstrated as being sellable skills and there is a continuing development of people of a younger generation being encouraged to work under that umbrella. (NILHV01)*

### **10.4.5 Conclusions**

The building services engineering sector in Northern Ireland does from the quotes it is argued show some evidence of enterprise and entrepreneurial culture. SummitSkills however believes that to adequately respond to the challenges of globalisation that the sector feels more acutely in Northern Ireland than in any of the other sectors within the UK that companies within the sector would benefit from the benefit of bespoke courses that teach the principles of entrepreneurship and the development of an enterprise culture within the sector. SummitSkills proposes to work with partners and stakeholders to develop/market courses of this nature to the sector. In relation to the existing curriculum for qualifications within the sector for both existing employees and new entrants, then SummitSkills proposes to work with partners and stakeholders to integrate entrepreneurial training into the curriculum at all levels. SummitSkills notes that the majority of new business starts within the sector come from the artisans within the sector, and therefore the teaching of entrepreneurship should not be seen as a subject for technician and management studies alone.

## **10.5 Competitive Advantage**

### **10.5.1 Introduction**

Porter (1980, 1985, and 1990) defines competitive advantage as being a fundamental requisite for company survival and development, as companies seek to develop specialisations which add value to what they do, and make them more preferable to consumers of their products and/or services than their competitors.

Competitive advantage as a concept can be viewed within this SNA as linking into the entrepreneurial and scenario planning sections, as although scenario planning within this SNA is restricted to the sectoral performance, individual employers may find it useful as the basis of their company strategic plan and as a means of identifying issues raised there.

Ringland (2006) and Harvard Business School (2005) place competitive advantage as a component within entrepreneurship and Fahey and Randall (1989) within competitive foresight scenarios (scenario planning). Certain benefit of competitive advantage may be obtained through consideration of positioning in the light of the PESTEL analysis contained within this SNA.

## 10.5.2 Academic Underpinning

Harvard Business School define competitive advantage through the prism of strategy, as the role of strategy is to deal with competition, and the obtaining of competitive advantage is a fundamental function of that strategy. Bruce Henderson of the Boston Consulting group has stated that the difference for a company between itself and its competitors is its advantage. As Henderson believed that no two competitors could co-exist if they sought to do business in the same way, they must differentiate to survive, through either price, product mix, ambiance or whatever will facilitate the development, as the essence of competitive strategy is about being different (HBS, 2005, p53). The Harvard Business School (2005) argues that strategies can be based on low-cost leadership, technical differentiation or company focus, and strategic position.

Positioning can be either variety-based positioning where a company chooses a narrow subset of product or service from within a wider set offered in an industry, so for example in building services engineering sector, it specialises only in electrical or plumbing, rather than across the disciplines, and due in part to the traditional make-up of the sector and the preponderance of small companies within it, this tends to be the mode used. Companies choosing this position can be successful if they deliver faster, better, or at a lower cost than their competitors, and the traditional tendering systems within the construction and building services engineering tends to perpetuate this model.

The second position is based on a need-based positioning, where companies that follow this approach aim to articulate and serve the needs of an identifiable set of customers, taking into account the sensitivities of those various customers, such as price consciousness, or a high level of personal attention and service, or finally may want products or services that are customised to their individual client needs. It is argued that within the building services engineering sector, particularly possibly in the service and maintenance sub-sectors of heating and ventilation for example.

The final positioning model postulated by the Harvard Business School, is that of the access-based positioning, which simply seeks to strategically place the company near its potential customers. Some evidence of this strategy may be identified in consultants within the building services engineering sector who retain satellite offices in certain geographical parts of the UK. The Harvard Business School conclude however by stating that being different is not sufficient on its own, and to gain competitive advantage, the difference must add value for the customer (HBS, 2005, p56).

Ringland (2006) looks at competitive advantage from the angle of case study on Shell PLC, where Shell took competitive positioning from a system of four methodologies: competitive position, strategic focus, scenarios and option planning (including multiple options, effect of uncertainty, competitive implications and explicit trade-offs). Competitive positioning (advantage) focuses on the business unit's competitive situation and then devises ways to improve that to create competitive advantage. This includes defining the business segments and analysing what can be an extensive range of competitors whether these are suppliers, customers, other producers or those offering substitute products and services. In this process Shell considered barriers to entry such as patents (not highly relevant to the building services engineering sector); economies of scale, technological know how, customer loyalty, organisational capability and product excellence. The competitive positioning process based on both hard and soft data is about learning systematically as much

as possible about the competitive issues, which aids in defining competitive advantage through strategic positioning of the business to achieve added value (Ringland, 2006, 229-330).

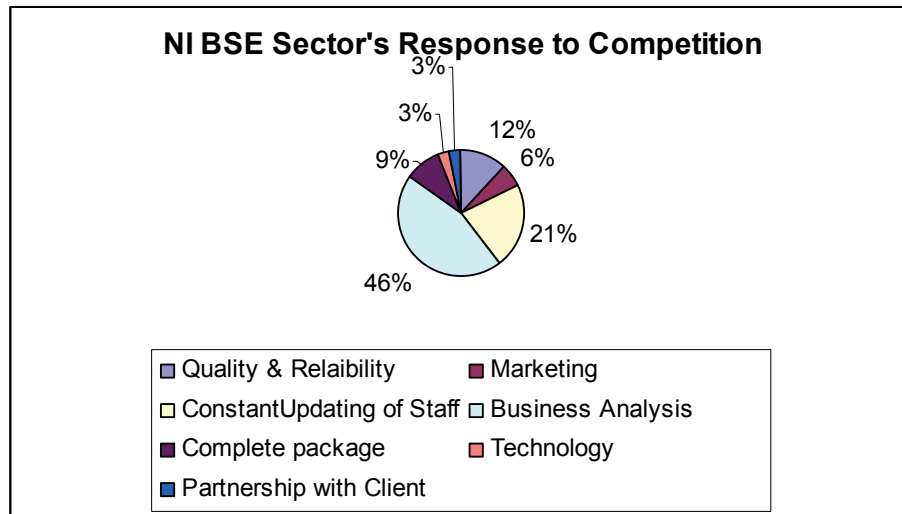
Fahey and Randall (1989) place competitive advantage within the concept of developing the business idea. The deciding on the companies competitive advantage is 'step 1' in formulating the companies business idea (the other steps being: addressing the devil's advocate question, developing cause and effect, completion of the diagram, identifying the distinctive competences, cleaning up, review of the business idea and strategic repercussions) and on Fahey and Randall's (1989) model is based on an initial SWOT analysis undertaken previously by the company. Which when completed allows the facilitator of the business idea process to begin to work with the team to consider the competitive advantage of the company, which can be drawn up as bullet points for consideration by the team and to enable them to clearly enunciate the competitive advantage of the business idea.

The team is then able to consider competitive advantage in relation to what customer needs are, and how might they change, and how does our companies product/service differentiate from those of our competitors and does our company have a cost leadership over our competitors. A company is deemed to produce a differentiated product if the nature of the market allows a premium on product differentiation, such that the companies system of distinctive competences allows it to put a product/ service on the market with enough unique features in design, quality, support and availability for the customers to be willing to pay a premium price.

Conversely, a company is a cost leader if it has a system of distinctive competencies that allow it to make a commodity-type product/service available at a cost consistently at the lower end of the industry cost curve. The currently tendering system within the building services engineering sector may be encouraging companies to focus more on a specific cost leadership model rather than on any other model for obtaining competitive advantage (Fahey and Randall, 1989, p345-346).

### **10.5.3 Competitive Advantage and the Response of the Northern Ireland Building Services Engineering Sector**

A major part of Porter's theory of competitive advantage is an analysis of the response of companies within the sector towards competition. The following diagram indicates the strategies that the Northern Ireland building services engineering sector adopts to address the challenge of competition:



The quotes below indicate the views of the companies interviewed and encapsulated within the diagram above:

*Quality, customer care, the experience of 28 years, training in the right culture... It's done in confidence within the people that work for me and I find that staff that have worked for me for 18 years plus, and with 5-7 employees, we have a very low turnover of staff, which then means that we must do the right thing. And as a backbone of the area which I live, a lot of people tend to use us because of our quality aspects and our customer care. (NISP02)*

*Certainly you have to move with the times, sort of thing, and as I said, our trade is sort of getting slowly but surely pushed in all directions, so you have to move with it. (NIMP02)*

*Well, initially we could probably shoot some of the more corrupt of our competitors, but that would not be acceptable. But on a serious note, we ourselves over the last number of months have implemented further cost reduction schemes in overheads, reducing staff, relocating staff and also introducing some multi skilled work, particularly in our minor works and maintenance and our clients welcome this. We do take up first aid repair work on plumbing, heating, boiler house controls, oil burner servicing. And where the skills are outside our operators remit we have a partnering agreement with some of the skilled people within the mechanical ventilation and plumbing industry. So we're trying to improve our skills to compete against those who perhaps don't have them. But it's always a situation that we have to keep improving and reducing our overheads. (NIMET01)*

*We have always portrayed a professional image for the audit side of our business. And the only immediate competition that we have comes from out of town. So effectively we know that it's cost that's driving our success within the industry locally. But what happens is most of the multi-national companies take on contracts nationally so*

*the only competition that we have we wouldn't get anyway for some of the major players in our local area. (NISSET02)*

*A lot of tenders are changing now to this PPP and PFI system, which means it's more open book tendering. But it also opens the doors for a lot more intense rivalry. (NILET01)*

*Well we feel that to meet the competition we must have a trained and flexible workforce that can meet new tendering practices – that is the e-tendering, and then on site to cope with the e-working practices that are being just gradually on a lot of sites. (NILET02)*

*We have experienced a significant change in the procurement methods of clients, and to that end we became focused and continue to be focused on our attempts to build partnerships with clients and in particular our direct clients... That continues to be the main driver in our organisation, to build those partnerships such that we can get repeat business. We have a number of and have had for a long period of time, a number of existing clients and they again are of paramount importance to us. We continue to do work for clients, you know, that goes back 20 years, 25, 30 years, and they are important to us. To keep them abreast of what's happening in the industry, new changes of lighting or heating or air conditioning. Keeping them on board with us and our knowledge of that there, so I believe the competitive side of things is going to be driven by the methods of procurement in the industry, which I think, as I said earlier on, I'm a little bit concerned about the level of PFI and PPP projects that are being suggested for Northern Ireland in the short to medium term. But as a group we are involved in those and have been involved and we will not be avoiding that there. We just will have to confront it and then make sure that we get our share of work at realistic, competitive costing and values. (NILHV01)*

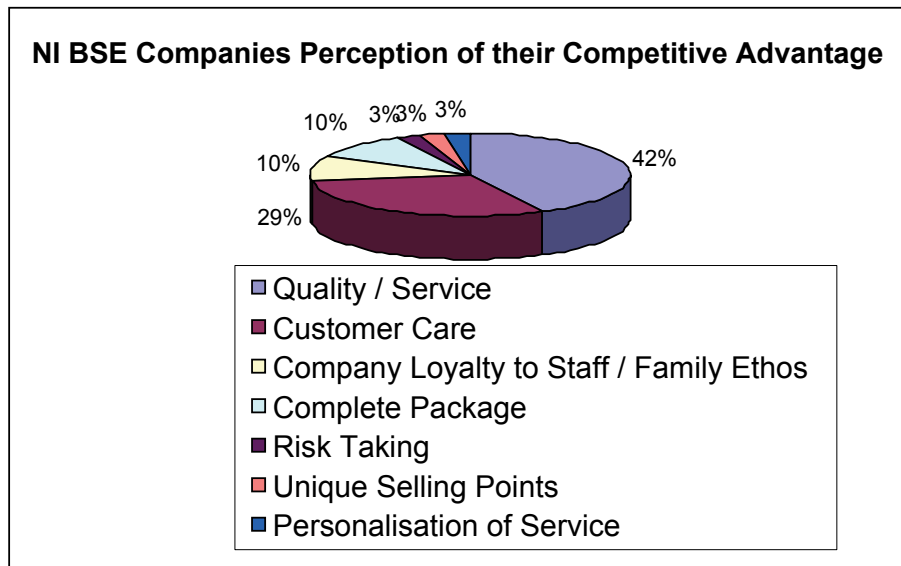
*Well, basically the competition has been pretty static these last few years. It's been the same competition over the last few years we've come across. The biggest problem I can probably see is the large supermarket chains that we don't deal with, the Tescos in this world, actually destroying the smaller towns, the smaller traders, the people that we rely on to get our business. So Tescos aren't only a threat to them, they're a threat to... I'm not... I'm using Tescos just... Yes, as a... 'Cause Sainsburys and everybody else, I mean, they're not only a threat to the smaller shopkeepers, they're also a major threat to the likes of ourselves who rely on these people. (NISACR01)*

*It's an understanding of the client's requirements, allied to all the statutory regulations and changes that come into play. That we're able to understand, collate that information and deliver it to the client in a usable format. (NISBSEC02)*

*I think we just... what we're finding is we have to make ourselves known to people. Much more of the time is now spent out talking to people...Promoting yourselves. For instance, just this morning... our new website's just been launched just this morning. I gave the final*

*go-ahead for that. That's not really a big marketing exercise, rather people to expect one. I don't think we'll get an awful lot of business just from that, but people expect to see it. But we find that we now have to get out, we have to talk to potential clients, we have to seek out work, which maybe... ten, certainly 20 years ago, the work turned up at the door and knocked at the door. That doesn't happen anymore, or very rarely. (NIMBSEC01)*

Porters model indicates that successful companies should be aware of the thing or things that give them the competitive advantage over their competitors. The diagram below indicates that the Northern Ireland building services engineering sector perceives a number of potential issues that the companies believe give them competitive advantage over their competitors:



The quotes below are indicative of the views of the companies encapsulated within the diagram above:

*I feel we give a good quality installation based on we try to hit the deadlines as and when they happen. If we say we're going to be there, we're there generally, and we don't have too many call backs, you know. It's just ...Yeah. Where we can, we try and keep on well with the customers. Repeat business is ...Yeah, and I know it does ... As I said before, most of it does come down to praise, but generally they do look at ... They look at praise first and then they look at past performance secondly. (NIMP02)*

*Quality installation and my opinion of that is that I have a highly trained and motivated workforce and a lot of clients from consulting engineers who are on the ground, who are actually at the coal face, know that and also the fact that we operate the full package in terms of M&E and renewables has helped us no doubt. (NILP02)*

*Well we strive to provide a quality and efficient service. From past experience of past years, most of our clients seem to stay with us because of that. (NISET02)*

*Our company has recently celebrated its fiftieth year in the construction industry. We've a large number of customer going back many years who keep telling us that we're not the cheapest but they admire and rely on our high standard of work and they respect our integrity and honesty. But sadly those particularly attributes are becoming less appreciated. (NIMET01)*

*We've always... as a company we've always prided ourselves to bring a contract in on time and on cost and give a first rate... a quality job. (NILET01)*

*Obviously we'll all blow our own trumpet on that, but quality, cost and turning around projects to pre-determined programme we think can satisfy most people over and above our own competitors. (NILET02)*

*Well personally I'm of the opinion that because we can offer all four, normally all four services that are within a building or matrix, but we can provide a multi-discipline facility to our clients be that the main contractor, the end user or otherwise, or alternatively a mix of the four. But where you've got the mechanical services, the electrical services, the ventilation aspect and also the sprinklers, provides a one-stop shop where the client is then not faced with difficulties of co-ordination and the like and it can be a mix where there's no sprinklers or otherwise, but we trade each of the four disciplines under the one management umbrella as individual units but as a consolidated unit on particular projects where it's required. (NILHV01)*

*Well that's a good question you know you've got to take a step back and look at that obviously. We're a people industry and we've got to put out the time and effort in to our staff and operatives and we've got to encourage them within that framework and I think that's maybe one area where we may be somewhat better than some other competition. (NILHV02)*

*We're more face to face and hands on and the relationship we have we are customer... I'm not a great one for IT skills or emails. I prefer to talk to my customer either on the phone or face to face. A good lot of our customers would rather than come through the switchboard would go to the individual engineer who in turn just says... he proactively just goes and does it and then comes in, like, "I got timesheets this morning and I put six jobs in the book" that I didn't know those guys had done because we've been so busy, that the customer's just phoned him, saying, like, "Could you..." you know...? It's personal contact and to a certain extent they'll want that particular engineer rather than anybody else. I've never had anybody turn around and say, "I don't want that engineer back on my site", you know? They pick the phone up and say, "Who's coming out?" you know? And I say, "Jim's coming". And if you served someone else and say, well, do they know the plant, do they know how to get along, you know? So... (NIMACR01)*

*I think we're quite good organisational... I think we're quite good at finishing off things in terms of once a job is finished to package it all up and leave the client happy. I mean, that's something that all firms should do, but it sometimes gets overlooked as you move on to the next project or scheme that you have. Other things that we would do... I'd have to then go into the specifics of sort of expertise, but that's probably not what you want. (NIMBSEC02)*

*One of the skills that we would offer that we feel makes us different or better option for clients is that we have we're a multi-disciplinary consultancy so not only do we have mechanical and electrical engineering we have environmental, civil, structural, project managers and quantity surveyors in-house, as well as specialists in energy procurement, so we feel that's that is a unique selling point. (NILBSEC01)*

### **10.5.3 Conclusions**

The data suggests that the sector within Northern Ireland adopts a number of strategies for responding to competition and identifying competitive advantage. As in many of the English regions however SummitSkills believes that there may be an over reliance placed on the 'softer concepts' that are harder to measure such as quality and reliability and customer care. While these attributes may be valuable, the clumping of companies citing them, may it is suggested hide the lack of a more detailed and realistic analysis of the true state of their companies, which may prove disastrous in the event of an economic turn down. SummitSkills believes that the sector within the province would benefit from be-spoke training courses for companies seeking to identify more accurately their competitive advantage and competition strategy. SummitSkills proposes to work with partners and stakeholders as well as the sector within the province to develop training of this nature. SummitSkills also believes that management training of this type should also be incorporated more firmly in the curriculum of courses for existing employees and new entrants to the sector, to more firmly bed management theory into the sector within the province, but also within the UK generally.

## **10.6 Benchmarking**

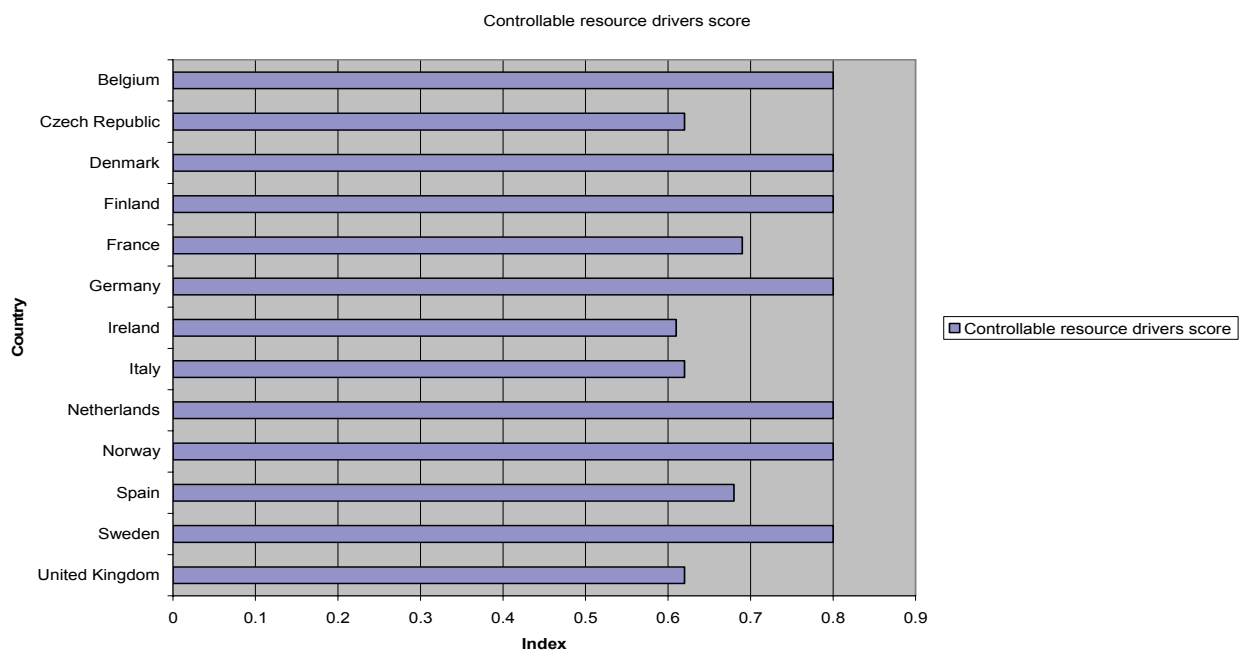
### **10.6.1 Introduction**

The concept of globalisation it is argued leads automatically to a consideration of the performance of the building services engineering sector within the UK in relation to productivity, efficiency and overall performance. The economic reality of a free market particularly within the European Union, leads (as has been explored within this SNA already) to building services engineering companies facing competition from 'foreign' firms for domestic contracts. This phenomenon is universal across the UK, but is anticipated to be a dominant factor for contractors within the SummitSkills footprint working within the South East, London, the South West and the East of England, as these are the areas most accessible from mainland Europe.

This section therefore may be read in conjunction with the sections of this SNA related to migrant workers and globalisation.

### 10.6.2 International Benchmarking against the European Union

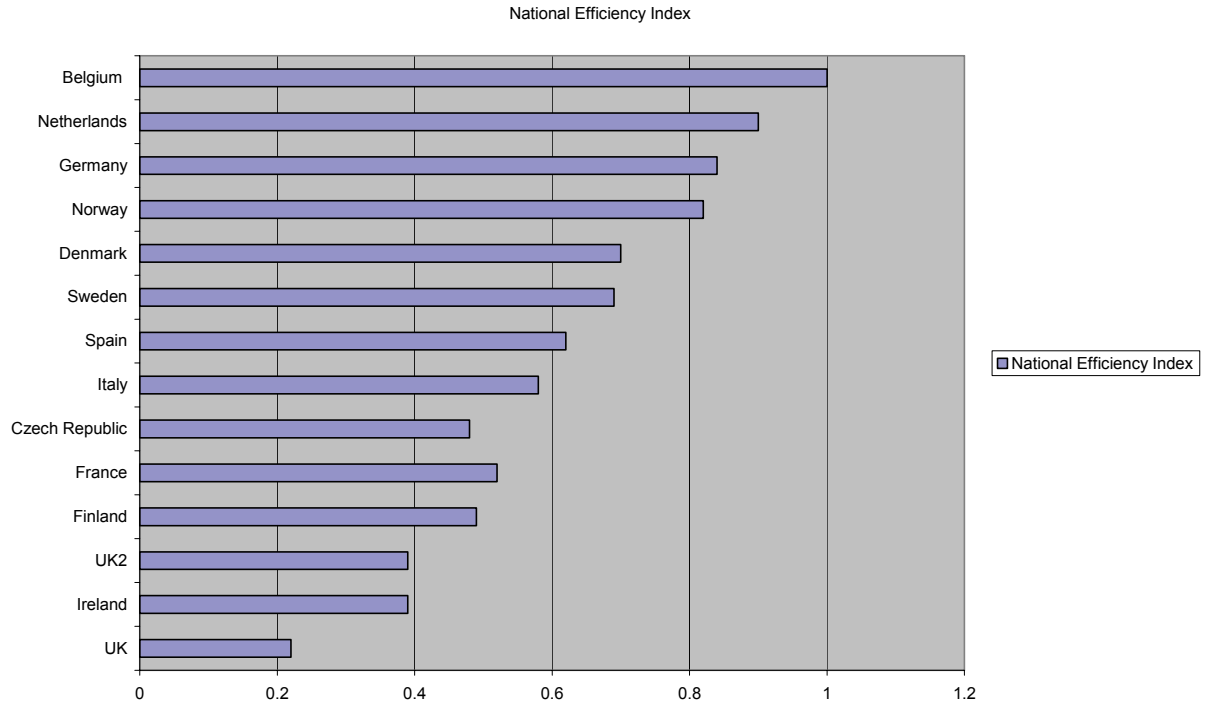
A major measure of efficiency in relation to the construction and building services engineering sectors is the concept of cost factors. Bernard Williams Associates (2006) (BWA) has produced a report in relation to their research into the 'Benchmarking of Construction Costs in the Member States'. This research showed that the UK construction industry performance against this measure is lower than many of the comparable member state countries. The index of efficiency of resource usage based on analysis of the resource drivers i.e. the Resource Driver Efficiency Index is shown in the graph below:



Source: BWA (2006, p5).

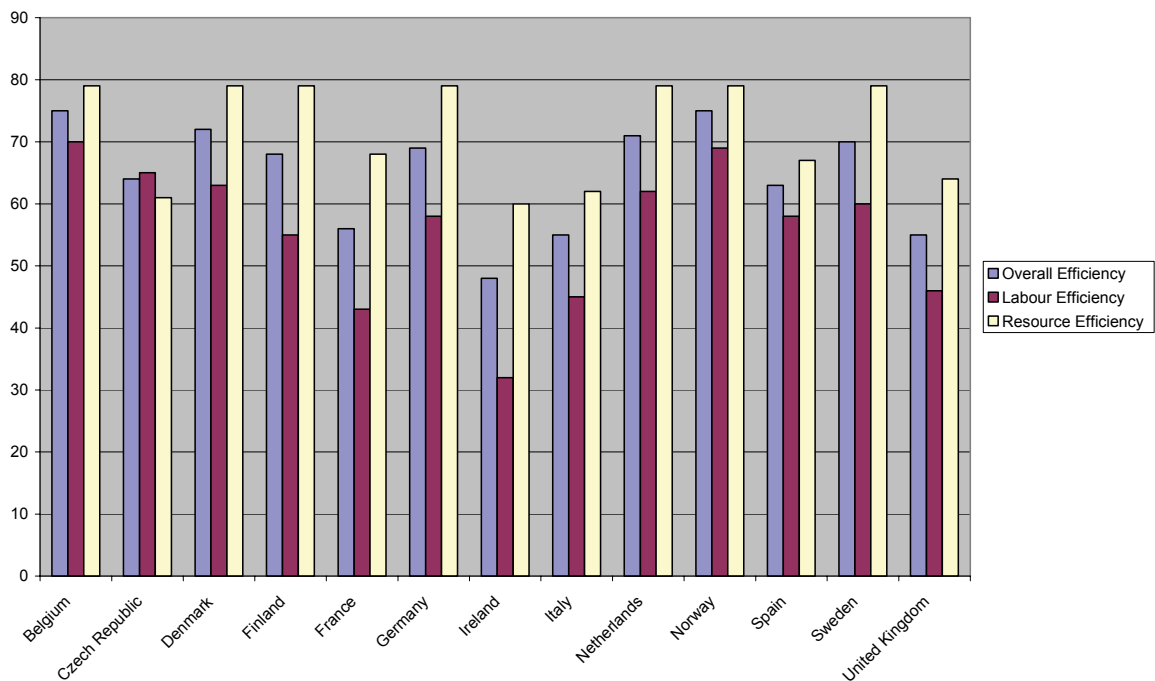
This research suggests that the UK construction industry lags behind Sweden, Spain, Norway, Netherlands, Germany, France, Finland, Denmark and Belgium. Only Southern Ireland, Italy and the Czech Republic can be construed to be performing at the same or a lower level of efficiency in relation to costs.

BWA (2006) then revisited the basis for its comparative international benchmarking data analysis, by comparing outturn efficiency against each country. The researchers used 'Spons European Handbook of Building Costs, 2<sup>nd</sup> Edition 2000 as the basis of their data. The use of UK2 as well as the UK is a problem with the graphical data, and justification for the disaggregating is not given by the researchers. The data from Spons suggests that the UK is a poor performer under the heading of 'resource usage efficiency index,' being the least efficient along with Ireland of all the EU countries (BWA, 2006, p7). The table below shows the full breakdown of the performance of all the countries under this heading:



Source: BWA (2006, p7).

From the two indicators described above, BWA (2006) has developed a proto-type of a benchmarking model for the EU construction industry by countries. From the table shown below, it can be seen that the UK performs only better than Ireland within all the EU nations considered within this research in relation to overall efficiency. The table below shows the overall efficiency, the labour efficiency and the resource efficiency of each country:



Source: BWA (2006, p8).

In relation to benchmarking within the greater world outside of Europe, then work by Porter (2003) suggests that the UK construction industry lags behind the USA in relation to the relative output per hour worked by the sector (based on research carried out in 1999) (Porter, 2003, p11). O'Mahon and deBoer (2002) found that the UK construction industry lagged behind the USA mainly on total productivity, but also to a lesser degree on capital intensity, whereas the IMF (2003) presents a slightly different view, arguing that total factor productivity differences are the main driver of the UK productivity gap in relation to all peer countries. But the authors also acknowledge that total factor productivity is often connected to capital investment (Porter, 2003, p11).

### **10.6.3 Conclusion**

While the USA and the rest of the world are a key issue, it is argued that the majority of the incoming competition will come from the European Union, particularly from the A8 countries. The scenario, presented by BWA (2006) can be challenged methodologically does the authors argue have some internal triangulation between the different measures used within the benchmarking exercise, which show a continuity between data sources, and suggest that currently, the construction industry is performing badly in relation to productivity and efficiency in relation to its European Union competitors. The potential economic consequence of this scenario is that UK Construction companies (Including those within the Building services engineering sector) may find it difficult to compete on cost when tendering for work within the EU, and further may lose domestic contracts to 'foreign' companies. Evidence from the primary data within the SNA suggests that in some regions and nations of the UK, this phenomenon is already beginning to happen in the domestic market.

### **10.6.4 Issues**

The research suggests that the building services engineering sector needs to improve the efficiency of its companies to compete in European Markets and to defend the UK domestic market from infiltration by 'foreign' companies. How might SummitSkills work with stakeholders and partners to develop strategies for tackling this issue?

The building services engineering sector also appears to perform badly in relation to labour efficiency. How might SummitSkills in co-operation with partners and stakeholders develop training opportunities to improve efficiency among the sector's workforce?

## ***10.7 Building services engineering sector Performance Benchmarking***

### **10.7.1 Academic Underpinning**

Benchmarking is a management tool that owes its origins to the philosophies and concepts of Total Quality Management (TQM) (Madu, 1998, p409). Benchmarking is seen as an important organisational tool for facilitating continuous improvement and stimulating process efficiency and effectiveness. Benchmarking is helpful in concentrating organisational thinking, and adding external perspectives on things to help organisations focus on matters that are really important to them within their

business environment (Bendell, Boulter and Goodstadt, 1988, p18). A fundamental part of benchmarking is the asking of questions, which may be as fundamental as: “Where do we now?” “Where do we want to be?” “What do we need to get from here to there?” (Bendell, Boulter and Goodstadt, 1998, p28).

A further requirement of successful benchmarking is that to be successful, the exercise must have the commitment of senior management (Bendell, Boulter and Goodstadt, 1998, p76). The actual process of benchmarking is one of comparing one company and the way that it operates with another company, to see if there are ways in which the first company might reengineer or change policies and procedures for example to gain improved business performance.

Benchmarking per se therefore may be undertaken both internally and externally to the company or the business market that the company is in, so for example it might be carried out against other divisions or sections of the same company. In the building services engineering sector, a large contractor might benchmark the performance of the Electrotechnical section of the company against that of the plumbing section for example. Alternatively a company may benchmark itself with a similar company within the same industry, so two electrical companies might benchmark themselves against each other for example. Finally, a company might benchmark itself against a completely different company in a non-related industry, so for example a multi-national building services engineering sector company might benchmark itself with ICI.

Most information relating to benchmarking can be obtained from a desk top study, which takes the form of annual reports, financial statements, technical literature, publications and other things such as conference seminars (Bendell, Boulter and Goodstadt, 1998, p111). Other primary data gathering tools may be used, such as interviews, work shadowing etc. Where this type of benchmarking is taking place, then to prevent the theft of confidential information or other ethical disclosure issues, all participants are bound by a Benchmarking Code of Conduct, which contains guidelines and regulations to be adhered to (Bendell, Boulder and Gatford, 1999, p197). Owen (1999) argues that benchmarking can be incorporated into a strategy incorporating flowcharting, Pareto analysis, cause and effect diagrams and EfQM (Owen, 1999, pp4-21).

