Skills at Regional Level in Ireland

A study of skills demand at regional level for specified enterprise sectors

Expert Group on
Future Skills Needs

To the Minister for Enterprise, Trade and Employment and the Minister for Education and Science

Forfás

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A study by the Expert Group on Future Skills Needs based on research undertaken by

PACEC
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Acknowledgement

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Foreword by Ms. Anne Heraty, Chairperson, Expert Group on Future Skills Needs

This study represents a new departure for the Expert Group on Future Skills Needs: its' first attempt to systematically investigate regional variations in the skills composition of the Irish labour force. Previous studies by the Group have been conducted at the national level and did not incorporate a geographical breakdown of skills.

A fundamental transformation is underway in the nature of regional employment in Ireland. This has been highlighted by the recent spate of announcements of, on the one hand, closures of low value-added manufacturing plants, and on the other, foreign investments in new high value-added projects, spanning services and biotechnology. In order to facilitate and smoothen this transformation for all involved, it is important to understand both the current make-up of regional skills and the profile of skill requirements for the new enterprise environment.

This study focused on six specified Key Sectors across 8 regions in Ireland and within this scope it identified a number of important issues in relation to the role of skills in regional development; these findings should provide a valuable contribution to on-going and future studies into the broader issue of overall regional development policy.

A further benefit to emerge from this study is a greater understanding of the challenges inherent in attempting a skills analysis at a sub-national level in such a geographically small, and economically open, country as Ireland.

Over 70 interviews were conducted by the consultants during the course of this study. I would like to thank all those from development agencies, local authorities, education providers and industry groups who participated in these interviews for the contribution to the study; their input has been invaluable.

I would particularly like to thank the following bodies for the time and energy which they contributed to this study: Enterprise Ireland; FÁS; HEA, IBEC; IDA Ireland; Shannon Development; Western Development Commission; Dept. Education and Science; Dept. Enterprise, Trade and Employment; and the Dept. Environment, Heritage and Local Government.

Ms. Anne Heraty
Chairperson
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May, 2006.

Table of Contents

List of Tables

List of Figures

Executive Summary

Objectives

The overarching objective of this study is to identify the role of skills in contributing to more regionally balanced economic growth and development, such that all parts of the country realise their full economic potential, which in turn will contribute directly to national competitive advantage. The specific objectives are to:

- Assess the skill requirements of six Key Sectors, namely:
  - Internationally traded business services;
  - Pharmaceuticals/biotech;
  - ICT hardware;
  - ICT software;
  - Medical devices; and
  - Engineering.
- Complete a baseline assessment of Ireland's current regional skills variations;
- Quantify the types of skills required to ensure success of regional development strategies over the period to 2010;
- Identify the major policy implications of these findings.

Methodology

The methodology comprised two concurrent strands of activity: (i) Field research incorporating some 70 face-to-face interviews with policy makers, regional authorities, executive agencies, higher educational establishments and other stakeholders in each of the regions; (ii) the analysis of historical and recent, national and regional labour market trends, with particular reference to the six target sectors.

Based on the results of these strands, projections of skill requirements for these sectors in the regions were developed, under two scenarios: a 'baseline' one and a 'stronger regional policy' one. The study has confined itself to developing projections for total employment in each of the KS and has not attempted to quantify skills gaps.

In developing the national projections for the sectors use was made of ESRI growth projections, as well as primary research. These ex ante ESRI projections, published in 2004, have proven to be conservative and actual employment growth in the intervening period has exceeded the projections by a significant margin. Nevertheless, the projections developed in this study still serve to provide broad indications of the trends for the sectors in each of the regions. Projections for the regions were made using evidence from past trends of each KS in each region in conjunction with a review of regional strengths and weaknesses. These projections present a possible scenario over the period to 2010, based on this methodology, and do not represent targets for the development agencies.

A degree of caution is always prudent when assessing projections. Developing quantified projections of skills deficits for a sector nationally is fraught with difficulty due to the complex, non-linear interplay between supply and demand both within, and between, economic sectors, as well as demographic factors such as birth-rates and migration. These difficulties are compounded when one moves to the regional level by the impact of commuting and the relative ease of inter-regional migration. Furthermore, structural changes will

have a pronounced impact over the medium-term on the evolution of the six Key Sectors selected for this study. Consequently, the projections in this report should be interpreted as representing a likely scenario which is underpinned by probabilities rather than certainties. Any number of plausible contingencies (global energy price shock, sharp decline in the value of the dollar etc.) could serve to undermine these projections.

Regional distribution of employment

The study estimated that employment in the 6 KS in 2004 was 186,500, equivalent to 10.6% of total employment. The regional distribution of the KS employment was quite uneven:

- BMW share of 21% (total employment 25%);
- Dublin and Mid East 46% (total employment 43%);
- Rest of State 33% (total employment 32%).

There was also pronounced regional specialisation in different KS:

- Medical devices in the West;
- Internationally traded services and ICT software in Dublin;
- Pharmaceuticals in South West, Mid East and South East;
- ICT hardware in Mid-East;
- Engineering in Rest of State.

Skill structure by educational qualification

Nationally, for all industries, approximately 31% of the workforce had 3rd level qualifications in 2004. Again, there were significant regional variations:

- Dublin: 37% of workforce with 3rd level;
- BMW: 25% of workforce with 3rd level;
- Rest of State: 27% of workforce with 3rd level.

11% of the labour force had science qualifications but regional differences were relatively small.

Skill structure of KS by educational qualification

Nationally, 37% of KS workforce has 3rd level qualification compared with 31% for all industries. Regional differences are also significant:

- 49% of KS workforce in Dublin with 3rd level;
- 28% of KS workforce in BMW with 3rd level;
- 34% of KS workforce in SW region with 3rd level.

Regional differences in the share of scientists also significant, with Dublin again dominant.

Drivers of KS Regional Employment

A number of important drivers of employment growth in the KS in the regions were identified:

- Presence of an existing concentration of firms in the KS;
- Accessibility to main cities and towns within and outside Ireland;
- Degree of urbanisation and urban critical mass;
- Capacity of the region to provide a distinctive quality of life; and
- Presence of high quality Universites/IOTs.