Other writers on benchmarking argue however that the techniques can be used as a stand alone discipline, and not integrated into other TQM mechanisms in the same way as those perceived by Owen (1999) (Bendell, Boulter and Goodstadt, 1998, p198). For the purpose of this SNA, benchmarking is treated as a separate discipline.

### **10.7.2 Constructing Excellence Benchmarking in HR Issues**

Benchmarking as a concept is utilised in constructing excellence in relation to people issues. People performance indicators developed by the Rethinking Construction programme cover things such as employee satisfaction, staff turnover, sickness absence, safety, working hours, travelling time, training, diversity, pay and investors in people. Toolkits and benchmarking clubs have been developed to enable contractors to measure their progress and through this it is anticipated that they will be able to enhance their ability to recruit and retain the best possible workforce. The toolkits comprise of a number of elements including: equality and diversity, health and safety, training plans, work in occupied premises, worker satisfaction and working environment (DTICRP, 2006, p1-2).

### 10.7.3 Benchmarking the Construction Industry

CIRIA (1998) undertook a piece of research into the status of benchmarking within the construction industry, which includes the building services engineering sector. Although the research is somewhat dated, it is considered still useful as being indicative of many of the issues which it is argued are still prevalent within the industry.

The research discovered that there was little or no experience of benchmarking within the industry, with there being a divergence of views as to what could or should be benchmarked (CIRIA, 1998, p7). The research also discovered that what benchmarking was taking place in construction, was taking place on an informal level and was opportunity and qualitative in nature, rather than on-going and quantitative.

The theoretical analysis underpinning the analysis of the industry was based on a control and influence hierarchical pyramid of levels, with the external environment being at the apex of the pyramid at level one, and suppliers being at the base of the pyramid at levels six. The other categories being level 2: major contractors, level 3: industry, level 4: projects and level 5: smaller clients (CIRIA, 1998, p21). An analysis of the construction industry under these six levels suggests ways in which benchmarking could support and facilitate better productivity and performance, high feasibility suggesting that benchmarking could make a significant impact, and low feasibility indicating only a moderate or very moderate application of benchmarking.

The table below indicates the feasibility of using benchmarking within the context of the industry’s external environment:

Feasibility Test	Remarks	Feasibility Assessment
Are there significant measurable performance and product factors?	Yes- for instance, interest rates, demand for transport. No simple correlation with industry performance.	Low
Are there definable processes?	No- complex and thus difficult to define and compare.	Low
Are there identifiable stakeholders who can act as agents for benchmarking?	Partly- government is main identifiable stakeholder. Other components, e.g. the financial system, have multiple owners.	Medium/Low
Are suitable benchmarking partners available?	Possibly- foreign Governments, banks etc.	Medium
Is there a clear understanding of management best practice?	Rarely- often highly 'political' or otherwise open to debate.	Low
Is information readily available?	Information available, but rarely on standard, comparable bases.	Low
Can benchmarking be conducted to a reasonable timescale?	Yes- but it needs to be undertaken as a long-term process to be of most value.	Medium
Are effective implementation mechanisms available?	Only through Government. Other processes not 'owned'	Low
Can the costs and benefits of benchmarking be assessed?	No-issues often diffuse, long-term, with unclear relationships	Low
Value of benchmarking	Product, Performance, Process.	N/A Medium Low

Source: CIRIA (1998, p27).

Benchmarking of the external environment faces a number of challenges, which include a dearth of measurable factors from which to benchmark, the diffuse nature of many processes, a lack of a clear facilitator to actually help the process happen, issues over the availability of benchmarking partners, a difficulty in defining best

practice, a lack of a clear means of implementing results and finally, problems in measuring benefits and costs (CIRIA, 1998, p28).

The feasibility of benchmarking among major clients is shown in the table below, and shows that there are significant potential opportunities for benchmarking to take place successfully at this industrial level analysis.

Feasibility Test	Remarks	Feasibility Assessment
Are there significant measurable performance and product factors?	Yes-major clients routinely measure their performance in various ways across their own projects.	High
Are there definable processes?	Yes but there may be several different processes in effect across different sectors.	High
Are there identifiable stakeholders who can act as agents for benchmarking?	Yes, through either commercial organisations or industry associations. Examples include the Construction Round Table, the European Construction Institute, the Construction Industry Institute (US) and the Group of 7 Metros.	High
Are suitable benchmarking partners available?	Yes- most major clients have the facility to benchmark, and many do so already.	High
Is there a clear understanding of management best practice?	In principles, yes- but no single approach is likely to be acceptable to all clients.	High
Is information readily available?	Yes- most major clients hold comprehensive information on their projects. While this is not always available in the form required for benchmarking, it can generally be made so relatively easily.	High
Can benchmarking be conducted to a reasonable timescale?	Yes- given the will and resources, reasonable timescales can be achieved.	High
Are effective implementation mechanisms available?	Yes- major clients' own management systems.	High
Can the costs and benefits of benchmarking be assessed?	In principle, although costs may be more visible than benefits.	High
Value of benchmarking	Product, Performance, Process.	High, High, High

Source: CIRIA (1998, p29).

The table below shows the feasibility of benchmarking the construction industry:

Feasibility Test	Remarks	Feasibility Assessment
Are there significant measurable performance and product factors?	Key statistics only: limited and poor for international comparison.	Medium/ Low
Are there definable processes?	Yes, but performance statistics are not currently related to the underlying processes.	Medium
Are there identifiable stakeholders who can act as agents for benchmarking?	Although the Construction Industry Board can be construed as a stakeholder, its effectiveness in stimulating continuous improvement on behalf of the industry is not yet established. Certain high-level trade associations, professional institutions and research associations would be ideally placed to act as agents for benchmarking.	Low
Are suitable benchmarking partners available?	Choices of benchmarking partner include other UK industries, overseas construction industries and other industries overseas.	Medium
Is there a clear understanding of management best practice?	No- real differences in perspective exist on many key industry-wide issues.	Low
Is information readily available?	Very little comprehensive, up-to – date information is available at the level of the industry.	Medium
Can benchmarking be conducted to a reasonable timescale?	Benchmarking of national construction industries would be complex and time consuming.	Low
Are effective implementation mechanisms available?	Only where stakeholders can be identified.	Medium
Can the costs and benefits of benchmarking be assessed?	Costs of benchmarking at this level should be easy to measure: benefits would not, because many of the issues are diffuse and long term.	Low
Value of benchmarking	Product, Performance, Process.	N/A Medium Low

Source: CIRA (1998, p30).

The feasibility of benchmarking individual projects against each other as a method of evaluating the industry is contained within the table below:

Feasibility Test	Remarks	Feasibility Assessment
Are there significant measurable performance and product factors?	Overall project performance is measurable in terms of such key factors as time, cost and safety.	High
Are there definable processes?	There is an extensive range of process options, but if generic models of sufficient precision and applicability can be developed to allow process benchmarking, the benefits will be significant, allowing relationships between project processes and performance to be demonstrated on the basis of data rather than opinion.	Medium
Are there identifiable stakeholders who can act as agents for benchmarking?	There are no 'stakeholders' at this level because projects are essentially short-term and transient. Larger clients and main contractors have a long-term commitment to improving industry performance, and they potentially provide the facility for benchmarking.	Medium
Are suitable benchmarking partners available?	While processes are generic, no two facilities are identical in every respect. The most practicable solution would be for an industry institution to establish a project benchmarking database.	Medium
Is there a clear understanding of management best practice?	'Best practice' will never be beyond debate in construction, but this work will offer a starting point.	Medium
Is information readily available?	While various organisations collect data on this project performance in construction, this is not generally compatible and refers to outputs rather than processes.	Medium
Can benchmarking be conducted to a reasonable timescale?	In theory, yes, but it must be recognised that construction improvement is a continuous process, not a one-off initiative.	High
Are effective implementation mechanisms available?	Yes- individual client, suppliers and industry institutions, if suitable commercial arrangements can be found.	High
Can the costs and benefits of benchmarking be assessed?	Overall benefits may be difficult to quantify. While it may be possible to enumerate the costs falling on individual companies, benefits would accrue to the industry as a whole in terms of improved project management systems and procedures.	Medium/ Low
Value of benchmarking	Product, Performance, Process.	High, High, Medium

Source: CIRIA (1998, p32).

The feasibility of benchmarking smaller clients is shown in the table below, and shows that benchmarking of this group also has a significant amount of potential.

Feasibility Test	Remarks	Feasibility Assessment
Are there significant measurable performance and product factors?	Yes- in general, overall project performance is measurable in terms of such key factors as time, cost and safety.	High
Are there definable processes?	Yes, project processes are definable.	High
Are there identifiable stakeholders who can act as agents for benchmarking?	Yes- many smaller clients are members of industry or sector associations, covering for instance health service trusts or education. A number of these already benchmark operational performance, and several are interested in benchmarking construction activities. However, very small, occasional clients may not be members of such groupings, and there will be difficulties in identifying stakeholders.	High
Are suitable benchmarking partners available?	Yes- there is no lack of smaller, occasional clients.	Medium
Is there a clear understanding of management best practice?	Best practice is open to debate. Generating a model of best practice acceptable to most should be achievable.	High
Is information readily available?	No- would have to be collected as part of any benchmarking exercise.	Medium
Can benchmarking be conducted to a reasonable timescale?	Yes, in principle, given the will and resources, and provided that identifiable agents can be found.	High
Are effective implementation mechanisms available?	Yes- but there would be difficulties in ensuring that all occasional, smaller clients were aware of the lessons emerging from the exercise.	Medium
Can the costs and benefits of benchmarking be assessed?	Costs will be readily identifiable. Benefits will be more diffuse.	Medium
Value of benchmarking	Product, Performance, Process.	High, High, High

Source: CIRIA (1998, p34).

Finally, the feasibility of benchmarking suppliers is contained within the table below, and there is also here the possibility of benchmarking practice taking place:

Feasibility Test	Remarks	Feasibility Assessment
Are there significant measurable performance and product factors?	Yes- suppliers routinely measure their performance in many ways, from financial to technical.	High
Are there definable processes?	Yes-business processes are well understood and defined.	High
Are there identifiable stakeholders who can act as agents for benchmarking?	Yes- the stakeholders at this level are the suppliers themselves.	High
Are suitable benchmarking partners available?	Options include internal partners within the company, other group subsidiaries, other companies in the same sector, and companies in other parts of the construction industry and in other industries. Much of the information held by companies about their own performance is commercially sensitive.	High
Is there a clear understanding of management best practice?	For most business-level processes and products it should be possible to define best practice.	High
Is information readily available?	Yes. Companies have access to extensive information about their own performance.	High
Can benchmarking be conducted to a reasonable timescale?	Yes- in general, the experience of those construction companies that have conducted benchmarking is that such exercises can be conducted to a reasonable timescale.	High
Are effective implementation mechanisms available?	Yes. Companies' own management systems allow them to implement the results of benchmarking.	High
Can the costs and benefits of benchmarking be assessed?	Costs should be relatively easy to identify; if performance measurements are made at a suitable interval after benchmarking, it should be possible to assess the main benefits.	Medium
Value of benchmarking	Product, Performance, Process.	High, High, High

Source: CIRIA (1998, p35).

The CIRIA (1998) report concludes that benchmarking at the level of major clients would be the most significant stage of the industry as it provides high leverage on industry performance. Benchmarking also offers the potential for high benefits at the level of the strategic environment created by European and UK Government legislation, policies and practices that have a direct impact on the structure, work processes and culture of the sector.

Benchmarking at the project level via national performance measurement data base could be of great value if a suitable owner/steward for it can be found, the data collected and then analysed cost-effectively. In addition small and occasional clients can also use benchmarking exercises to determine best practice performance, but this would require collective action to assemble and disseminate the data obtained through the exercise.

Suppliers to the industry could use benchmarking to good effect in improving their business performance, and this could be undertaken cost-effectively through benchmarking clubs, which could be operated through the trade associations, although it is not anticipated that the impact of supplier benchmarking will have a significant influence on overall business performance. The difficult issue that CIRIA

(1998) identifies is that only if partners within the benchmarking exercise share knowledge and information even that which is confidential or commercially sensitive, will the maximum benefit be gained from the exercise (CIRIA, 1998, p9).

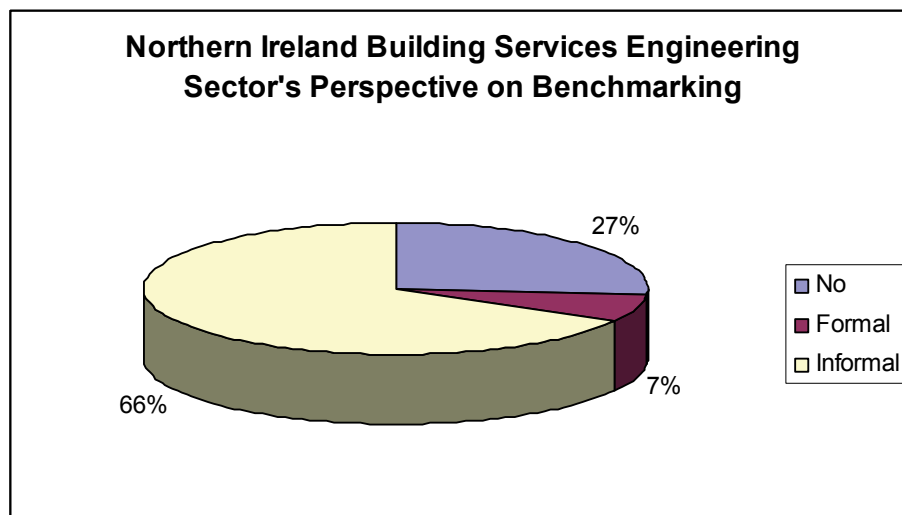
The CIRIA (1998) report concludes that the main identifiable stakeholders at the level of the external environment should be encouraged to consider the feasibility and benefits of comparing both performance and process within the construction industry systematically with overseas equivalents. This is particularly pertinent given the poor productivity performance of the construction industry in the UK, which shows that the UK is the second worst performing construction sector in main European competitors (see International Benchmarking section of this SNA).

Secondly, major client benchmarking clubs should be identified as a priority, and project benchmarking clubs should be established, based around coherent groupings within the industry, with CIRIA (1998) concluding that while considerable information is collected on project performance, it is not at present comprehensive or consistent. Benchmarking clubs are also recommended by CIRIA (1998) for smaller occasional clients through the auspices of trade associations and other industry bodies and finally, supplier benchmarking should be supported and encouraged (CIRIA, 1998, p9).

The CIRIA report was published in 1998, and as a result it is somewhat dated. Many of the initiatives may have been implemented, and this is considered further in the primary data part of this section below.

#### **10.7.4 Northern Ireland Building Services Engineering Sector Perception of Benchmarking**

As can be seen from the literature there is a history within the sector of benchmarking if it is carried out at all, to be carried out informally, and as can be seen from the diagram below this is the case in Northern Ireland:



The quotes below are indicative of the data supplied by the interviewees encapsulated in the diagram above:

*Well, two things. We try to do a bit of the benchmark with little tables and that type of thing but one of the things ... we've... at it. I haven't really sat down and done it seriously. It's one of these things – it's on the horizon. We keep on saying aye, we're going to get that done but it keeps on slipping because things take priority. But it's one thing we should really do more of and I think it's good because it gives you an idea how you're competing against your competitors. (NILP01)*

*Yes. That is an ongoing thing. And basically that is... the information is derived from the responses from our own clients. Because we do follow up interviews or informal interviews with our clients and... where we have went in after other contractors or whether we've went in to supplement or aid other contractors, then the feedback information we get is positive. (NISET01)*

*No. I don't believe in comparing myself with anyone else. (NISET02)*

*Yes indeed. Part of our ISO Quality Assurance remit is to... at least three to four times a year send out assessment forms to clients, professional people, architects, consultants and have a critique posted back to us. In reality seven days a week, twenty four hours a day, we like to look at how we're progressing. Why we fail to get tenders, why we lost customers. So we compare, look, listen and learn from what we see and sometimes hear. (NISHV01)*

*Just informally really ourselves (NISHV02)*

*All the time... We're constantly looking not at what others do, but whether we'll be successful, but the secret will always be to be innovative rather than sort of be proactive, or reactive, I should say. (NIMHV01)*

*We would .... Obviously at different levels but the first, one of the levels would be where we would compare financial information that's available on our competition with our own financial information. That would be probably a starting point that we would benchmark on.*

*We also have the opportunity obviously with operating regionally where we can benchmark between the regions from a productivity point of view, which has been very useful. (NILHV01)*

*No, not as yet... We did discuss it here in the Business Centre and they've done a couple of audits of my business and we've talked about benchmarking but it never actually happened. Once again it's something if... if someone says "look yes, we're... we've got a report on a similar size company in Dublin", you know, then yes, then we'd sit down and spend an afternoon to have a look at it, but it's not something... (NISACR02)*

*Certainly not formally I wouldn't have thought. And the only benchmarking or only comparison we would normally make with them*

*is, you know, where we have been successful in landing a job, where they have been successful in landing a job, that's about as formal as we get. (NIMBSEC01)*

*Certainly formally we do as a plc listed the stock market obviously there's various performance indicators there, I think locally coming from a smaller consultancy bought into the larger plc business we're constantly looking at our local competitors and seeing how we're comparing and what we're doing compared to other people, that's on a more informal basis. (NILBSEC01)*

### **10.7.5 Conclusions**

SummitSkills believes that the use of benchmarking as a tool for determining company competitive advantage and improving productivity is vital. The Northern Ireland building services engineering sector would appear to be involved predominantly in the use of informal techniques of benchmarking, despite the existence of KPI and benchmarking clubs. SummitSkills believes that while what are predominantly anecdotal experiences have value, SummitSkills believes that formal benchmarking techniques would help companies within the province to define their competitive advantage more accurately than might be suggested is the case now. SummitSkills believes that in conjunction with partners and stakeholders bespoke company formal benchmarking courses should be developed, which enable the sector's companies within the province to benchmark more effectively. SummitSkills also believes that the incorporation of formal benchmarking techniques should be placed within the curriculum of building services engineering courses at all levels to develop good practice across the whole of the sector. SummitSkills is committed to working with partners and stakeholders to develop these proposals further within the province.

## 11 Skills for Business Requirements

### 11.1 Workforce Qualification Levels

The table below shows the qualifications acquired by the electrotechnical industry within the building services engineering sector according to the Labour Force Survey (LFS). It should be pointed however that the drawback of the LFS survey is that some of the qualifications gained by the employees might be in 'other' sectors or disciplines not related to the electro-technical discipline:

	Level NVQ 4 & 5	Level SVQ/ NVQ 3	Level SVQ/ NVQ 2	Level SVQ/ NVQ 1	No Qualifications	Total
<b>UK- N/SVQ Equivalents All SICs</b>	41,040	173,726	72,927	29,878	9,888	<b>327,459</b>
<b>N/SVQ Equivalents Adjusted SummitSkills</b>	9,843	95,757	46,495	15,911	3,408	<b>171,414</b>
<b>Actual NVQs held</b>	1,034	19,885	8,367	2,292	139,836	<b>171,414</b>
<b>UK- N/SVQ Equivalents All SICs</b>	13%	53%	22%	9%	3%	<b>100%</b>
<b>N/SVQ Equivalents Adjusted SummitSkills</b>	6%	56%	27%	9%	2%	<b>100%</b>
<b>Actual N/SVQs held</b>	1%	12%	5%	1%	82%	<b>100%</b>

Source: LFS

The table below indicates the number of applicants who have completed NVQ 2 and S/NVQ 3 in the electrotechnical industry. In the table below, the figure of 20,632 is derived from City & Guilds provider returns, and is therefore probably more accurate than the 28,252 figure, which is contained within the LFS.

Completion of NVQ/ SVQ electrotechnical sector, UK.	NVQ/ SVQ 3	NVQ 2	Total	Period
<b>England and Wales's % share.</b>	7,746 48%	8,227 52%	15,973 100%	1999-2005
<b>Scotland % share.</b>	3,306 100%	N/A -	3,306 100%	1998-2005
<b>Northern Ireland % share.</b>	998 27%	355 73%	1,353 100%	1999-2005
<b>Total</b>	<b>12,050</b>	<b>8,582</b>	<b>20,632</b>	<b>1999- 2005</b>

Source: England & Wales: City and Guilds

Source: Scotland: SECTT- Number of completion of SVQ (= modern apprenticeship). Completion rate 85%.

Source: Northern Ireland: Electrical Training Trust (ETT).

The qualification levels of workers within the industries of plumbing, gas heating & ventilation, air conditioning & refrigeration are shown in the table below, in relation to the figures given within the LFS. As with the electrotechnical section, allowance must be made for the fact that some of these qualifications may have been achieved in other non-relevant sectors of other industries.

**Qualifications, plumbing, gas and HVACR sector, UK, 2005**

Current and Previous Level of Qualifications	Level NVQ 4 and 5	Level SVQ/ NVQ 3	Level SVQ/ NVQ 2	Level SVQ/ NVQ 1	No Qualifications	Total
UK-N/SVQ Equivalents All SICs	11,373	85,846	46,340	20,685	6,301	<b>170,546</b>
N/ SVQ Equivalents Adjusted SummitSkills	11,373	85,846	46,340	20,685	6,301	<b>170,546</b>
Actual NVQs held.	1,627	15,242	14,939	1,780	136,958	<b>170,546</b>
UK- N/SVQ Equivalents All SICs	7%	50%	27%	12%	4%	<b>100%</b>
N/ SVQ Equivalents Adjusted SummitSkills	7%	50%	27%	12%	4%	<b>100%</b>
Actual N/ SVQs held	1%	9%	9%	1%	80%	<b>100%</b>

Source: LFS

Note: No SVQ in Scotland and SVQ/ NVQ 1 does not exist.

Note: gas was compulsory from 1994- 1995.

As with the electrotechnical section, the total of 30,181 NVQ/SVQ 2 & 3 qualifications recorded by the LFS is lower than the 39,919 figure recorded in the table below, which shows the completion of NVQ/SVQ plumbing and HVACR qualifications in the UK and emanates from the examination boards.

**Completion of NVQ/ SVQ Plumbing and HVACR UK**

		NVQ/ SVQ 3	NVQ 2	Total
	<b>Northern Ireland 1999-2005</b>			
Plumbing, H & V, RAC.		342	1,212	1554
% Share		22%	78%	100%
	<b>England and Wales 1997- 2005</b>			
RAC		640	2,358	2,998
H & V		1,541	3,716	5,257
Plumbing		4,420	23,461	27,881
% Share RAC		21%	79%	100%
% Share H & V		29%	71%	100%
% Share Plumbing		16%	84%	100%
	<b>Scotland 2000- 2005</b>			
RAC			82	148
H & V		66		
Plumbing	<b>1998- 2006</b>	1,481		1,481
<b>Total</b>		<b>8,490</b>		<b>39,319</b>

Source: England and Wales: City and Guilds

Source: Scotland (plumbing): SNIPEF (modern apprenticeship)

Source: Scotland (H &amp; V and RAC: Scottish Further Educational Funding Council, 2000- 2005

Source: Northern Ireland: Electrical Training Trust (ETT).

The rates of employees holding the industrial standard of NVQ level 3 is good in comparison with other sectors within the economy as a whole. As indicated elsewhere within this SNA the building services engineering sector traditionally has outperformed other sectors of construction in qualification levels. It would appear however that to get a fully trained industrial standard workforce within the SummitSkills footprint then more people need to progress to level 3 than currently is the case at the moment in line with SummitSkills' strategic aim.

## 11.2 Essential skills

### 11.2.1 Introduction

The International Adult Literacy Survey (IALS) was carried out in 1996, and this report highlighted that almost one in four (24%) of people in Northern Ireland performed at the lowest level of competence. To respond to this issue the devolved administration in Northern Ireland produced the Essential Skills for Living Strategy in 2002, to promote the benefits of improving the skills of reading, writing and mathematics, and to improve the quality of teaching in literacy and numeracy, and to make sure that there is within the province a flexible and accessible provision suited to the needs of adults in both community and family settings, as well as in the work setting (AS, 2006, p2). Further Education Colleges within the province have been tasked with economic development as a primary function, part of which will mean a sharper and greater focus on the provision of skills for the economy and the improvement of essential skills (FEMB, 2004, p6). The same report concludes Colleges in the province thus far had not been successful in developing achievements at Level 1 or below, with achievements rates being only 60%, Adult Basic Education achievements 40% and students with learning difficulties on level 1 courses recorded at 47% (FEMB 2004, p6).

Since the production of the IALS report in Northern Ireland there has been a lot of work carried out in setting up a Basic Skills Committee for the province comprising of stakeholders and supported by EGSA's Basic Skills Unit. Under this remit, the ESGA have been tasked with promoting collaboration among providers of essential skills and disseminate good practice. They have also been tasked to provide financial support to community and voluntary groups for activities related to innovation in adult basic education and provide the Department at DELNI with advice on standards, curriculum, tests, qualifications and the requisite qualifications for those wishing to teach essential skills (ESLFBT, 2002, p21).

The Essential Skills strategy for the province is initially focusing on literacy and numeracy, although it is intended subsequently to extend this provision to cover ICT skills within the province also, and currently the standards for ICT are the same as for England (For details of the standard please see the English Regional SNA reports). The definition for Essential Skills in Northern Ireland is similar to that in England in that it defines essential skills in literacy and numeracy as being:

*“The ability to communicate by talking and listening, reading and writing; to use numeracy; and the ability to handle information”*  
(ESL, 2002, p6).

The vision that underpins this strategy is:

*“To provide opportunities for adults to update their Essential Skills to assist them in improving their overall quality of life, their personal development and their employment opportunities and by so doing to promote greater economic development, social inclusion and cohesion”* (ELS, 2002, p6).

For Apprentices within the SummitSkills footprint, to achieve a full frame modern apprenticeship, then they are required to obtain Essential Skills Level 2 in Communication, Essential Skills Level 2 in Numeracy, and Level 1 in ICT. The term

Essential Skills is used throughout Northern Ireland, and there is no blurring between Essential Skills and Basic Skill and Key Skills as in England, which avoids some confusion. The levels of skills are similar to those in England and Wales and range from Entry Level 1 through to Level 2.

## 11.2.2 Essential Skills Northern Ireland Literacy and Numeracy Standards

The Adult Literacy Core Curriculum Entry- Level 1

Speaking and Listening	Reading	Writing
Listen for the gist of short explanations. Listen for detail using key words to extract some specific information. Follow single step instructions in a familiar context, asking for instructions to be repeated if necessary. Listen and respond to requests for personal information	Follow a short narrative on a familiar topic or experience. Recognise the different purposes of text at this level.	Use written words and phrases to record and present information.
Speak clearly to be heard and understood in simple exchanges. Make requests using appropriate terms. Ask questions to obtain specific information. Make statements of fact clearly.	Read and recognize simple sentence structures.	Construct a simple sentence. Punctuate a simple sentence with a capital letter and a full stop. Use a capital letter for a personal pronoun "I"
Speak and listen in simple exchanges and everyday contexts.	Process a limited, meaningful sight vocabulary of words, signs and symbols. Decode simple regular words. Recognise the letters of the alphabet in both upper and lower case.	Spell correctly some personal key words and familiar words. Write the letters of the alphabet using upper and lower case. Use basic sound-symbol association to help spelling, as appropriate for the needs of the learner.

Source: UALANCCNI (2002, p18).

## The Adult Literacy Core Curriculum- Entry Level 2

Speaking and Listening	Reading	Writing
<p>Listen for and follow the gist of explanations, instructions and narratives.</p> <p>Listen for detail in short explanations and narratives.</p> <p>Listen and identify the main points of short explanations or presentations.</p> <p>Listen to and follow short straightforward explanations and instructions.</p> <p>Listen and identify simply expressed feelings and opinions.</p> <p>Respond to straightforward questions.</p>	<p>Trace and understand the main events of chronological and instructional text.</p> <p>Recognise the different purposes of texts at this level.</p> <p>Identify common sources of information.</p> <p>Use illustrations and captions to locate information.</p>	<p>Use written words and phrases to record or present information.</p>
<p>Speak clearly to be heard and understood in simple exchanges.</p> <p>Make requests and ask questions to obtain information in everyday contexts.</p> <p>Express clearly statements of fact, and short accounts and descriptions.</p> <p>Ask questions to clarify understanding.</p>	<p>Read and understand linking words and adverbs in instructions and directions.</p> <p>Use knowledge of simple sentence structure and word order to help decipher unfamiliar words and predict meaning.</p> <p>Apply own life experience and knowledge to check out plausible meanings of a sentence as a whole when decoding unfamiliar words.</p> <p>Use punctuation and capitalization to aid understanding.</p>	<p>Construct simple and compound sentences, using common conjunctions to connect two clauses.</p> <p>Use adjectives.</p> <p>Use punctuation correctly.</p> <p>Use a capital letter for proper nouns.</p>
<p>Follow the gist of discussions.</p> <p>Follow the main points and make appropriate contributions to the discussion.</p>	<p>Read and understand words on forms related to personal information.</p> <p>Recognise high frequency words and words with common spelling patterns.</p> <p>Use phonic and graphic knowledge to decode words.</p> <p>Use a simplified dictionary to find the meaning of unfamiliar words.</p> <p>Use initial letters to find and sequence Words in alphabetical order.</p>	<p>Spell correctly the majority of personal details and familiar common words.</p> <p>Use their knowledge of sound-symbol relationships and phonological patterns to help work out correct spellings, as appropriate for the needs of the learner.</p> <p>Produce legible text.</p>

Source: UALANCCNI (2002, p19).

Adult Literacy Core Curriculum- Entry Level 3

Speaking and Listening	Reading	Writing
<p>Listen and follow gist of explanations, instructions &amp; narratives in different contexts. Listen for detail in explanations, instructions and narrative in different contexts. Listen for and identify relevant or new information from discussions, explanations, presentations. Use strategies to clarify and confirm understanding. Listen to and respond appropriately to other points of view. Respond to a range of questions about familiar topics.</p>	<p>Trace and Understand the main events of chronological, continuous descriptive and explanatory texts of more than one paragraph. Recognise the different purposes of texts at this level. Recognise and understand organizational features &amp; typical language of instructional texts. Identify the main points and ideas and predict words from context. Understand and use organisational features to locate information. Skim read title, headings, and illustrations to see if material is of interest. Scan texts to locate information. Obtain specific information through detailed reading. Relate an image to print and use to obtain meaning.</p>	<p>Plan &amp; draft writing. Organise writing in short paragraphs. Sequence chronological writing. Proof-read and correct writing for grammar and spelling.</p>
<p>Speak clearly to be heard and understood, using appropriate clarity, speed and phrasing. Use formal language &amp; register where appropriate. Express clearly, statements of fact, and give short explanations, accounts and descriptions. Make requests and ask questions to obtain information in familiar/ unfamiliar contexts.</p>	<p>Recognise and understand organisational features and typical language of instructional texts. Use implicit &amp; explicit knowledge of different types of word to help decode and predict meaning. Use punctuation &amp; capitalization to aid understanding.</p>	<p>Write in complete sentences. Use correct basic grammar. Use punctuation correctly.</p>
<p>Follow and understand the main points of discussions on different topics. Make contributions to discussions that are relevant to the subject. Respect the turn-taking rights of others during discussions.</p>	<p>Recognise and understand relevant specialist key word &amp; words. Read and understand words and phrases commonly used on forms. Use dictionary to find meanings of unfamiliar words. Use 1<sup>st</sup> and 2<sup>nd</sup> letters to find &amp; sequence words in alphabetical order. Use a variety of strategies to help decode increasing range of unfamiliar words.</p>	<p>Spell correctly common words and relevant key words for work &amp; specialist interest. Use developing knowledge of sound symbol relationships and phonological patterns to help spell wider range of words. Produce legible text.</p>

Source: UALANCCNI (2002, p20).

## The Adult Literacy Core Curriculum- Level 1

Speaking and Listening	Reading	Writing
<p>Listen for and identify relevant information.</p> <p>Listen for and understand explanations, instructions and narratives.</p> <p>Use strategies to clarify and confirm understanding.</p> <p>Provide feedback and confirmation when listening to others.</p> <p>Make contributions relevant to situation and subject.</p> <p>Respond to questions.</p>	<p>Trace and understand main events of continuous descriptive, explanatory and persuasive texts.</p> <p>Recognise how language &amp; other textual features are used to achieve different purposes.</p> <p>Identify main points and specific detail and infer meaning from images not explicit in text.</p> <p>Use organizational and structural features to locate information.</p> <p>Use different reading strategies to obtain information.</p>	<p>Plan and draft writing.</p> <p>Judge how much to write and level of detail to include.</p> <p>Present information in a logical sequence using paragraphs as appropriate.</p> <p>Use language suitable for purpose and audience.</p> <p>Use format and structure for different for different purposes.</p> <p>Proof-read and revise writing for accuracy and meaning.</p>
<p>Speak clearly in a way which suits the situation.</p> <p>Make requests and ask questions to obtain information in familiar/unfamiliar contexts.</p> <p>Express clearly statements of fact, explanations, instructions, accounts &amp; descriptions.</p> <p>Present information and ideas in a logical sequence and include detail and develop ideas where appropriate.</p>	<p>Use implicit &amp; explicit grammatical knowledge etc to predict and try out possible meaning.</p> <p>Use punctuation to help understanding.</p>	<p>Write in complete sentences.</p> <p>Use correct grammar.</p> <p>Punctuate sentences correctly and use punctuation so that the meaning is clear.</p>
<p>Follow and contribute to discussions on a range of straightforward topics.</p> <p>Respect turn-taking rights of others.</p> <p>Use appropriate phrases for interruption.</p>	<p>Use reference material to find the meaning of unfamiliar words.</p> <p>Recognise and understand vocabulary associated with different types of text, using appropriate strategies to work out meaning.</p> <p>Recognise and understand an increasing range of vocabulary, applying knowledge of word structure, related words, word roots, derivations, borrowings.</p>	<p>Spell correctly words used most often in work, studies &amp; daily life.</p> <p>Produce legible text.</p>

Source: UALANCCNI (2002, p21).

## The Adult Literacy Core Curriculum- Level 2

Speaking and Listening	Reading	Writing
<p>Listen for and identify relevant information from extended explanations/presentations on a range of topics.</p> <p>Listen to, understand and follow lengthy or multi-step instructions and narratives.</p> <p>Respond to detailed or extended questions on a range of topics.</p> <p>Respond to criticism and criticize constructively.</p>	<p>Trace and understand the main events of continuous descriptive, explanatory and persuasive texts.</p> <p>Identify the purpose of a text and infer meaning which is not explicit.</p> <p>Identify the main points and specific detail.</p> <p>Read an argument and identify the points of view.</p> <p>Read critically to evaluate information, and to compare information, ideas and opinions from different sources.</p> <p>Use organisational features and systems to locate texts and information.</p> <p>Use different reading strategies to find and obtain information.</p> <p>Summarise information from longer documents.</p>	<p>Plan and draft writing.</p> <p>Judge how much to write and the level of detail to include.</p> <p>Present information and ideas in a logical or persuasive sequence, using paragraphs where appropriate.</p> <p>Use format and structure to organise writing for different purposes.</p> <p>Use formal and informal language appropriate to purpose and audience.</p> <p>Use different styles of writing for different purposes.</p> <p>Proof-read and revise writing for accuracy and meaning.</p>
<p>Speak clearly and confidently in a way which suits the situation.</p> <p>Make requests and ask questions to obtain detailed information in familiar/unfamiliar contexts.</p> <p>Express clearly statements of fact, explanations, instructions, accounts, descriptions.</p>	<p>Use implicit and explicit grammatical knowledge, alongside own knowledge &amp; experience of context, to help follow meaning and judge the purpose of different types of texts.</p> <p>Use punctuation to help interpret the meaning and purpose of texts.</p>	<p>Construct complex sentences.</p> <p>Use correct grammar.</p> <p>Use pronouns so that their meaning is clear.</p> <p>Punctuate sentences correctly and use punctuation accurately.</p>
<p>Make relevant contributions and help to move discussions forward.</p> <p>Adapt contributions to discussions to suit audience, context, purpose and situation.</p> <p>Use appropriate phrases for interruption or change of topic.</p> <p>Support opinions and arguments with evidence.</p> <p>Use strategies intended to reassure.</p>	<p>Read and understand technical vocabulary.</p> <p>Use reference material to find the meaning of unfamiliar words.</p> <p>Recognise and understand vocabulary associated with texts of different levels of accessibility, formality, complexity and of different purpose.</p>	<p>Spell correctly words used most often in work, studies and daily life, including familiar technical words.</p> <p>Produce legible text.</p>

Source: UALANCCNI (2002, p22).

## The Adult Numeracy Core Curriculum- Entry Level 1

Number	Measures, Shape & Space	Handling Data
<p>Count reliably up to 10 items.</p> <p>Read and write numbers up to 10, including zero.</p> <p>Order and compare numbers up to 10, including zero.</p> <p>Add single-digit numbers from numbers up to 10.</p> <p>Interpret +, - and = in practical situations for solving problems.</p> <p>Use a calculator to check calculations using whole numbers</p>	<p>Recognise and select coins and notes.</p> <p>Relate familiar events to: times of the day; days of the week; seasons of the year.</p> <p>Describe size and use direct comparisons for the size of at least two items.</p> <p>Describe length, width, height, and use comparisons for length, width and height of items.</p> <p>Describe weight and use direct comparisons for the weight of items.</p> <p>Describe capacity and use direct comparisons for the capacity of items.</p>	<p>Extract simple information from lists.</p> <p>Sort and classify objects using a single criterion.</p> <p>Construct simple representations or diagrams, using knowledge of numbers, measures or shape and space.</p>
	<p>Recognise and name common 2-D and 3-D shapes.</p> <p>Understand everyday positional vocabulary (e.g. between, inside near to).</p>	

Source: UALANCCNI (2002, p23).

## The Adult Numeracy Core Curriculum- Entry Level 2

Number	Measures, Shape & Space	Handling Data
<p>Count reliably up to 20 items. Read, write, order and compare numbers up to 100. Add and subtract two digit numbers. Recall addition and subtraction facts to 10. Multiply using single digit whole numbers. Approximate by rounding up to the nearest 10. Use and interpret +, -, x and = in practical situations for solving problems. Use a calculator to check calculations using whole numbers.</p>	<p>Make amounts of money up to One pound sterling in different ways using 1p, 2p, 5p, 10p, 20p and 50p coins. Calculate the cost of more than one item and the change from a transaction, in pence or in whole pounds. Read and record time in common date formats. Read and understand time displayed in analogue and 12-hour digital clocks in hours, half hours and quarter hours. Read, estimate, measure and compare length using common standard and non standard units. Read, estimate, measure and compare weight using common standard and non-standard units. Read, measure and compare capacity using non-standard and standard units. Read, measure and compare positive temperatures in every day situations such as weather charts. Read simple scales to the nearest labeled division.</p>	<p>Extract information from lists, tables, simple diagrams and block graphs. Make numerical comparisons from block graphs. Make numerical comparisons from block graphs. Sort and classify objects using two criteria. Collect simple numerical information. Represent information so that it makes sense to others.</p>
<p>Read, write and compare halves and quarters of quantities. Find halves and quarters of small numbers of items or shapes.</p>	<p>Recognise and name 2-D and 3-D shapes. Describe the properties of common 2-D and 3-D shapes. Use positional vocabulary.</p>	

Source: UALANCCNI (2002, p24).

## The Adult Numeracy Core Curriculum- Entry level 3

Number	Measures, Shapes & Space	Handling Data
<p>Count, read, write, order and compare numbers up to 1000. Add and subtract using three-digit whole numbers. Recall addition. Multiply two-digit numbers by single-digit whole numbers. Recall multiplication facts and subtraction facts up to 20. Divide two-digit whole numbers by single digit whole numbers and interpret remainders. Approximate by rounding numbers less than 100 to the nearest 10 or 100. Estimate answers to calculations. Use and interpret +, -, x, AA and = in practical situations for solving problems.</p>	<p>Add and subtract sums of money using decimal notation. Round sums of money to the nearest pound sterling and 10p and make approximate calculations. Read measure and record time. Read and interpret distance in everyday situations. Read, estimate, measure and compare length using non-standard and standard units. Read, estimate, measure and compare weight using non-standard and standard units. Read, estimate, measure and compare capacity using non-standard and standard units. Read, measure and compare temperature using common units and instruments.</p>	<p>Extract numerical information from lists, tables, diagrams and simple charts. Make numerical comparisons from bar charts and pictograms. Make observations and record numerical information using a tally. Organise and represent information in different ways so that it makes sense to others.</p>
<p>Read, write and understand common fractions. Recognise and use equivalent forms. Read, write and understand decimals up to two decimal places in practical contexts. Use a calculator to calculate using whole numbers and decimals to solve problems in context, and to check calculations.</p>	<p>Sort 2-D and 3-D shapes to solve practical problems using properties.</p>	

Source: UALANCCNI (2002, p25).

## The Adult Numeracy Core Curriculum- Level 1

Number	Measures, Shape & Space	Handling Data
<p>Read, write, order and compare numbers, including large numbers. Recognise negative numbers in practical contexts.</p> <p>Add, subtract, multiply and divide using efficient written methods.</p> <p>Multiply and divide whole numbers by 10 and 100.</p> <p>Recall multiplication facts up to 10x10 and make connections with division facts.</p> <p>Recognise numerical relationships. Work out simple ratio and direct proportion.</p> <p>Approximate by rounding.</p> <p>Estimate answers to calculations.</p>	<p>Add, subtract, multiply &amp; divide sums of money &amp; record.</p> <p>Read, measure and record time in common date formats and in the 12-hour and 24 hour clock.</p> <p>Calculate using time.</p> <p>Read, estimate, measure and compare length, weight, capacity and temperature using common units and instruments.</p> <p>Read, estimate, measure and compare distance.</p> <p>Add and subtract common units of measure within the same system.</p> <p>Convert units of measure in the same system.</p> <p>Work out the perimeter of simple shapes.</p> <p>Work out the area of rectangles.</p> <p>Work out simple volume.</p>	<p>Extract and interpret information.</p> <p>Collect, organize and represent discrete data.</p> <p>Find the arithmetical average for a set of data.</p> <p>Find the range for a set of data.</p>
<p>Read write order and compare common fractions and mixed numbers.</p> <p>Find parts of whole number quantities or measurements.</p> <p>Recognise equivalences between common fractions, percentages and decimals and use these to find part of whole-number quantities.</p> <p>Read, write order and compare decimals up to decimal places.</p> <p>Add, subtract, multiply and divide decimals up to two places.</p> <p>Multiply and divide decimals by 10, 100.</p> <p>Approximate decimals by rounding to a whole number or two decimal places.</p> <p>Read, write, order and compare simple percentages, and use simple percentage increase and decrease.</p> <p>Find simple percentage parts of quantities and measurements.</p> <p>Find simple percentage increase and decrease.</p> <p>Use a calculator to calculate efficiency using whole numbers, fractions, decimals and percentages.</p>	<p>Solve problems using the mathematical properties of regular 2-D shapes.</p> <p>Draw 2-D shapes in different orientation using grids.</p>	<p>Show that some events are more likely to occur than others.</p> <p>Express the likelihood of an event using fractions, decimals and percentages with the probability scale.</p>

Source: UALANCCNI (2002, p26).

The Adult Numeracy Core Curriculum- Level 2

Number	Measures, Shape & Space	Handling Data
<p>Read, write, order and compare positive and negative numbers of any size in a practical context. Carry out calculations with numbers of any size using efficiency methods. Calculate ratio and direct proportion. Evaluate expressions and make substitutions in given formulae in words and symbols to produce results.</p>	<p>Calculate with sums of money and convert between currencies. Calculate, measure and record time in different formats. Estimate, measure and compare length, distance, weight and capacity using metric, and where appropriate imperial units. Estimate measure and compare temperature, including reading scales and conversion tables. Calculate with units of measure within the same system. Calculate with units of measure between systems, using conversion tables and scales, and approximate conversion factors. Understand and use given formulae for finding perimeters and areas of regular shapes. Understand and use given formulae for finding areas of composite shapes. Understand and use given formulae for finding volumes of regular shapes. Work out dimensions from scale drawings.</p>	<p>Extract discrete and continuous data from lists, tables, simple diagrams and line graphs. Collect organize and present discrete and continuous data in tables, charts, diagrams and line graphs. Find the mean, median and mode, and use them as appropriate to compare two sets of data. Find the range and use to describe the spread within sets of data.</p>
<p>Use fractions to order &amp; compare amounts or quantities. Identify equivalencies between fractions, decimals and percentages. Evaluate one number as a fraction of another. Use fractions to add and subtract amounts or quantities. Order, approximate and compare decimals when solving practical problems. Add, subtract, multiply and divide decimals up to three places. Order and compare percentages and understand percentage increase and decrease. Find percentage parts of quantities and measurements. Evaluate one number as a percentage of another. Use a calculator to calculate efficiently using whole numbers, fractions, decimals and percentages.</p>	<p>Recognise and use common 2-D representation of 3-D objects. Solve problems involving 2-D shapes and parallel lines.</p>	<p>Identify the range of possible outcomes of combined events and record the information using diagrams or tables.</p>

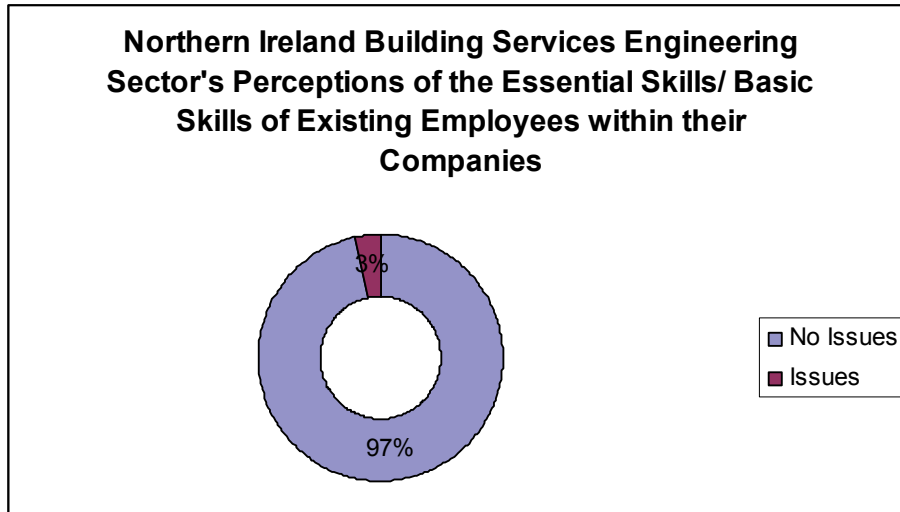
Source: UALANCCNI (2002, p27).

**11.2.17 Northern Ireland Building Services Engineering Sector Perspective on Essential Skills**

As can be seen from the literature element of this section, the Northern Ireland economy may have a problem with the essential skills deficiencies of a large percentage of potential employees.

**11.2.17.1 Existing Staff**

In the first question within the primary data element of this section, the interviewees were asked about the current essential/basic skills of their current workforce. The diagram below suggests that there are no potential issues, but the reader is directed towards the quotes, which it is argued shows some evidence of rising concern among employers in the sector as to whether this will continue:



The quotes below are indicative of the views of the companies encapsulated in the diagram above:

*I think they do have the basic skills at the present time for what we need but it's hard to tell if or not they have the basic skills for what's needed in the future because as time goes on you just don't know what is going to come up. It's getting much more that the likes of the gas and so on is getting much more where you start having to do calculations and so on into it. But I think they have at the present time. (NILP01)*

*Yes, but this is limited to the training that's provided now. But none of us can tell what the future does hold and we can just go along with the trend as needed, as it arises. (NISET01)*

*The short answer is yes because I continually train my people. There are pre requisite entrants into some of the training courses that we do to have their O Levels or A Levels or third level practical skills. The secretary here goes on and she's done business management which we have facilitated out of here. So the short answer is yes, they've got basic skills. But on a wider range, because I've been involved in training, I feel that the secondary education is such that there's a lot of key skills not evident when the students come into third level education. (NISET02)*

*No. I'm honest enough to admit that a number of employees do not have sufficient basic skills to meet the needs of the organisation not only now but in the future. As we discussed earlier the industry is*

*becoming more technological, more demanding for control of waste, the protection of the environment and health and safety. Particularly approved electricians, supervisors and contract managers need to be further educated and they need to have more essential basic skills. One skill we're finding very poor response to, particularly in young people coming into the industry, is reading, writing and arithmetic. And it is becoming a serious problem in Northern Ireland. There is also a downturn in the ability of young people to carry out verbal reasoning and common sense. (NIMET01)*

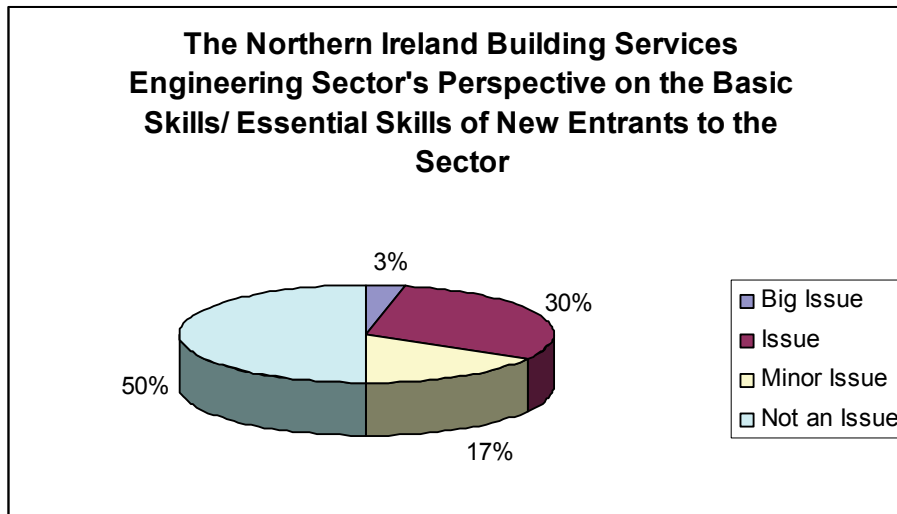
*Yes we have the basic skills but obviously there's always room for improvement. (NILET01)*

*Certainly now, yes. In the future that is continuing to develop and I would hope that they will still have the basic skills in a changing industry. (NILHV01)*

*Yes, we've placed a comprehensive training matrix in place within the local marketplace that has taken our skilled operative base through to a position that we're confident they have the knowledge to take them forward. We haven't [elicited] that any of the young people that we're employing, the school leavers, that communication skills is not, is probably lacking and that's an area of basic skill that we feel that we have to work on when they do come in. (NILHV02)*

### **1.2.17.2 New entrants**

The data in the diagram and quotes above should be compared with the data from the next question, which sought to elicit the views of the companies within the building services sector in Northern Ireland to the basic skills/essential skills of new entrants to the sector. As in many other regions/nations of the UK there is a considerable amount of concern at the skill levels being exhibited by School leavers entering the profession. The diagram below indicates the levels of concern:



The quotes below are indicative of the views of the companies encapsulated within the diagram above:

*Atrocious. Never seen it this poor in the last five years... (NISP01)*

*Certainly in the last intake we had no, they lacked it... (NISP02)*

*I don't always think so. Now we try to look for kids to come into our place with the grades and the English and maths but I know a lot of the ones that come to us that don't have the grades and quite often there are some guys that are good and do well in the aptitude tests and that type of thing but they just don't have the maths and the English and it's a great disappointment to me personally because one of the things that really irritates me at the present time is we're getting all these essential skills being brought into the apprenticeship and over in England they are talking of having to bring apprenticeships down into schools. I think the schools would be far better teaching the kids the basic skills and then when they have the basic skills to come out and learn to do ... do the vocational training after that. The two things seem to be meshed between it and where we should be doing more ... spend more time teaching them the vocational side of their skill, we're sitting having to do their core skills on it. (NILP01)*

*Well Ronnie, I partly covered this in the first part of the question. There's much room for improvement. Particularly in the primary schools in the basic skills. I also think that both the secondary and grammar schools in Northern Ireland could liaise more in preparing young people for the construction industry. It is a well known fact that some of the grammar and secondary schools do this and they unite together and meet through a local education business partnership agreement. But some schools in particular do not prepare their young people for a possible career out of grammar school. They do not prepare them for a career in the construction industry. And I would like to see this tackled by government where there is a clear choice made, not with a year to go before GCSEs, but at least two years to*

*go. Where inherent skills in young people that would suit the construction industry are highlighted and they're channelled towards that. Rather than, at the last moment in their final year, before GCSEs, deciding they want to come into the construction industry. So I think more could be done. (NIMET01)*

*I don't think so. I personally think that schools are pushing people down the route of non-trades a bit too much. And when you have young school leavers, etc, it's a bit of a shock to the system coming into the trade set. (NILET01)*

*Some do but not always and I feel that we ought to look at the educational grades as required as a basic minimum. I feel that maybe C grades across the board should be the very basic and we shouldn't drop below that. (NILET02)*

*To be honest I would find that hard to answer. On a very specific basis, without becoming repetitive. We do review continually the skills levels that we need to have. We haven't genuinely any gaping areas currently where... one which may specifically come up in the very near future is that... because of the scale of our contracting side of our business we haven't had the necessity to do any computer aided design works. Our contracting division is now starting to grow fairly significantly. And we use CAD on a read only basis usually. (NIMHV02)*

*There is a deficiency there but I think that's the demands of the industry now as well. We're looking for these individuals to slot into a team environment very quickly and to take a useful role within that team. (NILHV02)*

*I think they need GCSE levels definitely because basically they need some intelligence to do... it's not a semi-skilled job, it's a very skilled job. So, yes, there's plenty of them out there with GCSEs but, as I spoke earlier, unfortunately they're being encouraged now to go on to... To go to further education and that... to me that is the main problem. Rather than encouraging them... A prime example, the local school here we approached them for apprentices and out of 16 guys that were coming out every one of them were going on to further education. So there was... and I think getting... going away from the refrigeration side of it and so no one... the local training centre closed here simply because it couldn't get the numbers to go through it... So I think this has down to Government. What they should be doing is looking at that very... (NIMACR02)*

*It would be fair to say that in the last whiles when we have been interviewing staff we have found good staff hard to get and when we do appoint, when we do find a good one they're normally are head and shoulders above the rest of the competition so there is an issue with the level of skills coming out of some of the universities for sure. (NILBSEC01)*

*Yeah, I mean, I don't think the educational system's that good compared to what it used to be. But anybody that we've brought in on*

*the engineering side are all graduates, they've all got their degrees. I don't... I'm not blinkered in the sense that a degree means anything in terms of your ability but they would have basic skills and a basic knowledge. We have quite an extensive interview procedure with them. And then we provide additional training to equip them to actually do the job at the end of the day. (NILBSEC02)*

### **11.2.17.3 Conclusions**

SummitSkills believes that the sector within the province is facing the same basic skill issues that are facing other areas of the UK, however it might be argued that in relation to existing workers, the companies within Northern Ireland are more articulate in identifying potential future problems as IT skills are required more than has been the case in the past. SummitSkills is committed to working within the province with partners and stakeholders to facilitate the development of bespoke courses in IT (see IT section of this SNA) as well as other basic skills where this is required in areas such as communication. In relation to new entrants to the sector, SummitSkills is committed to working with partners, stakeholders and providers to develop entrant tests which are as robust as the tests set by JTL and BEST for example. SummitSkills will also continue to promote the sector to more academic groups than has perhaps been the case up till now.

## **11.3 Skill Levels Required**

### **11.3.1 Introduction**

A skills shortage occurs when an employer has a vacancy that is hard to fill because applicants for that job do not have the necessary skills, qualifications or experience. A skills gap occurs when the employer judges that his employees are not fully proficient in their job. The table below indicates the incidence of vacancies within the SummitSkills footprint within Northern Ireland. The vacancies are relatively evenly spread across the various occupations within the sector, with percentage wise there being a significant number of vacancies for technician grade staff, whereas in the rest of the UK there is usually a significant shortage of skilled craft operatives.

## SummitSkills Footprint Incidence of Vacancies Northern Ireland

<b>Incidence of vacancies</b>		
Number of vacancies	190	16,109
Proportion of establishments reporting vacancies	15%	16%
Vacancies as a proportion of employment	3%	3%
Weighted base (base=all establishments)	710	43,320
<b>Unweighted base (base=all establishments)</b>	<b>72</b>	<b>4,504</b>
<b>Distribution of vacancies</b>		
Managers and administrators		3%
Professional occupations		6%
Associate professional and technical		14%
Clerical and secretarial		10%
Craft and related occupations		12%
Personal and protective services		10%
Sales occupations		13%
Plant and machine operatives		12%
Other occupations		20%
Weighted base (base=all vacancies)		16,109
<b>Unweighted base (base=all vacancies)</b>		<b>4,368</b>

Source: DEL (2002)

The table below shows the number of hard to fill vacancies within the SummitSkills footprint within Northern Ireland and it is in the area of Building Services Engineering Technicians as well as skilled craft operatives, that the sector is finding difficulties in recruiting.

<b>Incidence of hard-to-fill vacancies</b>		
Number of HTF vacancies	111	9,842
Proportion of establishments reporting HTF vacancies	9%	10%
HTF vacancies as a proportion of employment	2%	2%
Weighted base (base=all establishments)	710	43,320
<b>Unweighted base (base=all establishments)</b>	<b>72</b>	<b>4,504</b>
<b>Distribution of hard-to-fill vacancies</b>		
Managers and administrators		2%
Professional occupations		4%
Associate professional and technical		19%
Clerical and secretarial		7%
Craft and related occupations		17%
Personal and protective services		9%
Sales occupations		9%
Plant and machine operatives		14%
Other occupations		20%
Weighted base (base=all hard-to-fill vacancies)		9,842
<b>Unweighted base (base=all HTF vacancies)</b>		<b>2,566</b>

The table below indicates the incidence of skills shortage vacancies within the province, and the data suggests that approximately one in five vacancies within the Northern Ireland Building Services Engineering Sector is due to a skill shortage, which as already stated, is caused by applicants lacking the requisite skills, qualifications or experience. The data suggests that as in the rest of the United Kingdom, there is a shortage of suitably qualified craft operatives in the Building Services Engineering Sector. Northern Ireland also has skill shortage issues in relation to technician grade staff, and plant and machine operatives.

<b>Incidence of skill-shortage vacancies</b>		
Number of skill-shortage vacancies	36	3,128
Proportion of establishments reporting skill-shortage vacancies	3%	4%
Skill-shortage vacancies as a proportion of all vacancies	19%	19%
Skill-shortage vacancies as a proportion of employment	1%	1%
Weighted base (base=all establishments)	710	43,320
<b>Unweighted base (base=all establishments)</b>	<b>72</b>	<b>4,504</b>
<b>Distribution of skill-shortage vacancies</b>		
Managers and administrators		4%
Professional occupations		6%
Associate professional and technical		11%
Clerical and secretarial		7%
Craft and related occupations		25%
Personal and protective services		5%
Sales occupations		6%
Plant and machine operatives		19%
Other occupations		17%
Weighted base (base=all skill-shortage vacancies)		3,128
<b>Unweighted base (base=all skill-shortage vacancies)</b>		<b>668</b>

Source: DEL (2002)

The incidence of internal skills gaps, which are reflection of where employers within the Building Services Engineering Sector within Northern Ireland feel that their existing staff are not fully proficient/ competent in their jobs shows that as in the rest of the UK within the SummitSkills footprint there is a significant problem with management and administration within the sector. This problem is directly affecting the productivity of the sector, and may to some extent explain the productivity deficiencies of the sector in relation to its European competitors excluding Southern Ireland (see International Benchmarking section of this SNA). The percentages against the other occupations within the Building Services Engineering Sector suggest that there are not any significant issues within Northern Ireland per se.

## SummitSkills Footprint Incidence of skill gaps

<b>Incidence of skill gaps</b>		
Proportion of establishments reporting internal skill gaps	12%	13%
Skill gaps as a proportion of employment	3%	3%
Weighted base (base=all establishments)	710	43,320
<b>Unweighted base (base=all establishments)</b>	<b>72</b>	<b>4,504</b>
<b>Occupational pattern of internal skill gaps</b>		
Managers and administrators		29%
Professional occupations		9%
Associate professional and technical		5%
Clerical and secretarial		17%
Craft and related occupations		10%
Personal and protective services		6%
Sales occupations		11%
Plant and machine operatives		5%
Other occupations		8%
Weighted base (base=internal skill gaps : employee based)		16,164
<b>Unweighted base (base=internal skill gaps : employee based)</b>		<b>2,744</b>
<b>Impact of internal skill gaps</b>		
Loss of business/orders to competitors		18%
Difficulties meeting customer service		32%
Difficulties delivering quality		22%
Increased operating costs		15%
Difficulties with technological change		18%
Difficulties introducing new working practices		17%
None of the above		
Causes no difficulties		32%
Weighted base (base=all establishments with skill gaps)		3,777
<b>Unweighted base (base=all establishments with skill gaps)</b>		<b>548</b>

Source: DELL (2002)

The perceived impacts of internal skills gaps are that they have led 18% of contractors in Northern Ireland to lose work to 'other contractors'. The impact of globalisation and migrant worker business start up (see the relevant sections of this SNA) may mean that quintessentially this work although carried out in Northern Ireland the value will be lost abroad. Building Services Engineering Contractors within Northern Ireland are also experiencing significant issues because of internal skills gaps in meeting customer service and quality requirements, which will invariably lead to a poor reputation for the sector, if not a continuation or increase of contracts being lost. As this SNA has indicated (see technical change and technical change environmental parts of this SNA) technical change, particularly in relation to environmental technologies will play an increasingly large role in the future of the Building Services Engineering Sector, therefore the fact that 18% of contractors in the DEL research suggested that skills gaps were affecting their ability to implement technological change, this must be a cause for concern if the Building Services

Engineering Sector in Northern Ireland is going to respond effectively to the challenges it will face in the future.

One method however those Building Services Engineering Sector employers can adopt in relation to addressing the issues of skills gaps is through investment in training. The table below indicates the level of training both on and off the job that DEL identified as taking place within the Building Services Engineering Sector within Northern Ireland when they undertook their research:

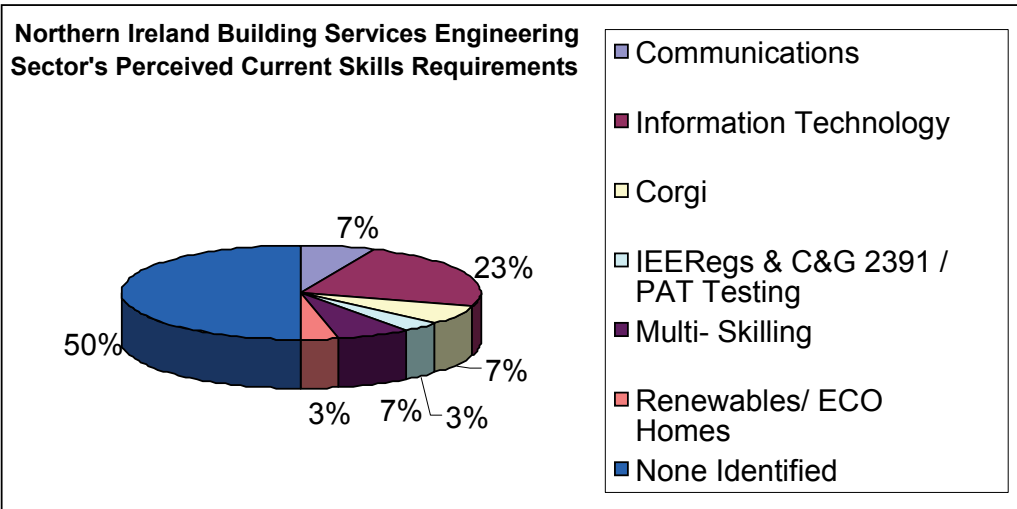
<b>Proportion establishments funding off the job training</b>		
Proportion of establishments funded or arranged off-the-job training for employees in the preceding 12 months	57%	42%
Weighted base (all establishments excluding respondents answering don't know or refusing)	701	42,999
<b>Unweighted base (all establishments excluding respondents answering don't know or refusing)</b>	<b>70</b>	<b>4,466</b>
<b>Proportion establishments funding on the job training</b>		
Proportion of establishments funded or arranged off-the-job training for employees in the preceding 12 months	68%	61%
Weighted base (all establishments excluding respondents answering don't know or refusing)	701	42,888
<b>Unweighted base (all establishments excluding respondents answering don't know or refusing)</b>	<b>70</b>	<b>4,459</b>

Source: DEL (2002).

The data suggests that a worryingly high percentage of companies within the Building Services Engineering Sector within Northern Ireland are not involved in the training of their staff, either on or off the job. The DEL research provides no explanation for this phenomenon, but research in the UK suggests that many contractors within the sector do not view training as part of their business, or that their staff are fully trained (see for example SummitSkills SNA for Scottish Enterprise). This reluctance to train on the part of a significant minority of Building Services Engineering employers within Northern Ireland may impact adversely in relation to the productivity of the sector generally, and thereby affect the Northern Ireland economy generally.

### **11.3.2 Northern Ireland Building Services Engineering Sector Perspective on Skills Requirements**

Within this element of the section, the primary data looks at a number of issues that emanate from skill levels required. First the primary data looks at the current skills requirements of the building services engineering sector within Northern Ireland. Secondly, the skills levels are analysed and thirdly the companies are asked whether they think that level 3 is the appropriate industrial standard for a fully trained craft operative. Fourthly the need for technician training is considered, and finally supervisory management training is considered. The first diagram below indicates that the sector was able to identify a number of different issues relating to the current skills requirements:



The quotes below are indicative of the views of the companies encapsulated in the diagram above:

*Gas, because it is so costly, we tend to just sort of send ... We won't put all the employees through it, you know. We tend to put a quantity of them through, but because the labour pull in Northern Ireland is quite fluid and you train somebody up and then they leave you, then we go on to the next. (NIMP02)*

*We're not too bad because we do a training analysis for the ones and we think we have most people skilled to the levels we require for them. So I don't think we're too bad that way. One of the things, you are never doing a constant level of work all the same things. Sometimes you need more of something and more of the other. So you can get occasional ... maybe you're short of welders or something like that, or maybe at another time you're short of copper workers, so on and so forth. But in the general we're not too bad. We feel we're not too bad. We do look at it – we look at it in analysis. (NILP01)*

*What skills do they not have? Well there's not enough registered electricians but as for everything else... (NISHV02)*

*I would like to see refrigeration engineers in particular, being better with electrics and I find that men are good at brazing and welding and you know, fault finding refrigeration wise, but when it comes down to fault finding for electrical problems it's nearly guess work. Guess work and experience. (NISACR02)*

*That's a good question. What we tend to do as part of an annual review, we ask our individuals the same question, so if they feel that there's something is lacking in their career profile... so if they could raise it between the company and themselves address whatever shortfalls they feel they might have. (NIMBSEC01)*

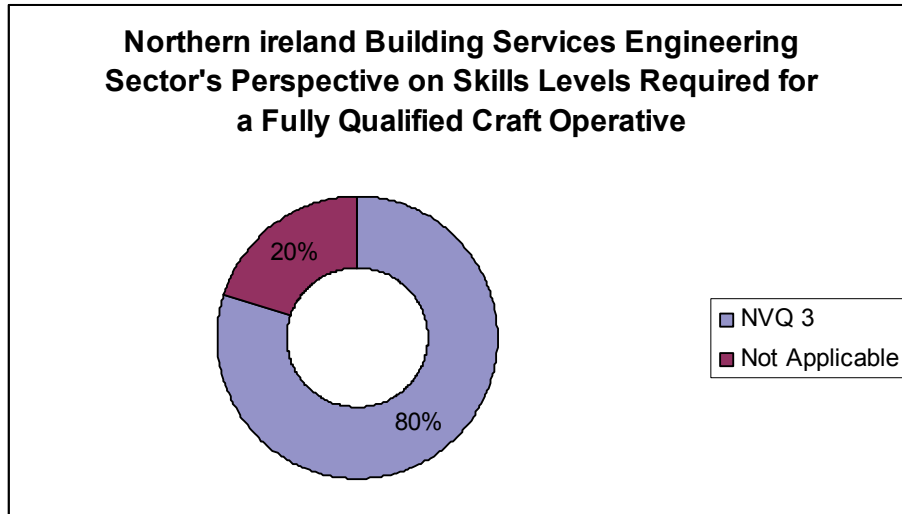
*I would say that my staff have all the skills because all my apprentices and everybody who works for me has the rounded skills. They're not boxed in their section to say, they do this specific skills. My staff are all rounded so I can put them into any box to do any task and any role and it doesn't matter what job needs done, they can all interlock with each other and have rounded skills. (NISP01)*

*Some two years ago, to improve our competency and bring people up to the required standard of the amendment to the 16<sup>th</sup> edition of IEE regulations, we put all our senior staff through City and Guilds 2391. We repeated that exercise in 2005. And what we discovered is that the more mature, forty, fifty year old electricians had great difficulty in coping with City and Guilds 2391 particularly in relation to the exams. The younger people had no difficulty. So, inherent in the construction industry and in any electrical contracting, not just in our company but generally throughout, there's been a gap in the continuity of more senior electricians submitting themselves to ongoing training. We're quite concerned about this and we've had discussions with the Electrical Training Trust as to how best we can improve the confidence of these people and assist them in achieving a higher degree of competency. The reason being is that many of our clients are now asking on select tender lists for confirmation of the competency of personnel throughout the company on all aspects. City and Guilds 2391, City and Guilds 2381 and on PAT testing and management of PAT testing. So this is an aspect of our company that causes concern to us. (NIMET02)*

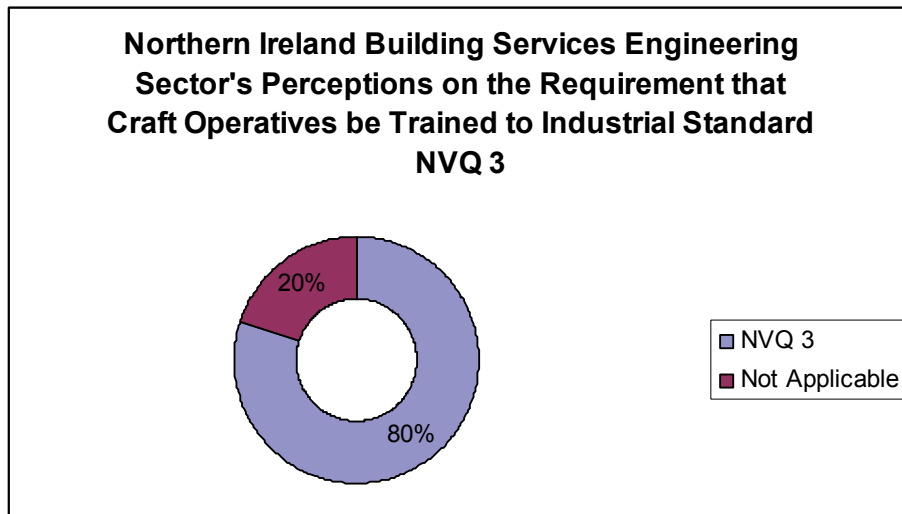
*To be honest ... I would find that hard to answer. On a very specific basis, without becoming repetitive. We do review continually the skills levels that we need to have. We haven't genuinely any gaping areas currently where... one which may specifically come up in the very near future is that... because of the scale of our contracting side of our business we haven't had the necessity to do any computer aided design works. Our contracting division is now starting to grow fairly significantly. And we use CAD on a read only basis usually. (NIMHV02)*

*JAB some of them wouldn't have or 16<sup>th</sup> edition that come in with any qualifications we would then train them in the 16<sup>th</sup> edition. We'll send them on PAT testing, we'll send them on. All the different relevant skills in the refrigeration industry we'll [feed into the] refrigeration man and air-conditioning, vice versa we'll train the air-conditioning man in refrigeration. At one stage we set up a course where we sent 16 of our refrigeration engineers on a basic electrical course and we sent the electricians on a basic refrigeration course which colleagues at [Nutmore] set up for us. (NILACR01)*

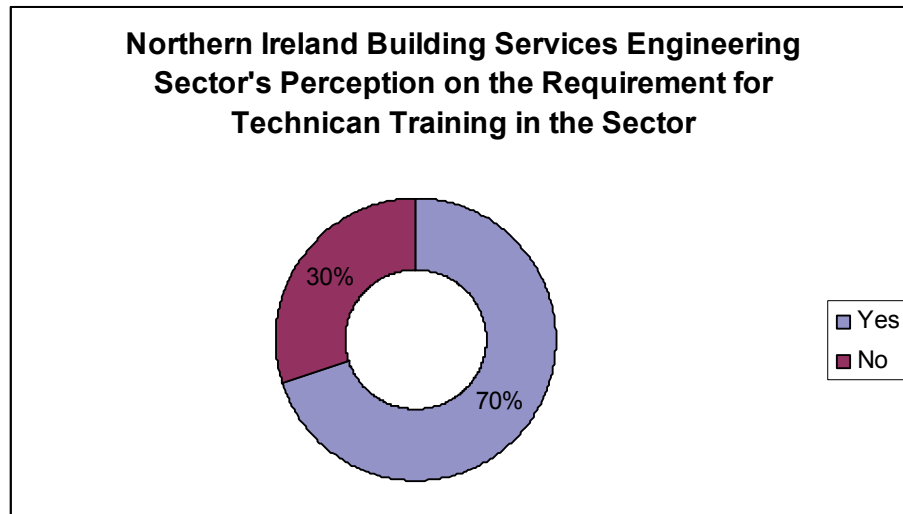
The next question sought to analyse the skill level required for a fully qualified craft operative, as the consultants did not employ these type of employees, it can be seen that if these are discounted then the percentage is actually 100% of the relevant sample:



The next question sought to extrapolate whether they agreed that the Training of Craft Operatives should be to the Industrial Standard of NVQ 3, which is favoured both by SummitSkills and the main trade associations, the answers were identical to those given in the last question by the companies as can be seen from the diagram below:



The next question sought to elicit the views of the sector on the requirement that the sector within Northern Ireland might have for technician training. As can be seen from the diagram, there was considerable support for the concept that technician training was needed within the province:



The quotes below are indicative of the views of the companies encapsulated in the diagram above:

*We have ... at the present time we have ... there's a couple of the guys have gone through on it but we don't have a mass of numbers. It's not as if we have people going through all the time in the way we had with site operatives. So we don't have a massive demand for the higher level stuff at the present time but we will at some time in the future as retrials take effect. (NILP01)*

*We'll generally in the past small to medium enterprises like ourselves have never had a need for employees going on to National Certificate, HND or HNC. But more recently the increase in demand for technology in the industry clearly indicates there is a need and a demand for people to be trained to these higher standards. And we would welcome funding to assist training in our senior staff in obtaining higher qualifications both in design, computer skills, technology and in general electrical estimating and higher skills. (NIMET01)*

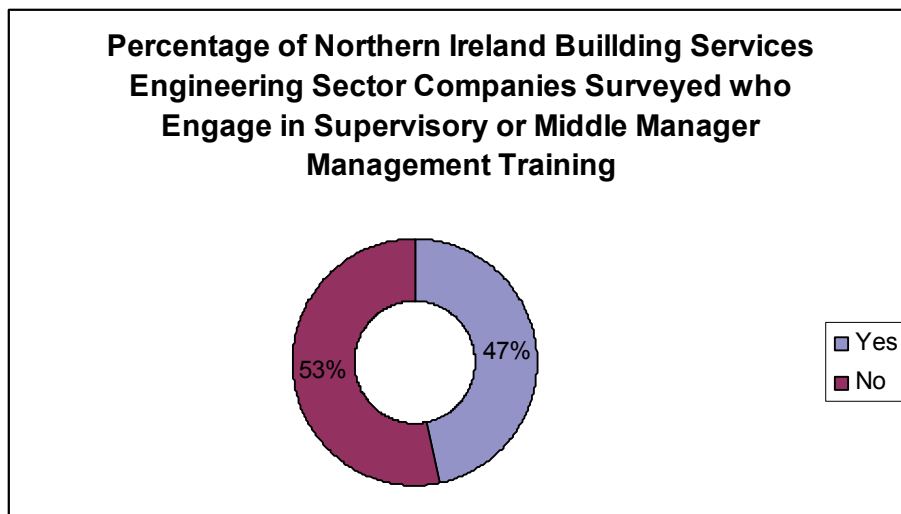
*While we always encourage the guys to go as far as they can, we feel that within the organisation we'd only require that for those who are in a supervisory capacity, either office based or site supervisors. (NILET02)*

*The answer to that is yes. And they're varied. There's so many of them. But they're all along standard guidelines. Certification is suitable for the particular person's elements. (NISBSEC02)*

*Generally as I say we have graduate engineers coming in so the requirements for entrants in the CIBSIE for example you now need a B Eng and we're looking for possibly in the future a Masters, so every level coming in we're looking for ideally people with potential to be a Chartered Engineer. (NIMBSEC01)*

*Well, at the minute we're fairly well covered. But unfortunately we lost a job last year because we didn't have as many chartered engineers as the people who got the job. I think personally it's a very, very sad thing. But I can appreciate a client's point of view when he looks and looks down qualifications. I find that is the wrong way... you should really make a decision on ability. Qualifications are only indicative that you've passed an exam. But unfortunately clients have to go down this road and that's the way it is. (NILBSEC01)*

Finally the Northern Ireland building services engineering companies were asked whether they provided their supervisors or middle manager with training. Evidence from the literature suggests that weaknesses in management and leadership can significantly affect productivity and that it is at first line supervisor level and middle management levels that most problems occur. As in the rest of the UK the Northern Ireland picture is mixed, with a significant number of companies appearing not to be involved in management training as indicated in the diagram below:



The quotes below are indicative of the views of the companies interviewed and contained in the diagram above:

*You see, as you come up that ladder, then the number diminishes, and they will show themselves, so if... and the person who has the ambition and wants to do that, then that's the person that you take out and then you get behind that person. (NIMP01)*

*Mechanically and I think electrically too, the supervisors have been brought through the ranks of the company... They would, as far as the health and safety on that would go, they do the management health and safety course... But they haven't done any sort of management courses on their own. It's based on experience. (NIMP02)*

*We haven't used any set qualifications on it because we've done it through project management courses ... Ah-ha through the likes of Parity and that type of thing where we go through ... the guys go through and they take them through. I'd never put them through because it always seems such a long thing for the guys who just don't*

*know what they are doing. You know, going through it on it for two or three years to get a qualification at the end of it... (NILP01)*

*At this moment in time we don't. Because the comp... because of the size of the company. There are only two managers who are... who have been effectively trained through this organisation. (NISET01)*

*Yeah... no. Well, if it's regarding university, no. But if there was ever management courses out there that we would feel would be a benefit to our contracts managers certainly we would take that on board, yes. (NIMET02)*

*We have used the essential management skills process through...University, Belfast. We have also used ... Associates with relation to our CDP to do project management skills, and a number of local consultants to carry out project management and site safety awareness courses. (NILET01)*

*Yeah. Well we would ... we have 2 site supervisors who have both been trained by CITB in site management, site supervisors management courses, now these are short-term courses, not the ones run in conjunction with, that follow-on to the chartered CIOB – I myself, want to take the course to the CIOB management. The problem with it is, is that it is obviously very, very relevant and it brings home, I think, one of the good things about this, is that it does bring home the relevancy, across the board, for actual overall management, within a project, where it brings all the different trades together and I think that's one of the good things about it, although, the only criticism I would have about it is, that it's basically led by the building industry and there's not, probably, could be parts ... parts of it could be more specific to the H and V, or heating and ventilation industry, or indeed, to the electrical industry, or whatever, but that's the only criticism I would have of it, if there was an element specifically for our engineers, that they went and done that on their own. That goes back to my very earlier point about when you're training young people, there's so much for them leaving school, when they go to a site that is relevant to every single fella that works in the construction industry, that that course could be run for a year, or 2 years, prior to them 16 year olds leaving school, you know. (NISHV01)*

*No formal qualifications other than... Like short courses? No between ourselves we have sort of 100 years experience in the plumbing industry so... (NILHV01)*

*All in-house. (NISaCR01)*

*No, I think, even if that were the case... you know, if I had supervisory I think that would be well down the priority list. (NISaCR02)*

*That's all in-house. In the future yes but I haven't found yet a course that offers... we find a lot of these training organisations that set their selves up, there good to get people employment but there's a level beyond that they don't understand their selves and they don't have the expertise to offer the courses. You would have to send people across the water or you'd have to probably bring someone in more professional to do it. We found that we were a bit disappointed in some of the courses we sent people on. (NILAcR01)*

*No. well nobody has gone on a manager training course. We have all grown up together sort of thing. I was service engineer and became a supervisor and then a service manager. We don't have any formal management courses... I'm not sure they whether they would be beneficial or not... (NILACR02)*

### **11.3.3 Conclusions**

The Northern Ireland building services sector has a more defined view of current skill requirements than many of the English regions for example. There however remain a large percentage of companies that feel that no further skill needs are required, which it is argued that given the data in this SNA is realistically unlikely. SummitSkills believes that the development of tools such as training matrices allowing companies to evaluate current skills and assess current and potential future skill needs would benefit the sector in Northern Ireland greatly. SummitSkills proposes to work with partners and stakeholders to facilitate the development of bespoke training packages on developing training matrices to help this development. SummitSkills is pleased to note the total support of the sector within Northern Ireland for the concept of NVQ3 being the industrial standard for a craft operative. SummitSkills believes that this will protect the status of artisans within the province and will work with the Trade Associations to make sure that this standard is maintained.

SummitSkills is keen to maintain technician provision within the province, and will work with the providers, partners and stakeholders to make sure that the sector has sufficient and appropriate technician training available. Finally SummitSkills believes that management and supervisory skill are vital to improve the productivity of the sector both within the province of Northern Ireland and generally across the United Kingdom. SummitSkills proposes to work with partners and stakeholders to develop appropriate level and flexible delivery first line supervisory and middle management courses for the sector not only within Northern Ireland, but across the UK generally.

## **11.4 Future Skills Needs**

### **11.4.1 Introduction**

This section of the SNA should be read in conjunction with the current skill needs section of this SNA, as the majority if not the totality of current skill needs are identified within the policy context at least as being identical. Within this literature

section of the SNA therefore, it is proposed to focus more specifically on the general information related to the building services engineering sector.

In identifying the needs of the sector, it is important first to understand the context under which the sector is operating at the present time, as it is argued that this impacts directly on the skills needs of the sector at any one time. The Warwick Institute for Employment Research, PERA and IFF Research have collaborated to produce a Building Services Summary Analysis and Evaluation (BSSAE,2006) which has identified issues and challenges facing the building services sector, through the prism of a PESTEL analysis.

#### **11.4.2 Political**

The Government and industry invested in a HEVACR 2005 initiative, which has sought to develop a strategy document to identify the sector's future training and skills requirements. In addition, the Electrotechnical Assessment Scheme (EAS) has been developed that provides agreed criteria, under which an electrical contractor can be adjudged to be technically competent or otherwise in relation to work standards against Building Regulations.

The scheme is currently limited to three categories of work; electrical installations in buildings and industrial locations; fire alarm systems; and emergency lighting, however the proposed scope of the EAS scheme is to go far beyond the scope of Building Regulations in relation to electrical safety, and this is projected to impact significantly on the training requirements within the industry in due course.

Secondly as stated in the migrant workers section of this SNA, the Government has made it easier theoretically for migrant workers to work within the UK within the sector, although there remain some major issues for the immigrant worker (as detailed in the migrant worker section of this SNA) in getting their relevant national qualifications recognised within the UK.

Thirdly, the environmental policies laid down by the Chancellor of the Exchequer in the budget in 2006, included a Enhanced Capital Allowances Scheme, which will allow for the overall expansion of the energy technology list, and will in turn include air to air energy recovery, compact heat exchangers and HVAC zone controls, from this list, a set of sub-technologies are emerging, which include condensing water heaters, air cooled condensing units and gas engine driven heat pumps (see also Environmental Technologies section of this SNA) (BSSAE, 2006, p7).

#### **11.4.3 Economic**

The performance of the UK economy generally has led to increasing levels of disposable income, which have led to increased consumer confidence and spending fuelled by cheap credit, has led to a buoyant market for the building services engineering sector, both in the domestic and commercial sectors. There is however a concern highlighted by SSDA, that in relation to the electro-technical industry within the sector, a relentless drive to achieve low costs has led to the industry struggling to meet new demands for improved quality standards, service and time-keeping is leading to serious implications for the industry.

It appears likely that this scenario as identified by SSDA may be being replicated across the sector, and will continue to exacerbate the productivity deficit that the construction industry finds itself in (see International Comparative Benchmarking section of this SNA) and also the vulnerability to global competition (see globalisation and migrant workers sections of this SNA). What appears certain is that the sector will not be able to rely on poorly skilled workers in times of labour shortage, and therefore skill levels will have to rise to meet improving standards of quality.

The SSDA report also highlights a rather interesting phenomenon that is occurring within the electro-technical industry, and may also be relevant to other areas of the sector. It was discovered that stakeholders within the industry were competing with each other for recruits, whilst at the same time, simultaneously contracting with each other for provision. The BSSAE (2006) concludes that this can lead to a conflict of interest of both commercial and resourcing interests, and better strategic positioning of companies may be required to overcome this (BSSAE, 2006, p8).

#### **11.4.4 Socio-Demographic**

The UK is characterised by an ageing workforce and population, which requires investment to take place in hospitals and 'other' facilities for elderly people. This of itself presents an opportunity for economic prosperity for the building services engineering sector through increased demand for installation, repair and maintenance services. Another sociological factor that is driving this is the growth in home-working, particularly among professionals, which it is anticipated may lead to demands for an overall improvement in domestic heating products and building services. An aging population and a declining birth rate however do have a negative impact on the sector in relation to the recruitment of apprentices, young professionals and 'others' to the workplace.

The traditionally white male dominated environment and the 'lads' culture within the sector (see the diversity section of this SNA) means that the industry will continue to suffer acute shortages in relation to the UK if the sector cannot begin to attract and recruit suitable women and ethnic minority candidates to the industry. Currently the BSSAE (2006) maintains that the industry age range is heavily skewed towards the 40-plus age range, with a significant number of building services engineering employers being aged over fifty.

Another factor identified as aiding recruitment to the sector, is the desire to create a more flexible approach to qualifications of an appropriate size to facilitate entry into the sector. Employers within the building services engineering sector argued in BSSAE (2006) that this should be developed in schools so that the industry will be able to improve the quality of candidates applying to enter the sector. It is suggested that the 14-19 diploma currently under development by the SSCs including SummitSkills in both engineering and the built environment may go some way to addressing this (BSSAE, 2006, p9).

It is a tradition within the construction and building services engineering sectors, that progression into supervisory management and other office-based careers takes place from those starting at craft level. BSSAE (2006) suggests that employees who have progressed to level 3 within various craft occupations are finding it difficult to obtain the requisite technical or managerial knowledge, which is required in order to progress from a craft to a technical or managerial occupation. The lack of

qualifications or of their availability is a major issue that needs addressing (BSSAE, 2006, p9-10).

### **11.4.5 Technological**

The use of technology in the sub-industry of service and maintenance within the industry of heating and ventilation has increased, and is likely to increase further. The creation of 'smart' houses is leading engineers within the sector to require skills in many different areas. For example such as fire protection pipe work, traditionally the domain of the plumber, is now are controlled by complex electrical circuits, which require extensive training.

The internet, e-commerce and e-retail are also impacting on the sector, as are demands of clients that 'mission critical' services are available constantly. To facilitate this demand for constant running, the provision of back-up power supplies and duplicate and diverse cooling systems are making data centres and communications rooms some of the most intensively serviced spaces around. The massive heat generated by computer servers is becoming a crucial factor in data centre design and is creating a number of challenges for building services engineers. The creation of 'high performance chips' for use in computers is resulting in high heat density in confined spaces, and this is rapidly necessitating a breakthrough in cooling technology to counteract this phenomenon, which will raise new skills set requirements for the sector.

In the environmental technologies section of this SNA it has already been pointed out, that the move away from fossil fuels towards 'green' energy generation and the development of microgeneration will lead to the development of new skills sets among both existing and new entrants to the sector.

Finally, the increased use of technology in the building services engineering sector will lead to an increased need for cross-skilling at management level. There will also be the need to develop specialist skills at functional level, however for craft, technical and professional employees, technical sophistication is increasing, leading to an increase in the required skill sets for the sector (BSSAE, 2006, p10-11).

### **11.4.6 Legislative & Environmental**

Related to the environmental issues identified above and the desire to reduce greenhouse gas emissions will lead to increased legislation emanating from Europe encouraging the development of energy efficient buildings. The merger of the demarcation between engineers and architects is also likely to increase, and this for professionals working within the sector, will create a need for new skill sets in order to facilitate the maintenance of these more sophisticated systems.

An example of the legislation coming from Europe is the Energy Performance of Buildings Directive 2002/91/EC, which enacted into UK law will necessitate that building work on both new and existing buildings meets a set of minimum standards, with the standards being reviewed every five years. This will lead to the creation of energy certificates which outline the level of energy consumption for all buildings and inspections on boilers and air conditioning systems in commercial premises so as to ensure that they are not wasting unnecessary energy. It is anticipated that this in turn

will have an impact on the skills needs of the overall building services engineering sector.

A further example of legislation impacting on the building services engineering sector is the EU Landfill directive banning the tipping of hazardous waste and biodegradable refuse at landfill sites. The training impact of this decision is that employees will need to be educated in the management, treatment and disposal of waste to make sure that this waste is treated correctly (BSSAE, 2006, p12).

Building Regulation Part P introduced in certain parts of the UK (it is envisaged that those parts of the UK not covered by the Building Regulations will have similar provisions) has sought to heighten electrical safety in the home, by conceiving the concept of the 'competent person's scheme' thus quintessentially requiring that all work will be carried out by an electrician. In addition, any person carrying out work on fixed electrical installations in the home- such as sockets switches fuse boxes and ceiling fittings must follow the fundamental principles of BS 7671, which is the British Standard for electrical installations (BSSAE, 2006, p13).

The EU is also proposing to reduce the harmful HFCs found in refrigerants in the air conditioning equipment of buildings through legislation, which could have a considerable impact on the operation of air conditioning services within buildings. The F-Gas Regulation will be the first step towards a total ban on HFC refrigerants, and a general move away from using global warming gases in refrigeration and air conditioning (BSSAE, 2006, p13).

Additionally the European Emissions Trading System intends to reduce carbon emissions in industries across the EU, although allowances will be made for energy efficiency credits to be traded among those who can and those who cannot reduce emissions. It is anticipated that these regulations too, will increase the costs of generating heat and power, which will affect consumers and heat and power services, and will in turn, make decentralised power generation schemes a more viable option (BSSAE, 2006, p13).

EU harmonisation has also affected the standard colours of fixed wiring, which had been set within the UK under BW7671. For single AC wiring the live conductor standard colour changed from red to brown, neutral from black to blue, which brings fixed wiring inline with existing standards for flexible cords and appliance connections. From April 2006 all extensions to existing wiring must follow the new standard, and coloured tape consistent with the new standard may be applied to existing wiring in order to reduce the possibility of confusion during work undertaken on existing installations (BSSAE, 2006, p13).

#### **11.4.7 Skill Needs Assessment Based on PESTEL Analysis**

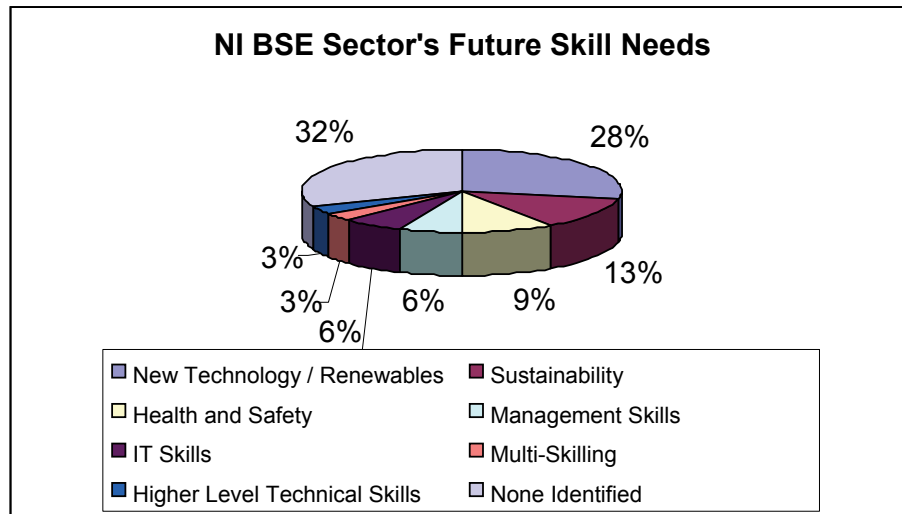
BSSAE (2006) identify that the following skills may be required in the future for the building services engineering sector:

- First, it is anticipated that there will be a requirement for marketing/sales and communication skills to project a more professional image to clients and prospective employees.
- Secondly, the sector's employees will need to develop sustainable technology skills including advanced heating engineering skills and heating and power technology skills.

- Thirdly, there will be a need for employees to have a clear understanding of legislation affecting the industry, and how to implement it.
- Fourthly, it is envisaged, that employees will need to develop advanced technical capabilities.
- Fifthly, supervisory and other management staff will need to develop advanced management skills, which will need to encompass strategic planning resources and change management skills.
- There will also be a requirement in the building services engineering sector of the future for more effective knowledge management, project management and planning skills, which will include resource planning.
- Sixthly more skills will be required in CAD, procurement, communications and marketing, planning and estimation, scheduling and cost control skills, which will need to be exhibited by management and professional level staff.
- Seventhly, to develop effective skill sets to meet the challenges facing the sector in the 21<sup>st</sup> century, the sector must begin to make collaborations and partnerships with colleges and universities to improve course content, course uptake and technology innovation. Related to this function, employers within the building services engineering sector will need to engage in training planning, with a view to meeting the increasing legislative requirements discussed above and also for competitiveness and productivity reasons, to maintain and update knowledge on new technologies and procedures.
- Eighthly, there will be a need for employees within the industry to develop facilities management specific skills to encompass essential design, installation and maintenance services for industrial, commercial and domestic clients (BSSAE, 2006, p14).
- Ninthly, there is a need for employers to develop effective HR and recruitment skills, so that they can recruit and retain stronger candidates within the industry, and as is discussed within this SNA, the need to recruit migrant workers, is leading to a skills need for language skills and training in the English language, or the provision on major sites of translators.
- Finally as clients become more quality focused and discerning, then the industry to retain and attract customers (particularly in markets that are under attack from 'foreign' competition, or those markets where the UK building services engineering sector may wish to expand) then the sector needs to develop improved customer service skills (BSSAE,2006, p14).

#### **11.4.8 Northern Ireland Building Services Engineering Sector Perception of Future Skills Needs**

Within this element of the section, the interviewees were asked about their future skills needs. As in current skills requirements, the Northern Ireland building services engineering sector were much more articulate than their colleagues in many of the English regions, and identify a number of skills:



The following quotes are indicative of the views of the companies encapsulated in the diagram above:

*Well, talking about my own practice, that's the only thing I can speak of, they keep abreast of... and of what's happening and by virtue of having a manufacturers, they're different products and bringing those forward at the AGM's and making their presentations then they keep the whole industry aware. (NIMP01)*

*At this moment in time I see our safety audit side of the company expanding because of the awareness now that's within the general public and domain to have a requirement for electrical audits to be done. So we, in the near future, will be looking for more electrical inspectors or auditors. And it's finding people of the calibre who have had the practical experience but now who need to come on and want to go on and do the additional training required to do the auditing. (NISSET01)*

*It's not affecting us currently but upskilling as necessary, we'll just have to, again, we'll have to deal with. (NISSET02)*

*I said earlier we have a training matrix now complete and we are looking at that and one thing that we are trying to improve is computer literacy skills and Autocad skills, particularly amongst site supervision. (NILET02)*

*It's probably... well, if we look at the ONC and the HNC or the level 4, level 5 thing. We will probably go out to the colleges to achieve those. In terms of the computer aided design areas which we need to do so much, we will probably go out to private industry to source that. (NIMHV02)*

*Well, I'd say the business is about to develop. We're going to be moving into premises, we'll be taking on staff within the next year, and that'll be engineering staff initially and ideally I would like to be getting someone who is a fully qualified engineer at this stage, but I would still*

*like to be sending them on a ... at least one course per year but that would probably be more product related. You know, for example, going to Mitsubishi on the VRF course or whatever. (NISACR02)*

*No. Thermal recovery is coming in the marketplace now, but that would be more for the bigger sort of high rise blocks and stuff like that there for offices where, you know, at our level we wouldn't... unless it goes down... which I think there are people doing research and they try and recover it for the heating, you know, you just stick this thing in your garden and you can recover it and heat the house domestic wise. I don't know. But there's a bit of talk going on about that, but that's about all. (NIMACR02)*

*In the short term... none on the short term because we have had a few people moving on and we have replaced them. So at the moment compared to where we were a year ago, 18 months ago, we're probably in the same... we're in the same position. Having said that, we are currently about to take on a couple of trainees because of a particular section of work that we have that has expanded, so we need to cover that bit. (NIMBSEC02)*

*Again, probably back to the, the sustainable technology. The building services engineer needs to have an understanding of building physics and a more complicated understanding of air flow and energy recovery, which is something maybe slightly new, again I think that's an area we need to address. (NILBSEC01).*

*We're really up to speed on the green technologies. We've produced fairly major reports in the past three months on these for clients, right across the whole board. The only thing that we're lacking, as I've already said, would be thermal modelling, that's something we don't have. We are looking at it, just to see if we can afford to bring it in. There's not really anything particularly that I can think of lacking in terms of skills, you know, to satisfy the clients requirements. (NILBSEC02)*

## **11.4.9 Conclusions**

The building services engineering sector within Northern Ireland shows more understanding than its English counterpart in relation to the development of future skills, and there is clearly a perception of the increase need to prepare for environmental courses for example. There is however still as in England a number of companies not identifying any future skill needs or identifying as future skill needs current skill sets such as health and safety. SummitSkills believes again that this might show evidence of a lack of planning and the need to develop frameworks for carrying out this planning might be advisable, through training matrices. SummitSkills again proposes to work with partners and stakeholders to develop the planning apparatus that SummitSkills believes that the sector requires not only in the province, but across the UK generally.

## **11.5 Retirement and Natural Wastage**

### **11.5.1 Introduction**

The 'Turner Report' (or indeed reports, as there are two of them) were laid before parliament in 2005, and discuss the retirement and pensions challenges that face the United Kingdom over the next few years. It would not be possible within the confines of this SNA to explore all the issues surrounding the diverse proposals for pension schemes, or indeed relevant to the thrust of the SNA. However, the reports identify some demographic trends that the building services engineering sector employers need to take cognisance of, and make plans to address, if they are not to discover that traditional recruitment streams into the sector all but dry up. Also questions may need to be asked by policy makers within Government, as to whether the 'Turner' proposals will actually have any sustainable effect on the building services engineering sector given tradition behaviours within the sector.

Because of a number of factors related to improved health and housing etc created in the twentieth century life expectancy is increasing rapidly, and is expected to do so. However there has been a steadily declining fertility rate since the nineteenth century, combined with sociological factors (divorce/single families) and housing costs, are reducing the birth rate within the country and this low birth rate is predicted to lead to a near doubling of the population aged sixty-five years and over between 2005 and 2050, with a continuing increase thereafter (PCC, 2005, p ix). The warning of the Turner report is stark, faced with the increasing proportion of the population aged over sixty-five then society and individuals must choose between four options. These are first, that pensioners will become poorer relative to the rest of society, or secondly, that taxes/National Insurance contributions devoted to pensions must rise, or thirdly that savings must rise of fourthly and finally that the average retirement ages must rise (PCC, 2005, p10).

When looking at the concept of an aging population, then there are a number of factors that are being considered. First there is a projected slowdown in longevity of age built into the calculations, which it is assumed is based on the diminishing returns on improved housing and medical treatments for example. Were this slowdown not to occur, and mortality rates continued to decline in line with recent trends, then the old age dependency ration will rise to 54% in 2050, an additional 6% over original projections. Some poor lifestyle trends including an increasing obesity and lack of exercise among young adults and children may in the long term reduce the increase in life expectancy, but this in fact may impact adversely on the working population as problems may impact earlier in life thus reducing the pool of younger working-age people rather than the dependant pensioners. Neither will the increase of the birth rate in the short term have any impact on the number of twenty to sixty-four year olds until 2025.

If there were to be an increased 'fertility' rate within the UK then the 2040 old-age dependency ratio would only reduce from 47.3% to 45.9%, although the impact would increase thereafter causing further reductions. Further until 2030, a rise in the birth rate would lead to an increase in the dependency ratio at the bottom rather than at the top, as the children would also need to be looked after. The only measure that can address this issue according to Turner, is a continuous high number of immigrant labour entering the UK can reduce the dependency ratio in the next fifty years, so a net inward migration of +300,000 per year, could bring the old-age dependency ratio down from 47.3% to 42.1%, but this in itself can only be a short term solution, as

more immigrants would need to be recruited to fund the original entrants, as those original immigrants will grow old and move into a dependency status (PCC, 2005, p8).

If we do not raise tax rates, savings rates or average retirement ages, then at current trends, pensioners will on average suffer a 30% decline in their incomes relative to average incomes between now and 2035. Therefore if society wishes to keep pensioners on average to be as well off as they are currently, without keeping retirement ages totally unchanged, then not allowing for the equalisation of male and female state pension ages already planned, the percentage of GDP transferred to normal retirement age pensioners would have to rise from 9.9% today to 17.5% in 2050. There will be some offset as savings are made between 2010 and 2020 for women now working to sixty-five as this increase will give the UK another ten years in which the ratio of people above the Statutory Pensionable Age does not rise, but even with this factor included, the GDP transferred is still estimated to rise to 15.1% (PCC, 2005, p8). Were this level of GDP transferred to be achieved, this would require that state spending on pensioners rising from 6.1% to 11.3% of GDP, with taxes/NI contributions rising by fifty-seven billion pounds in current terms, or private funded pensions received by pensioners above the SPA rising from 2.2% to 7.4% of GDP. The consequence of this is that even were the proportion of funded pensions flowing to early retirees (currently 40%) fell drastically, and then this would require a doubling of the stock capital held in pension funds. Turner concludes that if pensioners are to remain well off, then the average age of retirement would have to rise from the current male average of 63.8 to 69.8 and the current female average of 61.1 rising at the same rate. Were this to happen, then the relative pensioners' living standards would be maintained without increasing the percentage of GDP transferred to pensioners (PCC, 2005, p14).

The report goes on however to point out, that while it is important for the Government to remove barriers to working, retirement ages are almost certain to rise, it seems unlikely that the increase that most people will chose will be sufficient on its own to offset the dependency ratio, with male retirement rising to 69.8 for men and 67.4 for women. This would imply a achieving the higher participation scenario for increased employment for 50-64 year olds with an employment rate in the 60-64 age group of 65% for men and 54% for women (PCC, 2005, p44). It therefore is proposed by the report, that a range of measures are used to facilitate the development of retirement policy that encompasses a range of factors.

What effect though would the concept of increasing the retirement age for men and women in this country have on the building services engineering sector? The answer that may be suggested is that making the predominantly male workforce work a further four years will help to address skills gaps as well as reducing pension payments. However the data from the LFS survey suggests that there are reducing numbers of employees within the sector at older age levels:

	SummitSkills Remit		Whole UK economy
	Number of employees	% by employers	% of employees
16-19	29,000	5%	14%
20-24	56,000	11%	14%
25-29	44,000	8%	22%
30-34	68,000	13%	22%
35-39	78,000	15%	26%
40-44	61,000	12%	26%
45-49	60,000	12%	22%
50-54	55,000	11%	22%
55-59	44,000	8%	14%
60-64	28,000	5%	14%
65+	0	0%	2%
Total	523,000	100%	27,752,300

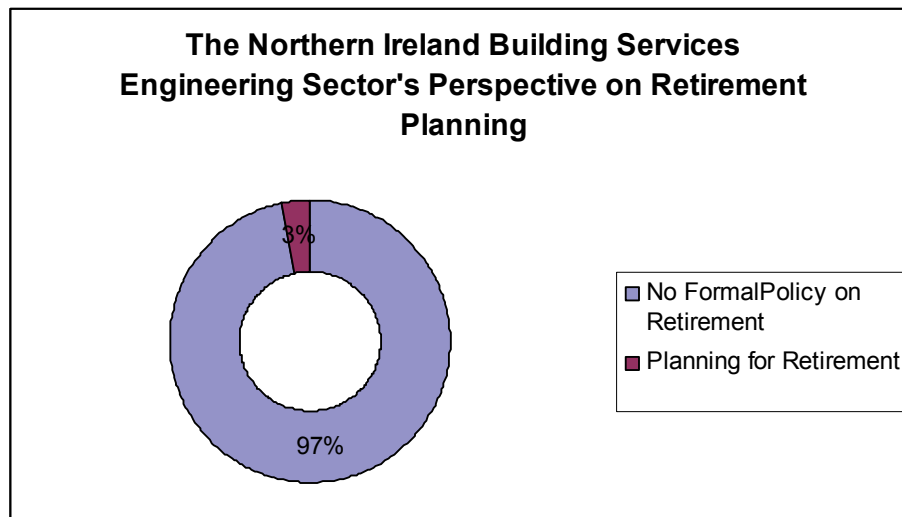
Source: LFS in BSRIA (2005, p31) unpublished.

It can be seen from this table, that there is a significant reduction in employees over the age of fifty years of age, and currently the data would suggest that only a negligible number of employees are working beyond the age of sixty-five let alone the projected sixty-nine years proposed by Turner. Anecdotal evidence suggests that this is due in part to the heavy nature of the work, and the physical demands made on the body by the work, which mean that older men tend to move either into office based, managerial or teaching posts associated with the sector, or indeed move out of the sector all together.

The question that arises however, is whether the impact of the Pension Commission’s proposals chaired by Lord Turner will have any impact on the productivity of the sector, or on reducing skills gaps, or indeed on the retirement pension issues related to particularly craft operatives within the building engineering services sector, given that a significant number of operatives will have left the sector by this time.

**11.5.2 Perspective of the Northern Ireland Building Services Engineering Sector on Retirement and Natural Wastage**

SummitSkills believes that as part of a productivity strategy, companies within the building services engineering sector within the UK generally and Northern Ireland specifically should have a retirement policy. SummitSkills believes that this helps to prevent productivity drops when experienced staff retire from the sector. The Northern Ireland building services engineering sector in line with the sector in other parts of the UK does not perform very well in relation to retirement planning, as is shown in the diagram below:



The quotes below are indicative of the views expressed in the diagram above:

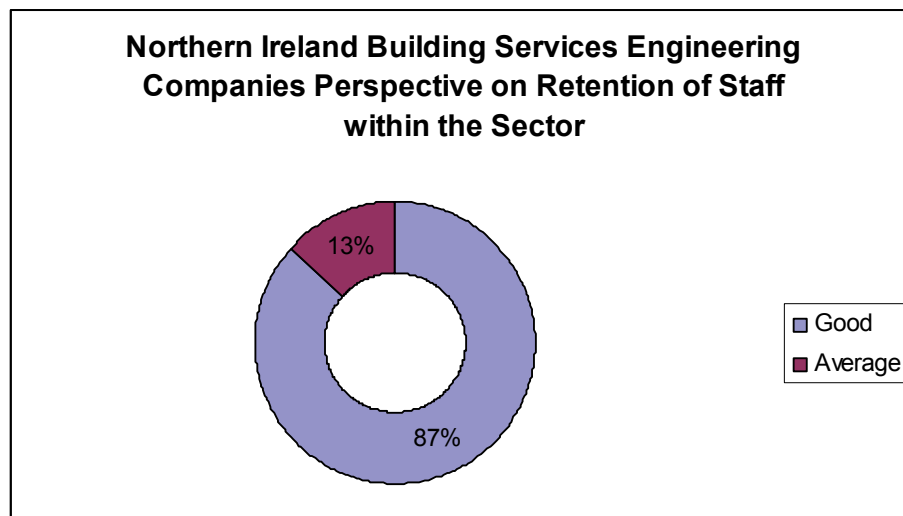
*I think to be fair and straight and right up honest with you, my intention's to retire in five years. I have a son who is a fully qualified trained gas fitter, not because he's my son, but an exceptionally very good plumber, he has had his fill of it, and is intending to move on to another occupation because he has had so much hassle and grief,*

*and he would have been the future of my company and he's decided to leave and move somewhere else. And purely based on the questions I've been asked earlier on, I think you've referred ...that we're not very happy... (NISP01)*

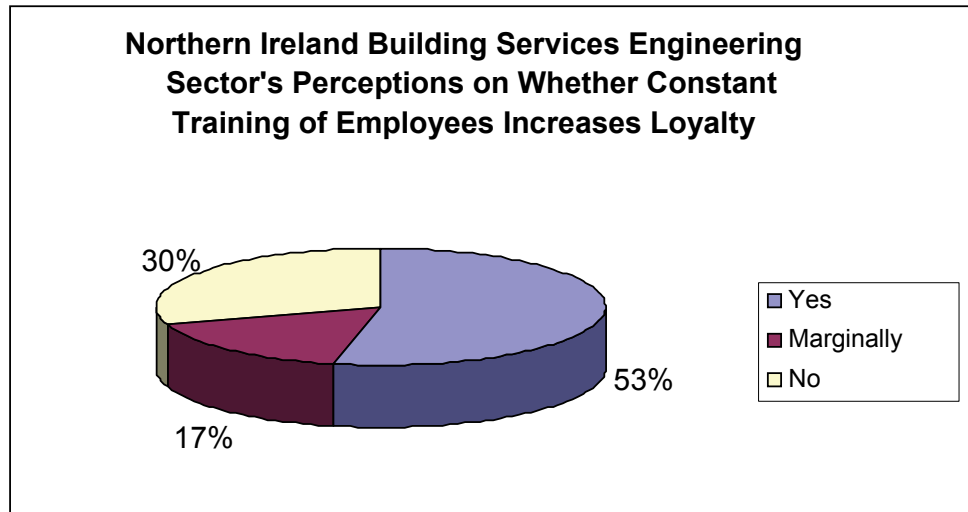
*That would be none. (NISET02)*

*There are yes, we've just recently... one of our quantity surveyors retired and also we were aware that was coming up so you're trying to look ahead and get another younger QS on board to run parallel with him for a certain time, to fill that gap. (NIMBSEC01).*

In relation to natural wastage the sector was asked about the retention of their staff. Within Northern Ireland the views of the sector was that the turn over of staff was very low and retention rates were good, as is evidenced in the graph below:



The next question within this element sought to analyse whether the companies interviewed within the Northern Ireland building services engineering sector felt that constant training of employees produced employee loyalty. As the diagram below indicates, generally the sector was in favour of this proposition.



The quotes below are indicative of the views of the companies encapsulated in the diagram above:

*[Laughs] No, I don't. I actually think the more you train them the more likely they are to jump ship. (NISP02)*

*I don't know if it would improve the loyalty or not ... I suppose to a certain extent it does really because I suppose the guys see you're prepared to invest time and effort into them and, yes, I suppose you could say from that point of view, yes. (NILP01)*

*No. We have trained in the past and found that, experience has shown me now, that they will still move on if they so desire. (NISET02)*

*Yes. Any guys we do train we've sort of fed them, if they're lads who are going to be with us if we have any doubt whatsoever and think they're not going to be with us they're not getting training. (NISHV02)*

*I don't ... It might help, but quite honestly I don't think loyalty's something that you can buy. I think either the organisation's loyal or it's not. The employee is either loyal or not. Providing more training I don't think would improve the organisational loyalty at all. I think communication is a much more important subject than training. Communicating of how the business is doing, relating to people, sharing your problems or sharing your trials with people at all levels, I think's more important than training of whatever nature it might be. (NILHV01)*

*Most of them rely on wages for organisational loyalty, you know?... A lot of them feel they're trained well enough. Obviously the proof of the pudding's in the eating, you know? (NIMACR01)*

*Yes I do. I think if they see... and also the internal promotions have been a great boost to us for people's loyalty because they see that other people have got on and have been promoted and have got better positions, better salaries and company vehicles. The perks that go with the jobs and they're keen... (NILACR01)*

*I think it does yes because the people see themselves being developed and gives themselves a loyalty to the company for helping to bring them on. (NIMBSEC01)*

### **11.5.3 Conclusions**

SummitSkills believes that retirement planning is very important in the development of a productivity strategy and to maintain momentum when an experienced employee retires. SummitSkills proposes to work with partners and stakeholders to promote or develop retirement planning courses for the sector both within Northern Ireland and also UK wide. SummitSkills also believes that constant training of staff does produce loyalty, and there is an indication that a large percentage of the building services engineering sector agree with this proposition, and therefore SummitSkills proposes to work with partners and stakeholders to promote and market this message within the sector in the province specifically and the sector generally within the UK.

## **11.6 Diversity**

### **11.6.1 Introduction**

The economic imperative for the development of equal opportunities is linked by the EOC (2006) to the 'identifiable' skills gaps issues in some traditional male dominated sectors of the economy. EOC (2006) therefore identifies that this could be an area where the recruitment of non-traditional gender and ethnic staff may impact on the productivity and profitability of the sector (EOC, 2006, p1). The literature section of this Sector Needs Analysis is broken down into three specific areas to reflect the Sex Discrimination Act, the Race Relation Act and proposed legislation that the Government is proposing in relation to 'ageism' (although this is dealt with in more detail within the retirement and natural wastage section of the SNA). The building services engineering sector is traditionally a 'white male' dominated industry, and this is explored within the literature in relation to existing published research.

### **11.6.2 Issues from Gender Literature**

The LLSC for London West has commissioned a report which concludes that there are a number of key factors within the industry that have become a barrier to entry for women into the industry. These are replicated in many areas of published research contained within this SNA and include: the image of the industry, and its perception

as being a male preserve not suitable for females. Aligned to this is the culture of the industry, which reinforces the male dominance culture (see later). This creates within women the view that there is a need for additional confidence on their part to succeed within this industry. Women appear from this research to also be unsure of the career prospects in the industry for them, as well as the recruitment process (see later) and the terms and conditions of employment, and the impact that this has on work/life balance, coupled with the lack of support that women perceive the construction industry gives, when moving into employment (One London, 2004, p5).

Dale, Jackson and Hill (2005) have identified a number of issues in relation to the employment of women within the construction industry (which includes the building services engineering sector generally) with special reference to the plumbing industry (which is specifically within the SummitSkills footprint). They have concluded that where women are engaged in construction and other non-traditional skill areas, they have a passion for their work, and have discovered that their quality of life has improved as a result, often as a result of receiving better pay. Women have found that the construction industry's self employment model gives them flexibility in relation to childcare and other domestic responsibilities.

Dale, Jackson and Hill (2005) have also identified benefits for employers and customers in increased numbers of female operatives, as it has been discovered that women have an eye for detail (see later) and are appreciated by vulnerable groups, who prefer not to be left in their home alone with a man, and prefer a woman (Dale, Jackson and Hill, 2005, piii). That said there are issues and challenges facing woman entrants seeking employment within the construction industry.

Dale, Jackson and Hill (2005) have concluded that women require a higher level of resilience and determination to succeed within the construction industry that that required of men. This is in part due to having to be determined to follow their particular career path, as many women participants within the research identified that they were actively dissuaded from construction careers by teachers and career advisors in schools.

*"School careers-it would have been good if they had just not discouraged us"* Qualified Woman Plumber in Dale, Jackson and Hill (2005, p19).

It is clear however, that although as the literature review shows, the building services engineering sector suffers from a range of challenges, which make it less favorable as a career choice for women, the problems of sex stereotyping go back to schools in general, and are reflected in the subjects that are studied post 16. The low numbers of women studying mathematics and physical sciences at 'A' level for example automatically act as a filter to the number of women who potentially will follow careers in the building services engineering sector professions, and who subsequently will achieve Chartered Status in the Chartered Institute of Building Services Engineers for example (Roberts, 2002, p47). It is perhaps important to understand the role that stereotyping plays in defining career choice for males and females at a very early age for both males and females.

Ashmore and DelBoca (1979) have defined a stereotype as being a structured set of inferential relations that link a social category with personal attributes. From this broad definition, Eagly (1983) has argued that stereotyping has separated men and women into various different occupations and roles. This role stereotyping appears to focus at least impart on the behavioural characteristics of males and females, and through this a job may be identified as being either male or female. An example of

this might be the role of the secretary, which can be seen as a supporting and caring role for a manager (a leader and therefore male) and this role may stereotypically be seen as deriving from the mother role of women, and therefore a woman's occupation (Ross, Amabile and Steinmetz, 1977; Silverstone and Towler, 1986).

Miller, Neathey, Pollard and Hill (2004) argue that in choosing careers, subliminally males and females identify with whether a job is masculine or feminine, which is based in part on the distribution of the sexes within the industry at the time that they seek to join it. If they see that a job is predominantly performed by women such as a care worker then they identify with that job feminine attributes (Miller, Neathey, Pollard and Hill, 2004, p27).

This trait of identifying job roles with sexuality traits has been found to be well developed in children as young as eight, and not to have been transformed to any great extent by the age of sixteen, with girls choosing traditional female careers and boys traditionally male careers as being their preferred career choices (Miller, Neathey, Pollard and Hill, 2004, p38). It therefore appears that from the work of Dale, Jackson and Hill (2005) that women seeking to enter the building services engineering sector had been subjected to adverse stereotyping behaviour exhibited by teachers and careers guidance people (who it is argued really should know better) trying to steer them towards more female stereotypical jobs and careers.

Another area identified by Miller, Neathey, Pollard and Hill (2004) is the issue of parental aspirations, which impact on their children's career choices, and whether they remain in education or training or leave (Payne, 1998). In the USA research by Farmer, Wardrop, Anderson and Risinger (1999) and Farmer, Wardrop and Rotella (1999) have identified parental support an influence as being a key factor influencing subject and career choice. While strong in all communities, this parental influence is particularly strong in Asian cultures (Schimmel, 2000; Parker-Jenkins, Haratas, Irving and Barker, 1999; Miller and Neathey, 2004).

Within their domestic environments, particularly for mature entrants, there was also evidence that male partners were also not in favour of their career choices, and the researchers identified success in a male dominated industry and higher pay rates as being possible foundations for this resentment. The researchers also found some resistance from employers to the point of being prepared to flout the Sex Discrimination Act to prevent the employment of women:

*"Probably the worst is outside the course- sometimes it feels like you're not given a fair chance getting a placement, because you're a woman. If people had a choice, they wouldn't choose you because you're a woman, so they find other reasons."* Trainee Woman Plumber in Dale, Jackson and Hill (2005, p24).

Andrew (2005) in a piece of research has identified a range of comments from women about their experiences in relation to interviews with employers ranging from: *"Quite reassuring, got quite a good feeling from it"* to *"They kept firing horrible questions at me"*.

There was also evidence that women were expected to respond to questions about how they would cope with working in a male environment, which also included in a minority of cases, quite graphical scenarios being painted. One example question was how the female would cope with *"140 boys aged 16-20 with their hormones running wildly"*.

Another woman was asked about what would happen if she was involved in a chemical spillage requiring her to strip off and be squirted down with water before chemical burning took place. That this is not an appropriate question (unless that it was asked of all the male applicants as well) is axiomatic, however the female appeared to deal with it very well, she concluded:

*“I think that they were just testing me, not so much to put me off, but I think they wanted to know whether I would be able to do it or not, whether I knew what it entailed. But anything could happen in any job couldn't it? I don't know whether they ask the lads that, or whether they were just testing me to see if I did have it in me.” Andrew (2005, p8).*

Miller, Neathey, Pollard and Hill (2004) point to two competing theories that may explain the reason why employers within the building services engineering sector may be discriminating against women (although this behaviour is in no way related just to them)- these are the theories of labour market discrimination (Wells and Jennings, 1983) and the rational bias theory (Larwood, Gutek and Gattiker, 1984; Larwood et al, 1988a, 1988b).

The labour market discrimination theory proposes that where employers have discriminatory tastes i.e. they will prefer to employ from one sex, then they will only consider employing from the less favourable group if they can do so at a wage discount sufficiently large to compensate for the perceived loss of utility and/or the discomfort associated with employing them (Miller, Neathey, Pollard and Hill ,2004 p31). Rational bias theory suggests that a manager's decision to discriminate in favour of one sex over the other may be generated through their belief that such discrimination may be viewed positively by others within the organisation, such as directors, shareholders, other managers etc. Further research will be needed to evaluate whether these theories may explain gender differentials within the building services engineering sector.

The respondent women within the research spoke of their difficulties of obtaining work placements to complete their NVQ training. Where women did obtain placements in some cases they faced ridicule, bullying, antagonism, as well as being expected to make the tea.

*“There's still a lot of macho culture round here. They think that Women can't do the job” Trainee Woman Plumber in Dale, Jackson and Hill (2005, p14).*

*“They put her on all the horrible jobs in the freezing cold. But she didn't have enough proof. She quit because of that” Trainee Woman Plumber in Dale, Jackson and Hill (2005, p27).*

*“On an unhappy site, men bully each other, so they're certainly going to bully you.” Qualified Woman Plumber in Dale, Jackson and Hill (2005, p27).*

Thankfully, it isn't all bad news within the SummitSkills footprint:

*“I've also had very positive feedback from the plumber I work alongside. He thinks working with women is great”. Qualified Woman Plumber in Dale, Jackson and Hill (2005, p38).*

*"I've never experienced any of that (lower pay for an equivalent job). I'm paid hourly and more than most of the men because I'm better"* Qualified Woman Plumber in Dale, Jackson and Hill (2005, p39).

*"Being the only woman was a help to me getting the job. I work for a posh plumbing firm, set up by an entrepreneur. He has lots of different ideas. I work in people's homes, so it's mainly small work, and not heavy. And they like having a woman that can talk to them."* Qualified Woman Plumber in Dale, Jackson and Hill (2005, p39).

Isolation both on site and within the training environment was also an issue for some women as they were often the only female on the course, with no female lecturers or other women that they could engage with. The quotes below emphasise the coping strategies that some women have adopted as well as identifying the sense of isolation that being the only women on the course or on site engenders:

*"When I went to the launch of this project in Germany, I was the only woman. Since then, I've been either the only woman on the course, or the only one of two."* Trainee Woman Plumber in Dale, Jackson and Hill (2005, p21).

*"The Lecturer said to me do you know that it's dirty?"* Trainee Woman Plumber in Dale, Jackson and Hill (2005, p22).

*"It depends on your personality; you've got to be willing to get in there and get stuck in, and mingle, like."* Woman Trainee Engineer in Andrew (2005, p10).

Problems of integration were not restricted to fellow apprentices, and some lecturers struggled with the reality of mixed classes. This tended to be an issue particularly with the older members of staff within the training providers:

*"I think with the old fuddy duddies, you know, obviously a little bit different, I've told them, cos at the start, it's weird, people say alright lads, and then they go, oh and lady. I don't like that, so I just said them, look just say guys and lads, I don't care, I take it as you mean me as well, you're just saying the group basically. But they've all got to grips with that now."* Woman Trainee Engineer in Andrew (2005, p14).

Fuller, Beck and Unwin (2005) in their research discovered that over 60% of construction, engineering and plumbing employers agreed that women did not want to work in their sectors, because the work is dirty (Fuller, Beck and Unwin, 2005, pvii) Other problems women entering construction face include for the long and unsociable hours of employed status employees and demographic travel issues for women with families, as well as the issues of health and safety on site which are still seen as being an issue in relation to attracting women.

*"I was shocked that structures are built in that exclude women. For example, when they have courses that start early. To be in for 7.30 am is very difficult for women with children"* Trainee Woman Plumber in Dale, Jackson and Hill (2005, p14).

*“The only thing that would stop me now is the lack of quality affordable childcare. Finding a job that pays childcare costs isn’t possible until you’ve been working for several years.”* Trainee Woman Plumber in Dale, Jackson and Hill (2005, p14).

In relation to the training of apprentices, then Fuller, Beck and Unwin (2005) suggest that over 70% of plumbing, construction and engineering employers agreed that it was easier to train the traditional sex (Fuller, Beck and Unwin, 2005, pvii).

Finally, the research discovered that many women come in to construction later within their careers, and therefore do not qualify for Modern Apprenticeship schemes, thus making the obtaining of industry relevant qualifications and placements etc even more difficult than it would be for a young ‘white’ male leaving school at sixteen for example (Dale, Jackson, Hill, 2005, pvi-v). Within the sample of women within the survey, the majority were studying for a level 2 (Dale, Jackson, Hill, 2005, p9).

The SummitSkills footprint covers the electrotechnical, plumbing, heating and ventilation and air conditioning and refrigeration industries, which along with consultants makes up the building services engineering sector. The definition of plumbing may sometimes include heating and ventilation and air conditioning and refrigeration.

Miller et al (2004) have identified the performance of ‘plumbing’ (in its most generic sense) against the rest of construction and other related industries, and this suggests that in ‘plumbing’ and construction women’s representation was worse than ICT and general engineering occupations, whereas construction at 38.2% of skills gaps has the second highest percentage of skills gaps out of 28 industries:

	<b>Women (thousands)</b>	<b>Men (thousands)</b>
All Construction Occupations	16	1,591
All ICT Occupations	151	834
All Engineering Occupations.	64	731
All Plumbing Occupations	*	191

\*= less than 10,000 in cell, Data are for employees and self-employed.

Source: Miller et al (2004) in Dale, Jackson, Hill (2005, p2).

The training data for apprentices is also not encouraging in relation to the SummitSkills footprint, with Miller et al (2005) identifying the following number of women being on SummitSkills footprint courses within England in the academic year 2001. Construction generally is included for comparative purposes. As stated above, it should also be remembered that many women enter construction later, and therefore are not caught in this data:

### **Female share of Modern Apprentices in training, England 2001.**

<b>Sector</b>	<b>Advanced MAs %</b>	<b>Foundation MAs %</b>
Construction (general)	1	2
Electrical Installation	1	*
Plumbing	1	1
Heating and ventilation, air conditioning and refrigeration	1	1

Source: Miller et al, forthcoming 2005 in Dale, Jackson, Hill (2005, p5).

EOC (2006) however point to an increase in the number of women engaged in apprenticeships, which suggests that the figures between 2003/04 and 2004/05 have

doubled from twenty-one to fifty, an increase of over 100% and a significant improvement on the figures fro 2001 contained within the table above (EOC, 2006, p2). It should be noted however, that these figures are significantly smaller than the figures for male entrants to the industry, as is shown in the table below, with plumbing climbing just above 1% of the total number of trainees:

Sectors	FMA		AMA		Total
	Number	Per Cent	Number	Per Cent	
Construction	6350	0.8	1247	2.1%	7597
Early years care and education	4033	97	2569	97.5%	6602
Engineering Manufacture	4267	5.2	4746	2.7%	9013
Information Technology and Electronic Services	2485	14.5	400	14.3%	2885
Plumbing	1757	0.7	660	1.1%	2417

Source: LSC, ILR 02-03 period 1 to 9, date of report June 2003 in Fuller, Beck and Unwin (2005, p3).

Empowerment is an issue for many women and the respondents in the research claimed that they found significant satisfaction from succeeding in a non-female environment:

*“When the certificates arrive, and the kids see what you’ve done, that gives you a big boost.”* Trainee Woman Plumber in Dale, Jackson and Hill (2005, p12)

Job satisfaction came from carrying out the job, but the researchers discovered that receiving good wages for the job was also an incentive:

*“I do it for job satisfaction and the pay”* Qualified Woman Plumber in Dale, Jackson and Hill (2005, p13).

As inferred above, there is also a business case to be made for the development of women in plumbing. Qualified women plumbers involved in the research articulated this in relation to working with vulnerable and specific religious groups, as well as capitalising on what might be seen as a feminine trait (tidiness) as a marketing tool:

*“There are more and more women living alone, old people, people with kids. They trust you more when you’re a woman”* Qualified Woman Plumber in Dale, Jackson and Hill (2005, p14).

*“A lot of single mums- they’d prefer a woman plumber. Us lot never leave a mess. We always clear up. And Muslim women won’t allow a bloke in the house without a chaperone. So we can do that work too”* Qualified Woman Plumber in Dale, Jackson and Hill (2005, p14).

Fuller, Beck and Unwin (2005) postulate, that many reasons for the conservative nature of companies within the SummitSkills footprint and in relation to construction generally, is due to the prevalence of small firms (85% of companies within the SummitSkills footprint employ less than five people) which are run on a father/son basis in relation to recruitment patterns (Fuller, Beck, Unwin, 2005, pv).

*“ Not many small or micro companies have owners who perceive girls to be suited to the business, it’s perceived to be too physical and dirty”* Training Provider, Plumbing in Fuller, Beck and Unwin (2005, p26)

*“It’s a very traditional industry, father to son, they’re very strong family traditions with fathers, sons, uncles, brothers all going into the family business”* Training Provider, Plumbing and Construction in Fuller, Beck and Unwin (2005, p26).

Their research suggests that 69% of employers in construction, plumbing and engineering have had no applications from women for apprenticeships, 26% very few, 4% some, and only 1% many applications from women for apprenticeship training (Fuller, Beck and Unwin ,2005, p17).

Even when women do find employment within the building services engineering sector, then they can face discrimination and hostility from employers even in employment. Andrew (2005) cites a case study of a heating and ventilation pipe fitter who was made redundant and who previously had made a grievance about being paid less than two male workers who were subsequently retained. Initially, the woman pipe fitter concluded that she had to:

*“Grin and bear it and to actually get on with it, if you brought a grievance it just made things worse.”* Female Pipe fitter in Andrew (2005, p31).

After making the grievance, the woman pipe fitter felt that she was perceived to be a trouble maker and this led to her being dismissed by way of redundancy. This perception that she was a trouble maker did, she felt impinge upon her ability to get another post in the building services sector:

*“In construction it’s all word of mouth, regardless of your paper qualifications they won’t touch me now.”* Female Pipefitter in Andrew (2005, p31).

### 11.6.3 Understanding the ‘Lads’ Culture

A number of reasons are given for the phenomena of women not entering construction, one of which that is predominant, is the ‘lads’ culture of construction particularly on site:

*“It’s a male dominated environment, the environment needs to change and the attitude of people in the environment needs to change...my first experience of going on site, what they were saying [swearing and sexual innuendo] and I became like them within a year or two, you behave the way you’re expected to.”* Plumbing Employer in Fuller, Beck and Unwin (2005, p29).

Faulkner’s (2006) study on the ‘lads’ culture in engineering has identified some sociological factors that underpin the behaviour patterns identified above by the plumbing employer involved in the research by Fuller, Beck and Unwin (2005). Under the generic title of ‘Men’s spaces’, Faulkner (2006) has identified subtle exclusion factors within discourses in engineering which exclude women, and include greeting patterns male engineers use with one another, i.e. the word ‘mate’ or ‘man’ or the handshake between male engineers.

Faulkner (2006) argues that male engineers display more formal greeting styles when interacting with female engineers, which may exclude women from that social setting. Faulkner has argued that power is in the discourse, and the use of the male pronoun “he” and statements such as: “We put our best men forward” and “Go talk to the electrical guys” may, argues Faulkner (2006) to be making the concept of the woman engineer a non-sequitur. Non-work topics of conversation reflect conventional masculine interests such as football, cars and families, which Faulkner (2006) argues takes to the margin those who are unable to communicate authoritatively across the limited range of male masculinity.

A further development of this is the incorporation of sexually explicit, homophobic and sexist humour and topics of conversations, the display of partially clad or nude women on calendars, or cut out of ‘soft porn’ ‘girlie magazines’ also create a sociological setting which, while making many men and women uncomfortable, is not challenged overtly as opposition risks the opponent being ‘expelled’ from the group (Faulkner, 2006, p11-12).

Power within engineering tends to be vested in male only social groups, which wield a significant amount of power as to who gets promoted etc. In turn these groups tend to congregate around male only interests such as the golf course, or heavy drinking sessions after work. Faulkner (2006) also argues that the numbers of men available allows for differentiation of personalities between different types of men, which given the far lower number of women in engineering means that women are not able to develop the multifaceted nature of their personalities in the same way.

Faulkner (2006) states that as a result of this women are subliminally encouraged to play down their sexuality, as this is not a recognisable norm within the male dominated culture. From the same species therefore, homosexuality and openly ‘gay’ behaviour traits are not exhibited, and would be rejected by the masculine dominant culture were they to be demonstrated (Faulkner, 2006, p11-12). Faulkner (2006) concludes that the woman engineer by this context becomes both visible and invisible at the same time, visible by virtue of sexuality and being a minority person, but invisible through being unable to integrate into the dominant male culture (Faulkner, 2006, p12).

#### **11.6.4 Solutions from Literature Review**

The Government commissioned a report, carried out by Baroness Greenfield into developing a strategy for women entrants and existing employees in science, engineering and technology. Some of whose findings although not primarily directed at SummitSkills footprint will have some influence upon the building services engineering sector.

The DTIoSAT (2003) therefore have or will develop a new resource centre aimed at supporting, advising and working with Science, Engineering and Technology (SET) employers and professional bodies to raise the profile of women in SET, producing a data base of expert women in SET, and good practice guides, as well as developing a mechanism for identifying good SET women employees. The purpose of this centre will be to draw on the experience of women in these organisations to “achieve critical mass”.

Secondly, the DTI propose to use funding to pump-prime the centre to support innovative pilot schemes, such as mentoring of new entrant SET women by more

experienced women SET employees. Thirdly to support returners to SET after maternity and other breaks and fourthly to use cross Government machinery to make sure that Government departments who utilise or incorporate SET functions within them, are good SET employers. Fifthly the DTI is committed to the development of a new independent implementation group to oversee the strategy's progress and impact (this phase should now be complete) with a new role for the Office of Science and Technology being to promote a SET for Women unit. Finally, the DTI is committed to improved statistical monitoring, to enable the position of women's participation in SET to be accurately monitored and tracked (DTIoSaT, 2003, p4).

Of more practical relevance to the building services engineering sector is the work that JTL has carried out within their Shockwaves project. JTL is a national training organisation for the electrotechnical part of the SummitSkills footprint. JTL was responding to the fact that it had discovered that of the 7,000 modern apprenticeship trainees in their industry, only nine were female. The Shockwaves project therefore sought to develop marketing materials to attract women into becoming electricians.

Secondly the programme sought to develop a 'fast-track' block release adult training course for women trainees, which enabled them to achieve level 3 NVQ in around two years as opposed to the typical four years, through the traditional route. These women and others coming through the system were then used as case studies and role models for future promotional events. A challenge that the project encountered was the ability to get buy-in from employers, as some of them were not prepared to take on a woman who with no background in the industry and would not become productive for about a year after commencement. Nevertheless by 2004, twelve women were recruited with a training officer providing mentoring and learning needs support, with JTL being committed to finding employment for the women on completion of the programme (Miller, Neathey, Pollard and Hill, 2004, p53).

### **11.6.5 Issues from Racial Diversity Issues**

The amount of material related to ethnic minority workers within the construction industry (which includes the building services engineering sector) is surprisingly low as opposed to the literature available for women into construction. The number of operatives and professionals from ethnic minority (EM) groups is shown below, and shows that ethnic minority groups are significantly under-represented within the SIC 45 occupations that include electro-technical, plumbing, heating and ventilation, air conditioning and refrigeration and consultants, which form the core industry's of the SummitSkills footprint.

The table below indicates the percentage of ethnic minority operatives across all the trade areas within SIC45, which include trade operations covered both by SummitSkills and ConstructionSkills, and therefore is indicative only of the SummitSkills area per se.

**Proportion of Non-white ethnic minorities in Construction (SIC45)**

<b>UK Population</b>	<b>UK Economically Active</b>	<b>UK Construction Workforce SIC 45</b>	
8%	7%	3%	
<b>Craft and Trade Occupations</b>	<b>Construction Design and Management</b>	<b>Other</b>	<b>Construction Sole Trades</b>
3%	3%	4%	3%
<b>England Population</b>	<b>England Economically Active</b>	<b>England Construction Workforce</b>	
10%	8%	3%	
<b>Craft and Trade Occupations</b>	<b>Construction Design and Management</b>	<b>Construction all other Occupations</b>	<b>Construction Sole Traders</b>
3%	4%	4%	3%
<b>Scotland Population</b>	<b>Scotland Economically Active</b>	<b>Scotland Construction Workforce (SIC45)</b>	
2%	2%	Less than 1%	
<b>Craft and Trade Occupations</b>	<b>Construction Design and Management</b>	<b>Construction all other occupations</b>	<b>Construction Sole Traders</b>
0%	1%	0%	0%
<b>Wales Population</b>	<b>Wales Economically Active</b>	<b>Wales Construction Workforce (SIC45)</b>	
2%	2%	1%	
<b>Craft and Trade Occupations</b>	<b>Construction Design and Management</b>	<b>Construction all other occupations</b>	<b>Construction Sole Traders</b>
1%	0%	6%	0%

Source: LFS Spring 2004

The data suggests that while ethnic minority involvement in construction is low generally across the UK, particular issues even within these low figures in relation to 0% returns in Wales and Scotland suggest that there is a major issue with ethnic minority involvement.

This concept is confirmed in Mann and Golden (2003) Construction Apprentices Survey 2002-2003: National Report, which from a 44% survey return identified a 98% white ethnicity, with 1% claiming not to be white. The Black African (4), Black Caribbean (3) and Black 'other' (3) and Indian (1) ethnic groups made up the sample return. What is perhaps of concern from the Mann and Golden (2003) work is the contention that little or no progress has been made on these percentages/figures since the 1990s (Mann and Golden, 2003, p5-6).

The Centre for Ethnic Minority Studies (University of London) in their report '*The under-representation of black and Asian people in construction*' has concluded that there are a number of reasons why ethnic minority groups do not engage in construction, which include a failure on the part of the industry's lead bodies and companies to develop within ethnic minority communities, the opportunities that are available within construction. A further element that discriminates against ethnic minority groups is the recruitment structure of the construction industry (see above where this was identified as an issue in relation to women) where word-of-mouth

recruitment practices are common, which by virtue of the existing composition of the industry tends to discriminate against ethnic minority groups.

*I still think there is in the UK in general a problem: there is a prejudice out there, and I would suggest that there are a lot of 'old school' people; if you're in the industry, you're in it for life and you like the industry and I think there is probably the history of prejudices there. I wouldn't say it was necessarily worse in construction than anywhere else. But I still think geography plays a part and just basic upbringing; if you're brought up in a multicultural society I think your views on life, on people, on race are totally different to somebody from the more secluded areas" White Construction Employer in CEMS (2005,p46).*

*It's about informal networks. Sometimes there's a job coming up; even in the department, you basically know who's going to get the job. You might get people saying: Oh look at this job! It's made for [...]. You know that they are loyal and they are going to get promoted, and that happens quite a lot in the council. What I've boiled it down to is that I think a lot of white people may not want ethnic minority people supervising them or being their manager. I've heard people saying: She doesn't know what she's doing half the time, or she's not a good manager; you know they are talking about an ethnic minority." BEM worker in CEMS (2005, p47).*

Even where jobs within the construction (professions) were advertised then there was a feeling that ethnic minority applicant (as with women, see above) was definitely the last choice:

*A lot of firms didn't even ask me for an interview, despite the fact that I had as good a qualification as anybody who I graduated with. And virtually everybody on my course had a job before I did, which I thought was strange- even people who'd got degrees lower than mine! There wasn't a surplus of planners in 1984, or jobs. They weren't easy to come by, but you should have been able to get a job after so many applications. BEM Construction Professional in CEMS (2005, p49).*

*On the phone: There is a vacancy come down for an interview. Immediately [I] walk through the door, keenness goes. Might not get the job-but then again might be a stereotyping thing; may be the way you dress, [the] way you talk- difficult to generalise because I'm black BEM Construction Professional in CEMS (2005, p49).*

*I have got the feeling that if I was to apply to any civil engineering company I would be refused because of my ethnic origin, since the majority of these companies are owned by [white] English People Asian Engineer in CEMS (2005, p49).*

Many ethnic minority people felt that they were prejudiced against simply on their name before they even got a chance to get to an interview situation, or show what they could do:

*"It's the name, because obviously it's not 'John Smith. So you might phone up and ask: Is the job vacancy still there? And they'd say enthusiastically Yeah and you'd send in your application, and without*

*an interview it comes back not accepting. I'd like to believe that it's just that I probably wasn't what they were after, rather than dwell on it[...] You do feel that if you had a more contemporary [sic] name you would be able to get your foot in. It's being able to get a foot in to be able to prove yourself first."* BME Construction Professional in CEMS (2005, p49-50).

*"I remember calling one authority, and I was keen to apply, so I spoke to the person who happened to [be] the person that the job would be under [...] I remember expressing an interest and he said: Oh yeah, we'll get the application form sent to you, although it was quite late in the day. As soon as I gave him my name, I thought, I'm not going to get the application form, and I didn't get the application form. It didn't come through the post and I kind of thought to myself: He's obviously [not sent it]. I could tell as soon as I gave him my [Asian] name"* Indian Asian Construction Professional in CEMS (2005, p50)

*"This is why some Caribbean kids and some African kids simplify and anglicize their names in order to get their foot through the door. It is very common. They would use their first Christian name and then their middle name and drop off their 'ethnic' name. "Black Construction Professional in CEMS (2005, p50).*

The report also identified that within ethnic minority communities, there is a perception of construction as being a white male dominated environment, where ethnic minority groups perceive that they may be subject to discrimination and racism, through less favourable treatment, widespread name-calling, harassment, bullying and intimidation (CEMS, 2005, p16).

*"For female Asians [the built environment] is a very male dominated profession, and maybe it's not seen as appropriate; secondly, the industry is not considered to be a particularly good profession to go into. Maybe that's how it is perceived because Asian people are very much pushed towards medical [professions], whether it's physiotherapy, whether it's opticians. We're also being pushed towards accountancy and things like law these days. So the building profession probably doesn't get a good press."* Asian Female Engineer in CEMS (2005, p38)

*"I don't think black people that have come in for training are viewed in the same vein as others that have come in from other backgrounds. The person I'm thinking about is from a refugee background, and when I take him on site and show him different things people think, he's not really up to it and I think, Well come on, English was never his first language but he can speak English. The chap graduated as an engineer. He was directed to come here for work experience by one of the college tutors, but it became a bit humorous how certain people saw him, whereas I was a bit more compassionate, knowing there's a struggle from the very beginning anyway."* Male Afro-Caribbean Building Control Surveyor in CEMS (2005, p42)

From work carried out by CITB ConstructionSkills, there was also a pre-conception that ethnic minority parents were hostile to the industry, and that this was transferred through to their offspring. Some ethnic minority professionals in research by CEMS

(2005) cited examples of where they felt that they had received different treatment than their white counterparts:

*“I and a friend from ‘Uni’ started with the same contractor. We both asked for pay rises after a period of time. He got his and I was told that the pot was empty. I ended up leaving them as obviously I had been on the same wage for one-and-a-half years. Obviously he was white.”* Asian Construction Project Manager in CEMS (2005, p63).

*“And you look at your peers, and you see a guy who has come in from a different line, straight into a project manager’s position. And you think: that isn’t right...I would be hard pressed to say race was the full reason. And I have never looked for that excuse. You could also say that I haven’t really noticed it because I don’t want to recognise it.”* BEM Construction Professional in CEMS (2005, p63).

Sometimes it would appear that companies within the construction industry do not even bother hide potential prejudice, and this would appear to also on occasions to include Local Authorities:

*“I was taken to one side by the team leader, who said: Don’t apply for this job, because you won’t get it. And I said: Fine, I’m glad you told me, I haven’t wasted my time. A job that I could do, that I had been doing for the last two years, being told by the team leader...and that was a white person and they employed a white person. So, when they appointed this new person, you think to yourself: What the hell am I doing in this place?”* BEM Planner in CEMS (2005, p64).

This problem was exacerbated with women from ethnic minority backgrounds that faced a ‘double whammy’ from both racial and gender based subliminal (and not so subliminal) prejudice.

*“Sometimes you apply for jobs and you think you’ve got everything, and then whether it’s because I’ve got two things [against me], colour and sex, it’s difficult to say which is which. As I got on in my career, I began to see the pattern a bit more and I could tell which was which, but certainly at the earlier stages it was difficult. I can only have gut feelings, I can’t prove anything, and so you just let it slide. After I got a few knock-backs I thought: stuff that, I just gave my CV to an agency and I got my first job as a civil engineer in the water industry.”* BEM Female Civil Engineer in CEMS (2005, p51).

This invariably has led to a perception among ethnic minority groups, that the construction industry was not suitable for them (CEMS, 2005, p17). Those who remain can then become less productive within the industry than they might have been if they had not suffered from prejudice, which in a sector that is seeking to become more productive, must be a concern:

*“Many other people [are] in the same scenario and it will trigger some people to leave the industry completely. It will lead others to put their head down and just take it, and a lot of people get disillusioned, which is an unfortunate thing when motivation begins to wane and people can become less productive.”* BEM Construction Professional in CEM (2005, p63).

As with women (see above) there is a perception among some ethnic minority staff that they have to perform at a much higher level than their white colleagues to gain the same recognition:

*“The companies would come to the university, and they would interview all the students, and they would decide which ones they wanted. So if you didn’t get selected, you went to the next one. I was the last one to get selected. I felt disgusted really. I felt maybe I am in the wrong profession. I think it boils down to perseverance. I was passionate about my belief that this was what I wanted to do and through my own efforts I was able to secure something that wasn’t classified as graduate training. In fact it was the most junior site job and taking that job on, I excelled in that, and the following year they said: Well we’ll have you back, So, because of what I am, I have to be three times better than my colleague. I have to be up to speed three times ahead of my peer group who are not black. That’s my own philosophy.” Black Construction Professional in CEMS (2005, p52).*

There is also a concern with some ethnic minority candidates, that they are being interviewed to allow the company to tick the ‘equal opportunities’ box, of having a ethnic minority candidate interviewed. This is probably as offensive to ethnic minority candidates as not being interviewed:

*“You are always really wary, whether a game is being played-that they interview a black person because they are required to interview one. I have had four interviews. Three I didn’t really want. The one that I did want to do was offered to an internal candidate. But you kind of feel you hope you are not being short listed because you area black person. You like to think you are short listed because you are a fully qualified planer with good experience, knowledge etc.” Black Planning Profession in CEMS (2005, p53).*

Fitting in is key concern of employers when interviewing ethnic minority candidates within the construction professions, and shows it might be argued a prejudicial predisposition by some employers:

*“No, this is going to be an effort: for a start, they’re from a different culture, so there might be a language problem; we have to adjust the culture of our office; they might not be able to play five-a-side football with us; they might not be interested in drinking. So, there is an issue of fitting in, which is always the biggest problem with professionals, because those who are harder work [to integrate] are less likely to be offered a job because it requires a shift within an organisation” White Employer in CEMS (2005, p54).*

*“Familiarity is very, very important in construction. You want someone who speaks your language and whenever you get someone who is a little bit different they struggle to fit in and don’t last very long. It’s illogical really” BEM Construction Professional in CEMS (2005, p66).*

Another example of the fitting in concept is illustrated by the quote below from a ethnic minority female construction professional. It should be noted that the questions she states she was asked do of themselves contravene the Sex Discrimination Act, as a potential employer may not examine family issues related to a female candidate.

*“Once I was interviewed by a practice, and they asked me a specific question about whether I drank alcohol and if I’d had children, and if I was planning to have children, when was I going to have them? [...] I said I do [and] I like going out. They said: D you like going to the pub? I said: Yeah, and they said: You’ll fit in fine then, so it’s a bit cheeky. But luckily I fitted the mould because I was single and not planning to have children at the time and I got offered the job. But that’s where it might be difficult for someone who’s Muslim say, and doesn’t drink.”* BEM Female Construction Professional in CEMS (2005, p53)

Other factors though that were also discovered were that often there were negative relations between ethnic minority learners and their craft teachers, with respondents in the research project speaking of an insensitivity and/or unawareness of the harm of their subliminal racial prejudice. Where colleges and universities have responded to that, and have recruited ethnic minority staff, this has helped learners:

*“I enjoyed my school days, but I would never go to the teachers or lecturers if I had a problem. When coming to the end of my career at college, I had a strange experience. One of the tutors actually said: If you do grade A work, you will only get a grade C. You see these [white] people here? If they do grade C work, they’ll get grade As”* BEM Engineer in CEMS (2005, p40).

*“I remember once when they were giving advice to some white students who hadn’t done so well (this was back in the ‘80s). Advice of the tutors would always be: Well, you need to do some more drawing, get some more experience. For black students it was always, have you considered going into another branch of architecture, maybe computing? - as that was the in-thing in those days.”* Black Female Architect in CEMS (2005, p41).

*“I was fortunate because there was an Indian tutor. He said: Don’t worry about this thing [i.e. potential for discrimination]. It does happen, and you just have to rub it off and get on with it. And with that inspiration I was able to continue.”* Male African Engineer in CEMS (2005, p41).

Although the literature on experiences of ethnic minority groups within construction is limited to professionals, it appears likely that similar experiences, perhaps even sharper than those experienced by professionals, have been experienced by staff in construction crafts, and it would be apposite for further research to be carried out to qualify this hypothesis.

### **11.6.6 Solutions from the Literature Review**

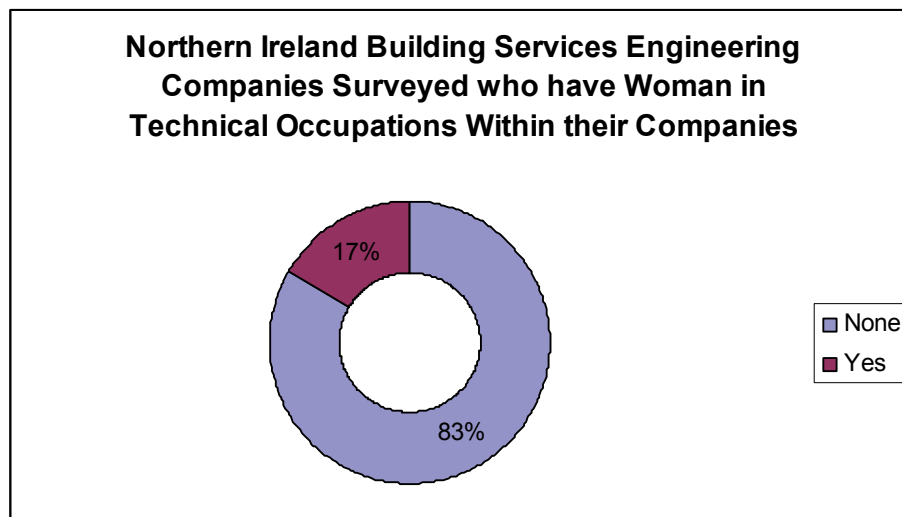
As with getting women into construction, JTL has also piloted through the European Social Fund, two projects to encourage the entry of ethnic minorities into the electrotechnical areas. The first project entitled *‘plugging the gap’* has two facets to it. First the project has allowed for the recruitment of a Youth Officer to go into schools and work with children from ethnic minority groups and speak to their parents about the options that careers in the electrotechnical industry can provide.

The project also seeks to work with the Connexions network, as EM children often form a significant percentage of the NEET (Not in Education, Employment and Training) groups post 16. To complement the Youth Officer, the project also provides for an Employers' Officer, who works with industry to promote the business case for diversity to electromechanical employers. The Employers' Officer will seek to persuade employers to at least offer interviews to ethnic minority candidates, although as indicated above, this target might cause more problems in that potential EM trainees are treated to 'token' interviews (Miller, Neathey, Pollard and Hill, 2004, p54).

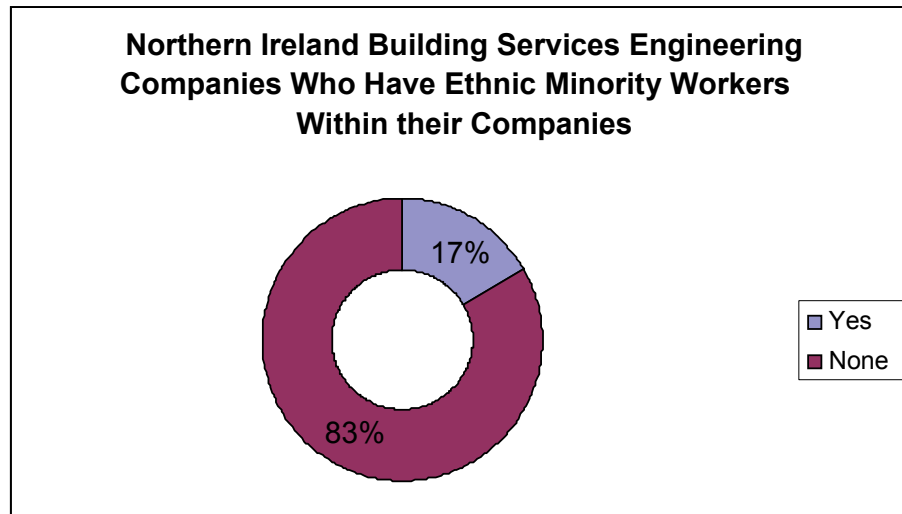
The second ESF project is entitled 'LiveWire' and is based within the Nottinghamshire area in conjunction with the Nottinghamshire LSC. As with the first ESF project this project involves the recruitment of a Youth Officer to work with schools, community groups and the Connexions network to raise the profile of the building services engineering sector amongst ethnic minority people. The project also seeks to secure work placements and company visits over a two year period (Miller, Neathey, Pollard and Hill, 2004, p54).

### 11.6.7 The Northern Ireland Building Services Engineering Sector's Perspective on Diversity

As can be seen from the literature, the building services engineering sector has a major issue in relation to the recruitment of women and people from ethnic minorities. Northern Ireland is a very traditional nation within the UK and therefore it was perhaps not surprising that in relation to diversity Northern Ireland performs less well than many of the English regions for example, as can be evidenced from the diagram below:



From this data only NILET01 had a female technician, and NISHV01 had a female doing a NEBOSH course so that she could take responsibility for Health and Safety. There were no examples in the sample of woman working within craft occupations. Where there were women then these were in consultancies with NISBSEC02 , NIMBSEC02 and NILBSEC01 each having one female engineer each. As can be seen from the diagram below a similar picture emerges for the sector in relation to ethnic minority staff:



The quote below is representative of the views of the interviewees contained within the diagram above:

*We have one lad. He's not black, but he's from an ethnic minority, who is our health and safety manager. (NILHV01)*

In addition NILBSEC01 has one engineer from an 'Asian' ethnicity, but no further ethnic minority staffs were identified.

## 11.6.8 Conclusions

The building services engineering sector within Northern Ireland clearly has an issue with diversity in relation to both women and ethnic minorities. SummitSkills proposes to continue to work with both partners and stakeholders to address the serious under representation from both these groups within the province, and where desirable aid in the development of specific curriculum to facilitate entry to the sector. SummitSkills believes that the sector should not simply seek to throw money at the problem, but through research seek to understand the problems these groups have in relation to the sector and then seek to address these or market the sector more effectively to the relevant groups, which may be parents or community leaders within the ethnic minority communities particularly.

## 11.7 Migrant Workers

### 11.7.1 Introduction

Portes & French (2005) point to the accession to the European Union (EU) on 1 May 2004 of eight central and Eastern European countries referred to within Government documentation as the A8 countries. The EU while guaranteeing a free trade area for members also provides within the union for free movement of workers within member states. Because the A8 enlargement involved the accession of former communist

countries whose economies had been weakened through restricted access to free market economics and centralised communist planning, it was anticipated that the richer western European countries would be inundated with labour looking for employment, partly due to perceived better wages, and it is suggested partly because of structural increases in employment within their own countries as the economies were modernised.

To address some of the concerns that member states had about this perceived phenomenon, the Accession Treaty for the A8 countries gave the existing members states the option of delaying the implementation of the free movement of workers for up to seven years. Most of the major economies within the EU chose to do this, with the exception of United Kingdom, who immediately chose to implement free movement immediately (Portes & French, 2005, p3). To address some political concerns about immigration overload, fuelled to some extent in the media, the Government enacted the Workers Registration scheme for the A8 countries, which meant that A8 workers had to register with the Home Office at the cost of £50. Other than this measure, no further inhibitions were made on A8 workers, and in contradiction to the dire warnings published within the tabloid media, there was no overrun of the UK with migrant workers, with only 176,000 workers registering to work in the first eleven months of the scheme (Portes & French, 2005, p4). The A8 countries joining the EU were the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia. Other countries joining at this time were Cyprus and Malta (AMR, 2005, p1).

Questions may be asked about why the UK Government is so keen to embrace the concept of migrant labour. Much of the anecdotal reasoning for this can be found throughout this SNA, but primarily relates to the issues surrounding an aging workforce, encapsulated in the UK by the Census data in 2001, which showed that in 2001, the population over 60 was greater than the population under 16. This has been coupled with lower fertility rates and mortality rates, and a trend towards early retirement especially among skilled workers. This in turn has fuelled a pension crisis, among countries that operate a state pension system, where there are simply not enough young people in the workforce to meet the pension requirements of the older people.

As will be seen in this section, most of the migrant labour coming to the UK is young, and therefore may act to reduce the deficit of indigenous young people, and provide pensions for those approaching and in retirement. The A8 countries on the other hand have growing populations, and therefore some transference is possible, although the current rates of migration may be insufficient to maintain economic prosperity within the EU. It is estimated that the EU will require a migration population of 1.5 million people per annum to meet growth needs and make up for those who are retiring (Zimmermann, 1995; United Nations, 2000; Drinkwater, Levine, Lotti & Pearlman, 2002, p26-27).

In relation to the data reported within this SNA, then this comes predominantly from the Labour Force Survey, and the Workers Registration Scheme (WRS). It should be pointed out however, that methodologically the LFS data is only an approximation of the number of migrants in the UK at anyone time, as only 20% of the data is refreshed each quarter, creating a time lag in the picking up of a representative sample (Portes & French, 2005, p14).

There were 293,000 applications to the WRS between 1 May 2004 and 30 September 2005. The breakdown of professions is also interesting as 4000 A8 workers registered as bus, lorry and coach drivers and 7500 as care workers, 700 as

teachers, researchers and classroom assistants, and 400 as dental practitioners (including hygienists and dental nurses) as well as 500 GPs, hospital doctors, nurses and specialists (AMR, 2005, p1). The predominant nation registering under the WRS are the Poles, who make up 58% of the total, followed by Lithuanians (14%) and Slovaks (11%) (AMR, 2005, p7). Although when compared against the proportion of the host countries population, then Lithuanians have entered the UK in a far greater percentage post A8 accession, as shown below:

### WRS applications as a proportion of the host country population

<b>Czech Republic</b>	0.13%
<b>Estonia</b>	0.22%
<b>Hungary</b>	0.05%
<b>Latvia</b>	0.57%
<b>Lithuania</b>	0.81%
<b>Poland</b>	0.27%
<b>Slovakia</b>	0.36%
<b>Slovenia</b>	0.01

Source: Portes & French (2005, p18)

The predominant numbers of migrants are perhaps not surprisingly to be found within the London and southern regions of England, although the number of A8 migrants is not as high percentage as might be expected, with only 25% of applicants under the WRS working in London. As will be discussed further in this report in relation to construction specifically, then wage rates for immigrants are on the low side, with approximately 82% of WRS registrations earning between £4.50-£6.00 per hour, when the minimum wage at the time the data was collected being £4.50 (Portes & French, 2005, p19).

The table below shows the numbers and nationalities of migrants received by the Home Office in the last two quarters of 2004 and the first three quarters of 2005:

	<b>Czech Rep</b>	<b>Estonia</b>	<b>Hungary</b>	<b>Latvia</b>	<b>Lithuania</b>	<b>Poland</b>	<b>Slovakia</b>	<b>Slovenia</b>	<b>Other</b>	<b>Total</b>
Q2 2004	2,520	660	1,090	2,930	7,715	23,465	3,730	50	30	42,195
Q3 2004	3,510	770	1,315	3,660	7,595	28,065	5,240	65	40	50,260
Q4 2004	3,020	615	1,430	2,770	5,355	23,920	4,875	55	30	42,075
Q1 2005	2,840	730	1,460	3,145	5,905	23,775	4,945	55	35	42,890
Q2 2005	2,815	740	1,650	4,315	7,645	33,590	5,995	30	30	56,810
Q3 2005	2,805	595	1,615	3,090	5,475	36,850	5,950	35	50	56,460
<b>Total</b>	<b>17,510</b>	<b>4,105</b>	<b>8,565</b>	<b>19,915</b>	<b>39,690</b>	<b>169,675</b>	<b>30,735</b>	<b>285</b>	<b>215</b>	<b>290,695</b>
As % of Total	6%	1%	3%	7%	14%	58%	11%	<0.5%	<0.5%	100%

Source: AMR (2005, p7)

The vast majority of workers are young and single, with 82% of workers being aged between eighteen and thirty-four, and of these, 95% have no dependants living with them, and only 3% had dependants with them under age seventeen (AMR, 2005,p2).

The table below shows the WRS breakdown for registered workers over the same time period as above:

	Q2 2004	Q3 2004	Q4 2004	Q1 2005	Q2 2005	Q3 2005	Total	As % of total
<18	100	140	80	100	185	245	845	<0.5%
18-24	16,155	21,960	16,230	15,925	23,180	28,165	121,615	44%
25-34	16,160	17,030	16,635	17,260	21,650	18,225	106,965	39%
35-44	3,740	4,385	4,525	4,935	5,980	4,995	28,525	10%
45-54	2,250	2,510	2,660	2,785	3,390	2,890	16,490	6%
55-64	335	325	355	355	400	345	2,120	1%
65+	5	5	10	10	5	5	35	<0.5%
Others	80	80	100	65	85	70	485	<0.5%
<b>Total</b>	<b>38,825</b>	<b>46,440</b>	<b>40,600</b>	<b>41,435</b>	<b>54,880</b>	<b>54,880</b>	<b>277,060</b>	<b>100%</b>

This table shows registered workers rather than the number of applications made. The figures are also for initial applications only (not multiple applications where an individual is doing more than one job simultaneously, nor re-registrations, where an individual has changed employers).

Source: AMR (2005, p8).

Males were making between 17% and 20% more applications during the period this data was compiled than women (AMS, 2005, p9).

One of the political arguments put forward against immigration and migrant workers is that these individuals are coming to the UK for free health care and benefits. The vast majority of national insurance numbers issued are issued for employment purposes as is shown in the table below:

	Total Allocated	Allocated for Employment purposes	Allocated for benefit purposes	Allocated for tax credit purposes	Total Refused
Q2 2004	7,946	7,806	83	57	220
Q3 2004	22,883	22,532	212	139	686
Q4 2004	32,650	32,201	293	156	705
Q1 2005	46,394	45,883	297	264	588
Q2 2005	55,623	54,812	495	316	588
Q3 2005	60,399	59,743	411	245	539
<b>Total</b>	<b>225,895</b>	<b>222,927</b>	<b>1,791</b>	<b>1,177</b>	<b>3,326</b>

Source: AMR (2005, p23)

ILO (2004) in its report on migrant workers reveals that migrant workers contribute around 10% more than the indigenous population, leading to the conclusion that were it not for migrant workers, the public services would have to be cut or income tax increase (ILO, 2004, p36).

Also from the AMR data, it can be analysed by region, where the migrant labour is working, and as can be seen from the table below, the southern regions of England dominate the destinations of the migrants. As can be seen in the basic skills section of this SNA, this is impacting on the provision needs in many of the sub-regions of the south.

	Q2 2004	Q3 2004	Q4 2004	Q1 2005	Q2 2005	Q3 2005	Total
London	3,733	7,726	9,357	11,645	15,241	16,964	64,666
South East	1,366	3,432	5,847	5,333	6,984	7,820	30,782
East of England	678	2,340	4,157	5,829	6,301	4,428	23,733
East Midlands	354	1,892	2,545	4,293	5,004	5,441	19,529
North West	445	1,460	2,198	4,134	3,754	6,634	18,625
Scotland	441	1,732	1,528	3,610	4,710	5,865	17,886
West Midlands	235	1,541	2,251	3,198	4,003	4,355	15,583
South West	368	1,360	2,472	3,371	3,440	3,830	14,841
Yorks and Humber	174	872	1,421	2,976	3,706	2,906	12,055
Wales	141	699	765	1,498	1,614	1,282	5,999
North East	75	219	275	474	614	757	2,414
Fast Track Claims	156	296	539	621	840	656	3,108
<b>Total</b>	<b>8,166</b>	<b>23,569</b>	<b>33,355</b>	<b>46,892</b>	<b>56,211</b>	<b>60,938</b>	<b>229,221</b>

Source: AMR (2005, p24).

The National Statistics Office has plotted the percentage of migrant workers (overseas nationals) entering the UK from 2002-2005 and where they have located, and this shows clearly the trends, with the North East, North West, Yorkshire and Humberside, East of England, South East, South West, Wales, Scotland and Northern Ireland showing stable migration destination percentages, with London showing as indicated above, a marked decrease between 2003-2005, which appears to have been picked up by other regions/nations within the UK, however, as can be seen, the pattern is fairly stable, with no major fluctuations to be seen:

	<b>2002-2003</b>	<b>2003-2004</b>	<b>2004-2005</b>
All	100%	100%	100%
North East	2%	2%	2%
North West	6%	6%	7%
Yorkshire and the Humber	5%	5%	5%
East Midlands	4%	4%	5%
West Midlands	7%	6%	6%
East of England	8%	7%	8%
London	43%	42%	39%
South East	11%	12%	12%
South West	4%	4%	5%
Wales	2%	2%	2%
Scotland	4%	4%	5%
Northern Ireland	1%	1%	1%
Unknown	4%	4%	2%

Source: NSO, (2005, p21)

In the Quarterly Labour Market Outlook published by cipd, the researchers discovered that 48% of employers recruit migrant workers to fill professional vacancies, 19% to fill manual vacancies, 8% skilled trade vacancies and 5% unskilled vacancies. The reason for recruiting migrants given by respondents were that migrants were hired as a solution to long term recruitment difficulties, with only 5% of respondents claiming that they hired migrants simply to cut wage costs (cipd, 2005,p3).

### **11.7.2 The Construction Industry: Demythologising the Polish Plumber**

The concept of the 'Polish Plumber' and his take over of the British construction industry, is actually a figment of the French. It was first coined by Phillippe de Villiers and anti-EU constitution politician as a symbol (of what he saw) as a symbol of cheap labour coming in from Central Europe as a result of the directive on services in the internal market during the EU Constitutional referendum in France in 2005. The Poles have now adopted the concept as part of a tourism campaign, inviting the French to visit the Polish plumber in Poland! (Wikipedia, 2006).

Where stated, the generic term 'construction' is used to describe both the construction and building services engineering sectors. Although perceived as being a major importer of migrant labour into the UK, in fact when compared internationally, the UK is a very small employer of migrant labour as illustrated within the table below:

Country	Construction
Austria	<b>13.5</b>
Belgium	<b>9.0</b>
Czech Republic	<b>11.0</b>
Finland	<b>7.8</b>
France	<b>17.5</b>
Germany	<b>8.1</b>
Greece	<b>27.6</b>
Ireland	6.9
Japan	2.0
Luxembourg	<b>16.4</b>
Netherlands	4.7
Norway	6.1
Spain	<b>15.8</b>
Sweden	3.3
Switzerland	<b>10.2</b>
United Kingdom	4.4
Australia	7.3
Canada	4.7
United States	<b>8.2</b>

Note: The numbers in bold indicate the sectors where foreigners are over represented (i.e. the share of foreign employment in the sector is larger than the share of foreign employment in total employment)

Source ILO (2005, p49) based on OECD: Trends in international migration: Continuous reporting system on migration: Annual report, 2003 edition (Paris), table 1.12.

As ILO (2005) points out, construction worldwide is a major labour intensive industry, with total global employment being estimated to be about 112,000,000 people, including 29,000,000 being in more developed countries and 82,000,000 being employed in the less developed countries. The construction Industry therefore has long history of using migrant labour particularly from lower-wage economies. So for example, migrant labour is important within the countries of the Arabian Gulf, which has small populations but large construction projects supported by oil. In the Asia, both Malaysia and Singapore both rely on foreign construction, while Israel due to the continuing problem with the Palestinians has recruited construction workers from the Philippines, Thailand, China and Romania. Many of the construction workers in Moscow and its environs come from the Caucasus and Central Asian republics. It can therefore be concluded that construction, given its project by project nature, will continue to have inflows and outflows of labour (ILO, 2005, p53).

Migrant workers in construction in the UK though, while still forming a major block of migrant labour was only the eleventh largest employer of migrant labour employer in the UK between July 2004 and June 2005 (AMR, 2005,p14). As shown in the table below the WRS data shows that at no point between Q2 2004 and Q3 2005, were more than 2000 workers registered compared with 19,145 registrations in Q3 2005 in the administration, business & management sectors:

	Q2 2004	Q3 2004	Q4 2004	Q1 2005	Q2 2005	Q3 2005	Total
<b>Construction and Land</b>	1,710	1,995	1,480	1,610	1,905	1,955	<b>10,655</b>

Source: AMR (2005, p12) amended.

What then are the issues for migrant workers within the construction industry? Dench, Hurstfield, Hill and Akroyd (2006) have carried out some research, which though it covers a number of sectors, does also cover construction. They point firstly to the number of migrant workers who are self employed, and move from site to site in search of work. This analysis corroborates the work of Shik, Sin et al (2004) who identified what they observed in Australia, where the contractors were employing Korean-speaking tiling workers in self organised teams at lower rates of pay than those for naturalised workers. The Koreans appeared to accept this situation, as they were able to work faster than other workers thus raising their overall pay levels. There was however some concern about the effect that this scheme might have on apprentice training (Dench et al, 2006, p19).

In relation to where contractors are getting their labour from, then the research suggested that construction employers relied heavily on workers from the EU and the A8 states, with one respondent only employing migrant workers from outside the EU. The majority however appear to be coming from the A8 states due to the fact that these countries are believed to have an available pool of labour or these were the countries from which the agencies were providing labour (Dench et al, 2006, p23). The research further determined that some migrant workers were employed as general labourers, while the others were employed in skilled trades. The trades specifically mentioned by respondents within the research were the trades of tillers, carpenters, plumbers and glaziers (Dench et al, 2006, p25).

Given what has been stated above and the prevalence of agency workers being employed through agencies and self employed, it is perhaps not surprising that migrant workers stayed from a minimum of a few days to several months, as they move from contract to contract. Even those contractors who claimed to have migrant workers as part of the workforce identified that these workers stay upwards of a year and then returned home, often coming back to England again after a few months.

In addition there is some evidence that some migrant workers are using their time in the UK to obtain qualifications with a view to getting a better job. There was also an impression by respondent contractors that they did not think that many of the young migrant construction workers wished to stay in the UK after a couple of years, although the view was also expressed by a construction contractor that he thought that older migrant construction workers were more likely to return home, as they had stronger ties (Dench et al, 2006, p26).

Earlier in this section reference was made to the fact that in Australia rates for migrant workers were below indigenous rates. This rather 'dubious' practice appears to be going on in the UK as well, with four employers in the research admitting to paying their migrant workers below normal rates, and of these four, three were in construction! One construction employer justifies this practice by saying that the migrant workers did not have qualifications or recognised (by him) qualifications which was why they were paid less (Dench et al, 2006, p26). The issue of qualifications and the lack of them, or non UK qualifications is also a reason why some construction employers involved in the research did not employ migrant workers.

The issue of poor English was also an issue for non employment in relation to construction (Dench et al, 2006, p30). Generally there is concern within the construction industry that lack of English is a problem due to health and safety (Dench et al, 2006, p33). There was a view expressed however that many large

construction companies in the UK were using migrant workers to undermine the pay and conditions of the indigenous staff (Dench et al, 2006, p63).

There was also evidence in the survey that at least one construction company in the North East got over the return home needs of the migrant workers to his own benefit by agreeing with his migrant workers that they could take their annual leave in one block, provided that they did it in a period where British workers were not taking their leave (Dench et al, 2006, p26).

Although generally employers did not see proficiency in English as being an issue, within the construction companies being researched, there was an acceptance that all migrant workers understood the Health and Safety provisions. Also within construction specifically, there was an expectation that migrant workers would work together to assist with the translation of any training, but it was also conceded by many construction respondents that they did not provide any training, rather expecting the workers to be fully trained on arrival (Dench et al, 2006,p28). One innovative contractor uses his office staff to fill out all the forms of those migrant workers who do not speak English (Dench et al, 2006, p39).

The next question therefore is why do construction firms employ migrant workers? The evidence suggests that they do so due to the perceived skill shortages, particularly in relation to the skills shortages in skilled craft operatives, particularly in regions like London, where demand on large projects is making the need for migrant labour more acute and many Poles are currently working (Dench et al, 2006,p30). In relation to construction labour, the reasons given for employment were simply those of availability due to labour shortages, not skill shortages as it is proposed to be the case with skilled labour (Dench et al, 2006, p30).

Another issue of concern to some employers in construction is a potential pool of illegal workers, with some contractors speaking of migrant workers “legging it” when a Home Office inspector came on the site (Dench et al, 2006, p31). Another contractor in the research spoke of seeing ‘fake’ documentation, he also said that he found that the processing of the paperwork surrounding migrant workers to be prohibitive (Dench et al, 2006, p34).

Where illegal working within the construction industry is taking place, it is more likely to be reported in London than anywhere else in the country. A major issue for contractors highlighted by the research was that the number of contractors, sub-contractors and sub-sub-contractors who were on a large building site at anyone time, makes it difficult for the main contractor to police the site properly. A construction contributor to the research also expressed the view that the main culprits of employing illegal labour were large contractors who used them for a number of small short term jobs (Dench et al, 2006, p60). Further evidence was also adduced of foreign workers on construction sites producing a false National Insurance number (Dench et al, 2006, p62).

Evidence from the research of Dench et al (2006) shows that of those contractors who do employ migrant labour, there is a very good work ethic amongst those workers, with migrant workers being happy to work overtime and weekends and will do most jobs on site without “moaning like the domestic labour” (Dench et al, 2006, p32). Within the construction industry, the employers conceded that in some cases there had been tensions between the migrant workers and the indigenous staff, with racist comments being the usual outworking of this tension. The employers claimed to have addressed these issues by making clear to the indigenous workforce that racism would not under any circumstances be tolerated. To tackle this issue, one

construction employer put the migrant workers together in a team, and then slowly began to break this team up, and integrate the migrant workers into teams with indigenous workers, and this was apparently successful (Dench et al, 2006, p35).

The view overall of the participants in the research from the construction sector was mixed, with some contractors feeling that migrant workers were not relevant to them, and others claiming that their businesses could not survive without migrant labour (Dench et al, 2006, p36). The problem of recruitment of the necessary skilled labour as already stated is most acute in London, with one London contractor concluding that without migrant workers the building industry could not survive! (Dench et al, 2006, p38).

The ways that construction employers recruit their migrant workers appears to ingenious, many of the contractors looked for certain characteristics in the workers that they hired, including physical strength and/or dexterity, reliability, a positive work attitude, willingness to go the extra mile and work extra hours when necessary. These criteria were often taken in advance of previous experience particularly in relation to the non-skilled jobs. In relation to skilled labour, there was a different attitude with experience being counted in many cases above qualifications, and this usually involved what might be described as a skills test and a two week trial period. Problems with recruiting migrant workers for management positions were however identified, as much work in this area in construction is traditionally done by word of mouth between employers which is not possible with migrant workers (Dench et al, 2006, p40). In relation to construction professionals, then contractors taking part in the survey claimed that qualifications would be the determiner of who got the job regardless of nationality (Dench et al, 2006, p41).

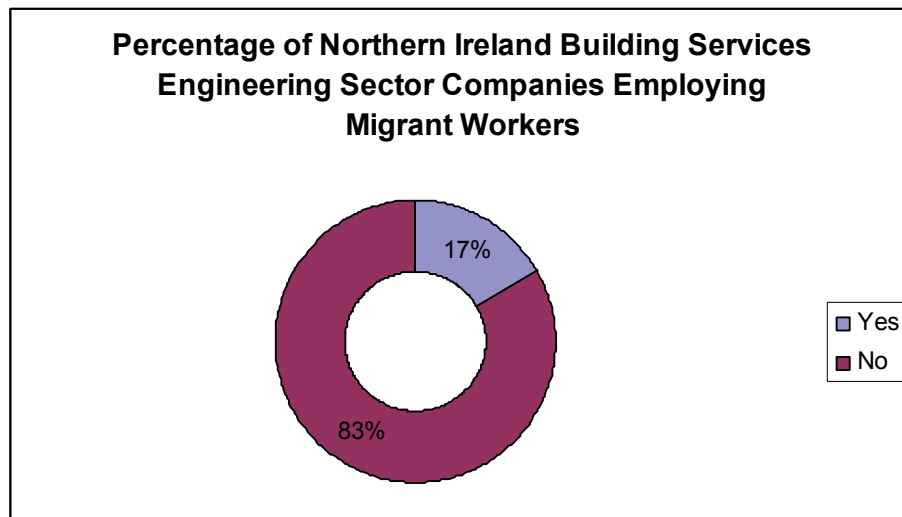
At the beginning of this section it was suggested that the concept of the 'Polish Plumber' was mythological and owes as much to French politics as it does to reality in Britain. Although as already stated, the total number of migrant workers in Britain cannot be determined and in the construction industry this may be affected by a large amount of unregistered and illegal working. The data from the WRS between July 2004 and September 2005 suggests that the majority of migrant workers are not to be found in the SummitSkills core footprint as shown in the table below:

Trade Area	Number	SSC Responsibility
Carpenter & Joiner	1,270	ConstructionSkills
Electrician	195	SummitSkills
Floorer and Wall Tiler	70	ConstructionSkills
Handy man general builder	840	ConstructionSkills
Painter and Decorator	475	ConstructionSkills
Plaster	120	ConstructionSkills
Plumbers and H&V Engineers	110	SummitSkills
Roofer, roof tiler and Slater	60	ConstructionSkills
Brick layer	575	ConstructionSkills
Civil Engineer	130	SEMTA
Construction materials delivery	80	ConstructionSkills
Constructor Road	110	ConstructionSkills
Constructor Roofing	100	ConstructionSkills
Constructor Steel	280	ConstructionSkills
Labourer Building	6,095	ConstructionSkills
Site Manager (Construction)	50	ConstructionSkills
Site Supervisor(Construction)	75	ConstructionSkills
Skilled Machine Operator (Construction)	395	ConstructionSkills
Skilled Vehicle Operator (construction)	45	ConstructionSkills
Supplier Construction Materials	30	ConstructionSkills

Source: AMR (2005, Annex A p31-37, amended).

### 11.7.3 The Northern Ireland Building Services Engineering Sector Perception of Migrant Workers

Although globalisation is seen as an issue within the building services engineering sector in Northern Ireland, the issue of migrant workers working within the sector would not appear to be as widespread as the quotations on globalisation might have expected, as evidenced by the diagram below:



The quotes below are indicative of the views of the companies encapsulated in the diagram above:

*No. I must admit now, I was tempted but then I thought to myself, no, I'll stick with who we're dealing with and again at the end of the day, if we did get busy, I might consider ... it depends. I did meet a couple of polish guys who were very, very highly technically trained, they were very pleasant, I was very, very impressed with them and it's a pity some of our tradesmen weren't as good as what they appeared to be. (NISP01)*

*No, we haven't. However, there are other companies in Northern Ireland which are taking on quite a few. We recently done a job in one of the boats in the North Irish ferries. There was 500 odd employees on the job, working on that job. I think the security man reckoned 70 per cent of them were Polish. (NIMP02)*

*No. We do not currently employ any migrant workers in the electrical trade. Nor would we unless we had total confirmation of their craft skills and ability and their ability to read and understand English. We had experience recently of migrant craft workers in a contract in Southern Ireland and their standard of installation... not for our company but for another company on the same large contract site, was appalling.*

**(NIMET01)**

*We have had and we have employed them. We do find, one of the problems with employing people from ethnic minorities is that they are quite unsettled and, maybe, it's just a case that, in a couple of experiences of people that we have had in, that didn't have a base, they weren't settled in their own base, they'd come and they'd come to the area and then, for certain reasons, they had found out, maybe, that we're in a small rural area, 'cause we live in a rural area, that wasn't just the centre of life and they found at that, maybe, they wanted to be in Belfast, or they wanted to be in Dublin, or they wanted to be somewhere, or in some of the cities, or in the bigger towns and we also found ... but, I'd have to say, that I never had a problem with any of them, I always found them very, very good workers and I would have no problem employing them again. The biggest downfall I did find, until employing them, was, in fact it had a major security risk and probably, in many ways, is that a lot of them do not understand English, now that's being prejudice, but English is the language that we would use mostly in the construction industry and there's also the other problem that we've have with it too, is that what their level of craft qualification is, is very, very hard to establish. People will come to you and tell you that they can, you know, they ... when you interview them, everything will be no problem to them. When you actually put them out to do the job, you find out that, you know, they have, maybe, no experience, or very little experience. So how we go about ... when people, one of the important things for ethnic groups who are coming into the country, looking for work, from my point of view is, that they actually have something that demonstrates their actual ability to do the job. (NISHV01)*

*None now 'cause the poor guy went to Romania and they wouldn't let him back. So... (NIMACR01)*

In addition NILBSEC01 has employed two Polish migrant workers as technicians

**11.7.4 Conclusions**

The building services engineering sector within Northern Ireland is not alone in claiming that as yet migrant workers have not infiltrated to any great extent. The current demographics of the employed population and the views contained in the Turner report suggest that there will be a continued need for increasing numbers of migrant workers entering the economy to make up for those indigenous workers retiring or leaving employment and not being replaced. The literature review within this report suggests that the sector in conjunction with SummitSkills, partners and stakeholders will need to look to providing ESOL training to facilitate these migrant workers in communicating in English and health and safety training to facilitate safe working on site. SummitSkills believes that it is also important for the indigenous qualifications of migrant workers to be incorporated within the Northern Ireland curriculum framework to prevent any deliberate refusal to recognise 'home qualifications' with a view to avoiding union agreed rates of pay for migrant workers, as would appear to have been the case with some unscrupulous companies within

the sector elsewhere within the UK. SummitSkills will continue to work with partners and stakeholders to make sure that this is a reality.

## 12 Future Thinking / Scenario Planning

### 12.1 Introduction

In this section of the SNA, the anticipated future performance of the building services engineering sector is analysed through the prism of three scenario plans. These plans do not project an absolute reality, but are only indicators of how the sector **may** perform over a given period based on a number of assumptions about economic performance within the UK as a whole and the devolved nations and regions as appropriate. Within this SNA, SummitSkills are presenting three different scenarios on the potential performance of the sector, and these represent two forms of Labour Market Information, the first being based on the University of Warwick model prepared for the sector by Experian (through Construction Skills) and the second being prepared from the same data by BSRIA albeit both scenarios have different assumptions as to the general growth rates within the economy, different outflows and inflows and retirements from the sector for example.

To triangulate this (see methodology) this SNA also as part of the primary data collection asked a scientifically devised cross section of the building services engineering sector their views on the performance of the sector in the short to medium term. The rationale for adopting this approach was to triangulate and/or question the scenarios put forward by the University of Warwick model, as there was a feeling among SummitSkills trade association stakeholders, that the figures presented in that model did not accurately reflect the views on the ground and of the sector. While it might be felt that this methodology lacks the scientific rigour of a LMI survey, SummitSkills believes that contractor confidence in the economic performance of the sector in the short to medium term will have a significant impact on the requirement for training of apprentices and on the business decisions made by companies within the sector. Economists have long accepted that a bullish market can in the short term at least drive a part of the economy, or indeed the whole economy for a given period. SummitSkills intends that in presenting these scenarios stakeholders and partners will have a framework through which to plan recruitment and/ or the provision of curriculum, however these scenarios are based on assumptions only, and SummitSkills advises that these scenarios are seen to be only indicative of what the future for the building services engineering sector might be.

### 12.2 Scenario A: SummitSkills Amended Experian Model

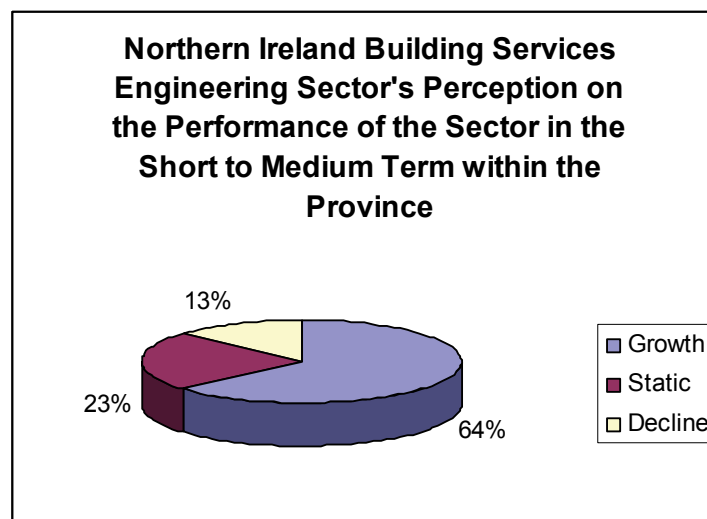
SummitSkills would like to thank ConstructionSkills for their support in enabling us to utilise their model in this SNA. The amended Experian model suggests that within the United Kingdom, the building services engineering sector will continue to enjoy growth patterns identified over the last few years, fuelled by a significant amount of new build, and that this will matriculate into a demand for significant numbers of apprentices within the building services engineering sector. Growth within the Northern Ireland replicates the rest of the United Kingdom, although it is not as might be expected, as buoyant as other regions/nations within the United Kingdom.

UK employment			Average Annual Requirement
	2006	2010	2006-2010
Electrotechnical	196,400	216,240	8130
Plumbers (including Gas)	82,323	90,617	2878
Heating and Ventilation	45,735	50,343	1599
Air Conditioning and Refrigeration	24,392	26,850	853
<b>Northern Ireland</b>	2006	2010	2006-2010
Electrotechnical	9,850	10,430	360
Plumbers (including Gas)	3613	3845	367
Heating and Ventilation	2007	2136	204
Air Conditioning and Refrigeration.	1070	1139	109

Source: Experian/ Hammond (2006) Amended.

### 12.3 Scenario B: Qualitative Research Data

The diagram below would appear to indicate that the building services engineering sector within Northern Ireland is generally of the belief that the market will grow over the short to medium term (up to five years). The confidence levels of the sector are however not as high as those in other parts of the UK, although as intimated in the quotes, this may in part be due to the current political climate in Northern Ireland:



The quotes below are indicative of the views expressed by the companies encapsulated within the diagram above:

*Well I suppose it all really depends. What we are told is that the Strategic Investment Board has a large spend plan to do in Northern Ireland and if that does come through then we will see the industry either market grow but really I think it all depends on government spend in Northern Ireland as to how the market grows because there is really very little major private spend which will generate anything. So if the SIB money comes through, yes the market will grow. (NILP01)*

*Well, sadly the building services sector has been contracting for the last year, particularly in relation to the industrial and commercial side*

*of the industry. Cutback in government spending in education, health services and other departments, the rapid downward turn in inward investment for private development, particularly in new manufacturing units, has clearly affected the industry. Currently the recession is biting deeply, not only in Northern Ireland but in the UK. I think it will continue. I think the further cutbacks announced in education, manufacturing and agricultural will result in liquidations taking place. I do accept that in housing, Northern Ireland and most of the mainland UK remain buoyant. But there will be an impact on that as the downward spiral in the other parts of the construction industry bite into the various other sectors of our economy. (NIMET01)*

*Well, all I can say at this present moment in time, especially in the workplace within Northern Ireland, if we had stable government I could see a massive increase in the sector. But at this present moment in time over the next period of the next one to two years, I see it being very... (NIMET02)*

*I would assume it would grow... it probably will. Yes probably it will. (NISHV02)*

*Yeah, I have no doubt. I mean the Strategic Investment Board had a recent release where they were talking about a release of £16bn into the economy, construction economy, which is welcome. But if you take out of that the Enniskillen Hospital, the Downpatrick Hospital West Link and the National Stadium, you know you can already see that incredible dent in the next couple of years. And if that's a 10 year spend then realistically it probably isn't a good deal. (NIMHV01)*

*I think based on the documentation that has been about, including the ... There's a new document, the strategic investment document, where it was alleged £16bn was going to be spent in that period of time, I believe of 10 years. In theory should that spend occur, there should be an increase in the size of business that's going to be available in the building services sector in the one to five year period. However, there has been a noticeable decline in the private sector investment over the period of time. If that continues, on balance I would say that it's going to remain very similar over the course of the next one to five years, perhaps with the occasional peak during that period. (NILHV01)*

*I think the opportunity is there for the sector to increase over the, certainly the next five years, the difficulty is with the fragmentation. If the marketplace doesn't see some commercial sense then the investment opportunity and training that's required is going to suffer and that will have an impact on the whole marketplace. (NILHV02)*

*I think it'll grow. (NISACR02)*

*The sector's going to grow in size because of all the green issues. Everything has to be changed to suit this. It's going to grow. (NISBSEC01)*

## 12.4 Conclusions

The scenarios presented are three potential scenarios for the Northern Ireland building services engineering sector's requirements for apprentices based on the Experian and BSRIA model predictions. Although the Northern Ireland building services engineering sector companies are not as robust as other regions in the country, there is still a perception amongst nearly 70% of the companies that the market will continue to grow, and SummitSkills believes that this opinion within the market will drive the need for apprentices in the short to medium term. As the figures quoted by Experian and BSRIA are so diverse, SummitSkills recommends that planners and policy makers follow the more optimistic Experian figures when planning for new apprentice starts in the sector at this time. SummitSkills will continue to monitor the market within Northern Ireland and advice planners and policy makers accordingly.

## 12.5 Scenario C: BSRIA Model

Unlike the Experian model, the BSRIA Model shows a more pessimistic outlook of the future performance of the building services engineering sector. The table below shows the forecast of the number of employees, as projected by the University of Warwick forecast for SummitSkills adjusted (by BSRIA) and also indicates the skilled trades in other sectors as a base for 2005. The data shows a decline in the volume of the workforce across the whole of the building services engineering sector, within every region and devolved nation.

### Forecast Employees within SummitSkills' remit by region, 2005-2010.

Adjusted SummitSkills plus skilled trade in other sectors (Warwick forecast)	Employees 2005	Employees 2008	Employees 2010	Average % Change 2005-2010
United Kingdom	653,494	630,009	621,809	-4.5%
Northern Ireland	22,376	20,881	20,134	-10.0%
Scotland	55,337	52,158	50,620	-8.5%
Wales	24,413	22,321	21,396	-12.4%
England	551,368	534,649	529,659	-3.5%
<b>England by Regions:</b>				
North East	22,776	27,578	27,386	-1.4%
North West	68,740	65,917	64,941	-5.5%
Yorkshire and Humberside	60,956	56,993	55,291	-9.3%
East Midlands	50,336	48,045	47,219	-6.2%
East England	75,767	74,574	74,644	-1.5%
West Midlands	56,399	53,142	51,818	-8.1%
London	64,877	64,400	64,577	-0.5%
South East	89,410	87,549	87,039	-2.6%
South West	57,106	56,451	56,744	-0.6%

Source: BSRIA model for 2005 based on LFS Working Futures 2

Notes: BSRIA figures adjusted pro-rata by the percentage change forecast by Warwick Institute for Employment. Research to give data for 2008 and 2010.

Breaking this down further into specific trade areas, this projects to the following skilled trade requirements being required within the sector across the UK.

**Warwick Forecast for SummitSkills remit 2005-2010**

Adjusted SummitSkills plus skilled trades in other sectors	2005	2010	Expansion Demand (5 yr period)	Retirement (5 yr period)	Net new entrants required (5 yr period)
Skilled trades	386456	375,261	-11,195	56,690	45,495
Electrotechnical	187,019	181,601	-5,418	27,428	22,010
Plumbers	92094	89426	-2668	13509	10842
Heating and Ventilation	51163	49681	-1482	7505	6023
Air Conditioning and Refrigeration	27287	26497	-790	4003	3212
Specialist Operatives	28,892	28,055	-837	4,245	3,408

BSRIA (2006) estimates based on LFS data, Working Futures 2

From the data above it is possible to extrapolate for Northern Ireland to identify the annual number of trainees required in each trade area within the province.

Adjusted SummitSkills plus skilled trades in other sectors	2005	2010	Expansion Demand (5 yr period)	Retirement (5 yr period)	Net new entrants required (5 yr period)	Average Net New Entry per Year
<b>Northern Ireland</b>						
Skilled trades	10434	10132	-302	1531	1228	246
Electrotechnical	5050	4903	-146	741	594	119
Plumbers	2487	2415	-72	365	293	59
Heating and Ventilation	1381	1341	-40	203	163	33
Air Conditioning and Refrigeration	737	715	-21	108	87	17
Specialist Operatives	780	757	-23	115	92	18

BSRIA/ Hammond (2006)

The Experian model is significantly more optimistic than the BSRIA model.

**12.6 Conclusions**

Of the three scenarios listed above, SummitSkills believes that the view of the contractors (Scenario B) may be the most important as, based on economic theory, the ‘bullish’ nature of the market can drive the need for training of apprentices and entry to the sector. Therefore it is argued that companies in the Northern Ireland will make business decisions, including apprentice training, based on their perceptions of the sector.

It is recommended that partners make allocation of training provision and funding arrangements on the more optimistic side (perhaps in line with the Experian model). SummitSkills intends to continue to analyse market conditions regionally and nationally and will monitor sector confidence and advise stakeholders and partners accordingly.

## 13 References

Action Renewables (2005) Renewable Energy in Northern Ireland: A quantification of renewable energy installations in Northern Ireland, with particular focus on small-scale renewables Belfast, Action Renewables.

Andrew, A., Open University Young Woman in a Modern Apprenticeship Scheme in Engineering Construction. Research report for JIVE Partners July 2005

A., Fuller Beck, V., Unwin, L., Employers, young people and gender segregation, Occupational Segregation Working Paper Series No. 28, Equal Opportunities Commission 2005, Spring 2005.

American Forum for Global Education (2001) American Forum for Global Education [http:// www.globaled.org](http://www.globaled.org)

AMR, Accession Monitoring Report May 2004- September 2005 A joint report by the Home Office, the Department for Work and Pensions, the HM Revenue & Customs and the Office of the Deputy Prime Minister, 22 November 2005

A., Dale Jackson, N., Hill, N., Women in non-traditional training and employment, Occupational Segregation Working Paper Series No. 26, Equal Opportunities Commission 2005, Winter 2005.

Ansell-Pearson, Keith, Parry, Benita and Squires, Judith. (1997). Cultural Readings of Imperialism. New York, NY: St. Martin's Press.

Ashcroft, Bill, Griffiths, Gareth and Tiffini, Helen, Eds. (1995). The Post- Colonial Studies Reader, London: Routledge 1995.

Basic Skills Agency (2005) Benchmark Statistics, 2005 London, Basic Skills Agency.

Bache, I. Mitchell, J. (1999) Globalisation and UK Regions: the Prospects for Constituent Diplomacy Sheffield, University of Sheffield

Berger, P. and Luckmann, T. (1967) The Social Construction of Reality Garden City NY, Doubleday.

Bernard Williams Associates, Benchmarking of Construction Efficiency in the EU Member States, Bernard Williams Associates 2006.

Braidford, P. Stone, I (2003) Construction Sector: 2002 Snapshot Northern Economic Research Unit.

Burleson, R. Hass, C. Tucker, R. Stanley, A, (1998) Multi-skilled Labour Utilization Strategies in Construction Journal of Construction Engineering and Management Vol.124 (6) pp480-489.

Bogdan, R. and Bilken, S. K. (1992) Qualitative Research for Education: A Introduction to Theory and Methods London, Allyn and Bacon.

Bollag, Burton. (2000). The New Latin: English Dominates in Academe. The Chronicle of Higher Education, September 8<sup>th</sup>.

- BSRIA, Labour Force Survey Unpublished
- Chimelli, Rudolph. (2000) Finite Fuels. World Press Review. 47 (10), 6-7. New York, N. Y.: The Stanley Foundation.
- CIPD 2005, Quarterly Labour Market Outlook, Survey Report Spring/ Summer 2005 CIPD
- CIRIA, Benchmarking for Construction: A Strategic Review, Project Report 69, CIRIA, London 1998.
- Clarke, L. Wall, C. (1998) A Blueprint for Change: Construction Skills Training in Britain Kings Lynn, CITB.
- Cooke, P. Roper, S. Wylie, P. (2002) Developing a Regional Innovation Strategy for Northern Ireland Belfast, Northern Ireland Economic Development Office.
- Cogburn, D. L., Globalisation, Knowledge, Education and Training in the Information Age Director, Centre for Information Society Development in Africa, 2000.
- Department for Education and Skills, National Employer Training Programme March 2005, London, DFES.
- DEL (2002) Skills Strategy for Northern Ireland; March 2002 Belfast, Department for Employment and Learning
- DEL (2004) Skills Strategy for Northern Ireland: November 2004 Belfast, Department for Employment and Learning.
- DEL (2006) Skills Strategy for Northern Ireland: February 2006 Belfast, Department for Employment and Learning.
- Department for Employment and Learning (2004) Sector Skills Strategy for Northern Ireland November 2004, Department for Employment and Learning.
- DfES 2005, Further Education: Raising Skills, Improving Life Chances, Department for Education and Skills 2005.
- DfES, 14-19 Education and Skills, Presented to Parliament by the Secretary of State for Education and Skills by Command of Her Majesty, February 2005.
- Faulkner, Dr. W., Science Studies Unit University of Edinburgh, Gender In/ Of Engineering, A Research Report Economic and Research Council, March 2006.
- DTI (2004) Trade and Investment White Paper 2004: Making Globalisation a force for good London. HMSO.
- DTI (2006) Our Energy Challenge: Power from the People London, Department of Trade and Industry.
- DTI, A Strategy for Women in Science, Engineering and Technology, Government Response to set Fair, Office of Science and Technology Department for Trade and Industry 2003.

Easterbrook, Gregg. (2000). Who's Afraid of Globalisation? The Wall Street Journal. April 14<sup>th</sup>.

EC (1998) Regional Innovation Systems: Designing for the Future-REGIS Final report of the REGIS project, Targeted Socio-Economic Research (TSER) Programme (coordinator: P.Cooke). Brussels: European Commission DG XII.

Economic Research Institute of Northern Ireland (Erni) (2005) Measurement and Benchmarking of Competitiveness- The cost of doing business in Northern Ireland Belfast, Economic Research Institute of Northern Ireland.

Economic Research Institute of Northern Ireland (Erni) (2006) Decomposition of regional GVA per capita by UK region Belfast, Economic Research Institute of Northern Ireland.

ECOTEC (2005) Occupational and Functional Map of the UK Renewable Energy Sector Cardiff Energy and Utility Skills.

ECOTEC 2005, Toward an Occupational and Functional Map of Renewable Energy, ECOTEC, Cardiff, November 2005.

EFRA 2006, Climate Change The UK Programme 2006, Presented to Parliament by the Secretary of State for the Environment, Food and Rural Affairs, March 2006.

Egan J (1998) Rethinking construction. Report of the Construction Task Force to the Deputy Prime Minister, John Prescott, on the scope for improving the quality and efficiency of UK construction, Construction Task Force, July 1998

Environment Agency (2005) Grey Water: Conserving Water in Buildings London , Environment Agency.

EOC, Gender Equality and Lifelong Learning in Scotland, Equal Opportunities Commission, Manchester, Spring 2000.  
Fahey and Randell 1989

Farmer, H., Wardrop, J. L., Anderson, M. and Risinger, R. (1995) Women's career choices: focus on science, math and technology careers, Psychology of Counselling Psychology, 42: 155-70

Fiet, J. O. (2000) The Pedagogical Side of Entrepreneurship theory, Journal of Business Venturing, 16 (2): 101-117

French, H. (2000) Vanishing Borders Protecting the Planet in the Age of Globalisation Washington D.C. Worldwatch Institute.

Giddens, Anthony. (2000). The Third Way and Its Critics. Malden, MA: Blackwell Publishers.

GIIC Forum (1998) Rethinking Education and Training to Meet the Challenges of the 21<sup>st</sup> Century Washington D.C. Global Information Infrastructure Commission.

Greider, W. (1997) One World: Ready or Not New York, Simon & Schuster.  
Harvard Business School 2005

- Gomar, E. Hass, C. Morton, D. (2003) Assignment and Allocation Optimaization of Partially Multi-skilled Workforce Journal of Construction Engineering and Management Vol 128 (2) pp103-109.
- Gruneberg, S.L. (1997) Construction Economics-An Introduction London, Macmillan.
- Hawken, Paul. (2000). The Storm Over Globalisation. World Watch, 14(1), 12-20, Washington D. C.: Worldwatch Institute 2000.
- Henderson, C. (1998) Asia Falling: Making Sense of the Asia Economic Crises New York, McGraw Hill.
- Henderson, Jeffrey,. Globalisation of High Technology Production, (London: Routledge, 1989).
- HM Treasury 2005 Global Europe: Full Employment Europe
- Home Office 2006, Sally Dench, Jennifer Hurstfield, Darcy Hill, Karen Akroyd Employers' use of Migrant Labour Main Report Home Office online Report April 2006
- Hwang, A. (2001) AIDS Has Arrived in India and China World Watch 14 (1) 12-20. Washington D.C. Worldwatch Institute
- IFF Research Ltd, Workforce Mobility and Skills in the Construction Sector in London and the South East, CITB, ECITB and SEEDA by IFF Research Ltd December 2003.
- Illich, Ivan. (1971) Deschooling Society. New York, NY: Harper and Row.
- International Labour Office, Towards a fair deal for migrant workers in the global economy International Labour Conference, 92<sup>nd</sup> Session, 2004
- International Monetary Fund, International Monetary Fund, September 2003.
- Jack, S. and Anderson, A., (1999), Entrepreneurship education within the enterprise culture producing reflective practitioners, International of Journal of Entrepreneurial Behaviour and Research, 5 (3), 110.
- Jameson, Fredric and Miyoshi, Masao, Eds. (1998) The Cultures of Globalisation. Durham, NC: Duke University Press.
- Portes, J., and French S., on behalf of the Department for Work and Pensions Working Paper No 18 2005, The Impact of free movement of workers from central and eastern Europe on the UK labour market early evidence. DWP 2005
- Kenny, R. Florida, M. (1993) Beyond Mass Production: The Japanese System and Its Transfer to the United States New York, Oxford University Press.
- Kirby, D. (2006) Entrepreneurship, McGraw Hill, London
- Lambert T., Lambert Review: Business University Collaboration, HM Treasury, HMSO December 2003.
- Larwood, L., Gutek, B. and Gattiker, U. E. (1984) Perspectives on institutional discrimination and resistance to change, Group and Organisation Studies, 9: 333-52.

- LeCompte, M and Preissle, J. (1993) Ethnography and Qualitative Design in Educational Research 2<sup>nd</sup> Ed, San Diego, Academic Press INC.
- Learning and Skills Council 2006 National Employers Skills Survey 2005: Key Findings Coventry, LSC.
- Learning and Skills Council London West, Building Your Future The Barriers to Women entering the Construction Industry and Possible Actions, funded by London West Learning and Skills Council, March 2004.
- Lincoln, Y. and Guba, E. (1985) Naturalistic Inquiry London, Sage.
- Linda Miller, Fiona Neathey, Emma Pollard and Darcy Hill, Institute for Employment Studies, Occupational Segregation Gender Gaps and Skill Gaps, Occupational Segregation Working Paper Series No. 15, May 2004.
- Lipietz, A. (1992) Towards a New Economic Order New York. Oxford University Press.
- Lord Leitch, Skills in the UK: The Long Term Challenge, Interim Report Leitch review of skills, December 2005.
- Lourenco F., and Jones O., Learning Paradigms in Entrepreneurship Education: Comparing he Traditional and Enterprise Modes, National Council for Graduate Entrepreneurship Working Paper 027/2006 June 2006.
- Lynne, Gary (2000). Industrialisation and Globalisation: A Battle over Values? Cornhusker Economics July 26. Lincoln, NE: University of Nebraska Institute of Agriculture and Natural Resources.
- Mansell, R. When, U (Eds) (1998) Knowledge Societies: Information Technology for Sustainable Development New York. Oxford University Press.
- Maykut, P. and Morehouse, R. (1994) Beginning Qualitative Research: A Philosophic and Practical Guide London, ROutledge/ Falmer.
- McGuinness, S. Doyle, J. (2005) Examining the Link between Skill Shortages, Training Composition and Productivity Levels in the Northern Island Construction Industry Working Paper Series No 3, Belfast, Economic Research Institute of Northern Ireland.
- Porter, M. E., Competitive Advantage Creating and Sustaining Superior Performance, Michael E. Porter, Free Press, London, 1985.
- Migration: A Survey University of Surrey December 3 2002
- Minniti M., Allen I. E., Langowitz N., Global Entrepreneurship Monitor: 2005 Report on Women and Entrepreneurship, GEM 2005.
- National Statistics (2001) The National Census 2001 London The Office of National Statistics.
- National Statistics 2005, National Insurance Number Allocations to Overseas Nationals Entering the UK Department for work and pensions, 2005

- ODPM (2004) The English Indices of Deprivation, 2004 London, ODPM.
- O' Mahony & De Boer (2002), Britain's relative productivity performance National Institute of Economic and Social Research, March 2002.
- Office of the Deputy Prime Minister, The building regulations 2000 Electrical Safety Part P: Design and Installation of electrical installations, April 2006.
- Office of the Deputy Prime Minister, The building regulations 2000 Conservation of fuel and power: Conservation of fuel and power in new dwellings, April 2006.
- Parenti, Michael. (1995). Against Empire San Francisco, CA: City Light Books 1995.
- Parker-Jenkins, M., Hartas, D., Irving, B. A. and Barker, V. (1999) The Careers Service and Young Muslim Women Sheffield: DfEE
- Paton, M.J. (1990) Qualitative Evaluation and Research Methods 2<sup>nd</sup> Ed. London, Sage Publications.
- Payne, J. (1988) Routes at sixteen: trends and choices in the nineties. DFES Research Report no. 55. Sheffield: DfEE.
- Pensions Commission, A new pension settlement for the twentieth first century The second report of the pensions commission, London 2005
- Pensions Commission, Pensions Challenges and Choices The First Report of the Pensions Commission, London 2004
- Pittaway L., and Cope J., Entrepreneurship Education: A systematic review of the evidence, National Council for Graduate Entrepreneurship Working Paper 002/ 2006.
- Porter, M. E. and Ketels, C. H., UK Competitiveness: Moving to the next stage, DTI Economics Paper No. 3 (2003)
- Postel, Sandra (2000). Troubled Waters. The Sciences, March / April.
- QCA, LSC, Principles for a credit framework for England, Qualifications and Curriculum Authority, Learning and Skills Council March 2004.
- Rahnema, M. Bawtree, V. (1998) The Post-Development Reader Atlantic Highlands, New Jersey, Zed Books. Ringland 2006
- Roberts, G (2002) SET for Success: the supply of people in science, technology, engineering and mathematics skills. Report of Sir Gareth Roberts' Review: London: The Stationary Office.
- Ross, L., Amabile, T. M. and Steinmetz, J. L. (1977) Social roles, social control and biases in social perception processes, Journal of Personality and Social Psychology, 35: 485-94.
- SDBNI (2004) Northern Ireland: Draft Economic Vision October 2004, Belfast, Sector Development Branch Northern Ireland.
- SSDA, (2005a) Evaluation of the Pathfinder Sector Skills Agreement Process: Research Report 15 November 2005 Waltham-upon-Dearne, Skills for Business.

- SSDA (2005b) Sector Skills Agreement: Stage 1 Skills Needs Assessments, Guidance January 2005 Waltham-upon-Dearne, SSDA Research Team.
- Sandwell LEA Internal LEA Report on Performance Sandwell, Sandwell MBC.
- Sarasvathy, S. D. (1999) Causation and Effectuation. Towards a Theoretical shift from economic inevitability to entrepreneurial contingency, Academic of Management Review, 26.
- Schimmel, D. B. (2000) Developing science talent in minority students: perspectives of past participants in a summer mentorship programme, Dissertation Abstracts International, Section A, 61: 498
- Silverstone, R. and Towler, R. (1984) Secretaries at work Ergonomics, 27 5: 557-64
- Sir Andrew Foster, Realising the Potential: A review of the future role of further education colleges, DfES Publications, November 2005.
- Stephen Drinkwater, Paul Levine, Emanuela Lotti, The Economic Impact of Migration: A Survey University of Surrey December 3 2002
- Steyaert, C. and Hjorth, D. (2003) (eds.) New Movements in Entrepreneurship Ch I pp 3-20 Edward Elgar
- Swartz, W. (2000) Net Gains and Losses: The Global Trade Scramble World Press Review 47 (4) 6-13 New York. The Stanley Foundation.
- Tesch, R. (1990) Qualitative Research: Analysis Types and Software Tools London, The Falmer Press.
- Tooley, J (2000) Reclaiming Education London. Cassell.
- Vesper, K. Unfinished Business (Entrepreneurship) of the twentieth century Cambridge University Press 2004
- Walker, R. (1985) An Introduction to Applied Qualitative Research in Walker, R. (Ed) Applied Qualitative Research Aldershot, Gower
- Warwick Institute for Employment Research, Pera The Innovation Company, IFF Research Building Services Summary Analysis and Evaluation, March 2006
- Wikipedia 2006 [http://en.wikipedia.org/wiki/Polish\\_Plumber](http://en.wikipedia.org/wiki/Polish_Plumber) Wikimedia
- Williams, G. (2002) The Enterprising University: Reform, Excellence and Equity, Buckingham: The Society for Research into Higher Education and Open University Press.
- Wilson N. C., and Stokes D., Entrepreneurship Education: The Road Less Travelled, National Council for Graduate Entrepreneurship Working Paper 024/2006 .

## 14 Appendices

### 14.1 Questionnaire

(This Interview Schedule is intended to be used with Company Directors/ Owners/ Managers of Building Services Engineering Companies as appropriate)

The Lead in is to be used by operations managers to set the scene for the questions, this should reduce the time explaining any issues, and will address any potential failure on the part of the interviewee to read the fact sheets.

Lead in:

In many sectors of manufacturing and other sectors of the economy, British Business and Manufacturing is increasingly being subjected to competition from organizations across the World. This increasing competition for work is often called globalization. What products are being specified, and do they raise a training need in your company?

Questions:

Have you experienced in your business, or do you think that you might experience competition from companies based overseas.

If you have, what countries are you discovering that these organizations come from?

Lead in:

Technological Change is another issue that is affecting some sectors of British Manufacturing and Business

Question:

Do you find that there are a number of new products being specified in work that you tender for?

Lead In:

Another area that may be affect the Building Services Engineering Sector is the Area of Customer Demand and how this is changing the industry. This may be particularly the case in relation to the concepts of Environmentally Friendly Construction Techniques and Sustainable Development, for example things like combined heating and power, grey water, solar panels etc.

Questions:

Is your organisation discovering that more regard for Issues relating to the environment, green issues and sustainability are appearing in tender documentation and contracts?

Do you have employees with skills and expertise in sustainable development construction techniques?

How is your organisation preparing for the future in relation to the requirements for 'greener' buildings and sustainable development?

Moving away from sustainability, are there any other issues that are driving change in your organisation, for example have the industry licensing scheme had any impact on your organisation?

(Prompt if necessary, if it appears anything else might be coming out of this question)

Lead in: Government Policy has a great effect on the economy through its laws and regulations, and in relation to the Building Services Sector, these might take the form of Building Regulations, Health and Safety, tax and self employment issues etc.

Question:

To what extent therefore have Government regulations affected your organisation and the Building Services Sector generally?

(CHANGES IN THIS AREA HAVE GENERALLY AFFECTED ONLY ENGLAND AND WALES, INTERVIEWERS PLEASE BE AWARE OF THIS)

Lead in: In addition to regulations, the Government also play a major part in the development of policy for training of new entrants and existing employees within the Building Services Sector, through for example the Foundation and Modern Apprenticeship scheme.

Question:

What is your view on the role that Government play in the development of policy in relation to the training of existing and new entrants to the Building Services Sector?

Lead in: Another area that I want to consider with you, is the concept of barriers to entry to the Building Services Engineering Sector, which includes the Plumbing Industry, the Electrotechnical Industry, the Heating and Ventilating Industry and the Air Conditioning and Refrigeration industry, and Building Services Consultancy or more simply, if you were starting out in business now, in a firm of the same size as that to which you now belong what issues such as for example qualification requirements, capital investment, insurances, management skills etc might hinder this development?

Question:

So, what problems do you think you would face today, if you were going to start up in business?

Lead in: A strange concept perhaps, but one that might affect the performance of contractors within your industry is the concept of rivalry between the various organisations. Rivalry between contractors/ consultants between each other might lead to cost cutting on tenders to win prestigious work, or to get on a particular Architects or Engineers approved contractor list or simply because of the diverse personalities of Chief Executives for example?

Question:

In your experience then, what is the extent of rivalry currently existing between the various contractors/ consultants within the Building Services Industry?

Lead in: Another issue for contractors particularly within the Building Services Sector might be that of bargaining power, particularly between the contractor and sub-contractors and the contractor/ subcontractor and the materials suppliers, this may be strong or weak depending upon whether the contractor is a large national contractor or a jobbing one man band plumber or electrician, or the contractor can do things like buy materials in bulk on ninety day credit, or weaker if the contractor can only buy materials over the counter job by job on a cash only basis.

Question:

What factors affect the bargaining power of your organisation with your material suppliers and sub-contractors?

Lead in: Another issue related to this is the bargaining power that a contractor in the Building Services Sector might have with clients, to an extent this might relate to the current performance of the economy and/or the competitive position of the relevant industries, which make up the Building Service Sector.

Question:

What factors affect the bargaining power of your organisation with your clients?

Lead in: A very important issue for contractors and consultants alike to consider in relation to the Building Services Engineering Sector, is how they feel that the sector will perform economically over the short to medium term, and whether they feel that there will be plenty of work and the sector will enjoy growth and prosperity, in which case they will decide to invest etc, or whether they feel that the sector is likely to contract, in which case Contractors and consultants alike may decide to 'draw in their horns' etc.

Question:

How do you think the Building Services Sector is likely to perform over the short to medium term of one to five years? Do you think the sector will grow in size and value, or contract?

Lead in: Investment in plant and equipment is an important part of the business strategy for many organisations within the British economy.

Question:

Does or has your organisation invested in plant and equipment?

Lead in: Research and Development is also a major factor in many sectors, for example the pharmaceutical industry, and this research may take place in-house by the companies own research department, through professional research companies, or through the University Sector.

Question:

Does your organisation engage in any form of Research and Development, and if it does, who carries it out?

Lead in: In this interview we have already looked at the incorporation of new technology in relation to sustainability, I would now like to look at your organisations investment in the IT hard and software end of new technologies

Question:

Is your organisation planning to incorporate new technologies into your business practice?

Lead in: Although this question may have been considered previously under other headings, I want to look at competition that you and your organisation are discovering within the industry. So in relation to competition there may be new companies entering the market, or your competitors may be investing in R&D, new plant and equipment or engaging in a large upskilling of the workforce etc; which is likely to affect your organisation.

Question:

So given the behaviour of the competition, what changes do you envisage that your organisation will experience over the short to medium term in relation to the competitive environment? And what do you intend to do about it?

Lead in: Enterprise and the role of the entrepreneur is a major issue in relation to the development of improved performance in the British Economy

Question:

Do you think that the concept of enterprise and the entrepreneur is relevant to your industry? If it is, how do you feel that your organisation is being entrepreneurial, how do you think it might be more entrepreneurial?

Lead In: Investment, innovation, competition and enterprise are factors that Building Services Engineering Companies may need to be successful in the future regardless of size or industry.

Question:

Do you feel that your organisation has the relevant skills to aid your organisation to develop an enterprise culture using investment, innovation, competition and enterprise?

Lead in: Many organisations have traits that they feel make them better than their competition and give them the edge in business. This might include things like paying higher wages, multi-skilling, providing extra training, safety equipment, private healthcare for employees, productivity bonus etc anything that gives you the edge.

Question:

What particular thing do you think that your organisation does that makes it better than your competitors?

Lead in: Another business technique that is popular is called benchmarking, which means comparing your organisational performance against another organisation. This can be in the same industry or sector, or indeed an organisation from another industry or sector, and can be done informally or formally, and can take many forms from desk top research to visits and sharing of ideas. The purpose of benchmarking is to help an organisation to gather ideas of good practice, and seek to implement them into their own organisation.

Question:

Do you ever compare your organisation formally or informally with your competitors?

Lead in: We are now going to talk about basic skills; these are the traditional skills of reading, writing and arithmetic, renamed today as literacy, numeracy or information technology (computer use). There is concern in Government that the poor basic skills of the workforce may be affecting the productivity and performance of the UK economy.

Questions:

Do your employees have sufficient basic skills to meet the needs of your organisation both now and in the future?

When recruiting school leavers etc as apprentices, do these and other relevant new entrants to your organisation display the relevant and requisite basic skills to meet your organisational requirements?

Lead in: Talking now about general and practical skills that your employees need to do the work that you require of them, and this could relate to things like requiring a pipe fitter who can weld pipes using both gas and arc. If you struggle however to find staff who have the skills you require to complete a task satisfactorily such that you may have to sub it out, then this might affect your organisation's productivity etc it is therefore an important issue to discover what skills you are finding difficult to obtain/retain or train.

Question:

What Skills do the existing staff in your organisation not have, and what skill requirement issues do you think that they have, and how do you perceive that these will affect your business, and what do you intend to do about it?

Lead in: Skills are categorised between basic which is level One and Advanced, which is level five. In relation to craft level operatives, the S/NVQ level 2 is equivalent to old craft level certificate and the S/NVQ 3 is equivalent to the Advanced Craft Certificate. The old ONC and HNC are still in place as are degrees, but S/NVQ levels 4 & 5 are also qualifications available for professionals, particularly in relation to supervisory and management qualifications for staff within Building Services Engineering Organisations.

Questions:

Given the size and type of work that your organisation carries out, what level of skill do you find that you need in your organisation for the various levels and occupations of the staff employed?

Does your organisation see training craft operative staff to the industrial standards in plumbing, and/or H & V, Electrical and Air conditioning and Refrigeration as a priority, this being level 3?

What if any are your organisations needs for technical skills and qualifications at National Certificate/ Higher National Certificate/Diploma both now and in the future?

Does your organisation train its supervisory staff and management using management qualifications or training and if so, which are they?

Lead in: Given the issues that we have looked at in relation to competitiveness and investment etc, it is important to consider how the future need for skills will impact on your organisation, and how your organisation is seeking to address the issues related to future skills.

Question:

What future skill needs does your organisation anticipate needing in the short to medium term future? What is your organisation doing to address these identified needs?

Lead In: Akin to skills is the recruitment of staff to replace staff lost through retirement and natural wastage within the industry, and in some cases it may be that some organisations failed to retain existing staff.

Questions:

How many staff do you anticipate requiring in the short to medium term to take account of retirement and natural wastage?

How would you describe your organisation's retention of employees, and what percentage would you put on staff turn over within your organisation yearly? How do you think that your percentage turn over compares with the percentage turn over of other organisations within your industry?

Do you think that giving existing employees more training would improve organisational loyalty?

Lead in: Construction and the Building Services Engineering Sector is often perceived by the outside world as a white male dominated preserve, and so the Government is keen to engage with sectors such as ours to encourage the employment of as diverse a range of staff as possible. Within this context, although not directly related to it, Construction is also seen as a sector that is beginning to recruit migrant workers to fill skills gaps and skills shortfalls.

Questions

How many of your staff are women, and what percentage of the total staff are made up of women, and of them, how many are engaged as Craft operatives, and how many as technicians or professionals?

How many of your staff are from black ethnic minorities, and what is the percentage of the total staff are from BEM backgrounds, and of those, how many are women?

Do you or have you employed migrant workers from other parts of the world? What percentage of the staff total would you classify are migrant workers?

Lead In: Scenario planning, or if you like, trying to judge what the future will look like, is a very important theme in the Government's efforts to shape the economy and plan for the future, and it is important to look at the planning of the Building Services Sector also over a five year period, seeking to look at what the size of the industry might be, the type of work being undertaken, whether there will be a need for more employees or less, and what skills and qualifications these workers will require if the Building Services Sector is going to continue to be successful.

Question:

How do you think the Building Services Industry will change and what do you think it will look like in the short to medium term?

#### NATION SPECIFIC QUESTIONS

OPERATIONS MANAGERS ARE RESPONSIBLE FOR THE REGIONAL/ NATIONAL FEEL OF THE SNA FOR THEIR REGION, SOME QUESTIONS HAVE BEEN IDENTIFIED, AND IT IS RECOMMENDED THAT MORE QUESTIONS BE ADDED TO AID REGIONALISATION.

#### WALES

Does your organisation carry out work in England? If yes, what percentage of your total work comes from England?

Does your organisation carry out its business through the medium of the Welsh language? If not, are you aware of the current legislation relating to the Welsh language?

#### EXTRA QUESTIONS AS REQUIRED

#### NORTH WEST/ SOUTH WEST/ SOUTH EAST/ WEST MIDLANDS REGIONS IN RELATION TO WALES

Does your organisation carry out work in Wales, if yes what is the percentage of your total work that comes from working in Wales?

Is your organisation familiar with the requirements of the Welsh language Act and marketing/developing your business through the medium of Welsh?

If your organisation is familiar with the issues surrounding the Welsh language, then how are you implementing them? If not, how are you planning to address the issues related to the Welsh language, and do you intend to undertake any training in this area?

#### ADDITIONAL QUESTIONS RELATING TO ENGLISH REGIONS

#### SCOTLAND

Does your organisation carry out work in England? If yes, what percentage of your total work comes from England? If yes, what percentage of your total work comes from England?

Are there any additional issues for Scottish Organisations, working within England, in relation to for example the Building Regulations?

## ADDITIONAL QUESTIONS RELATING TO SCOTLAND

### NORTHERN IRELAND

Does your organisation carry out work in Eire? If yes, what percentage of your work comes from Eire? To what extent is your organisation affected by the performance of the economy in the South of Ireland?

## ADDITIONAL QUESTIONS RELATING TO IRELAND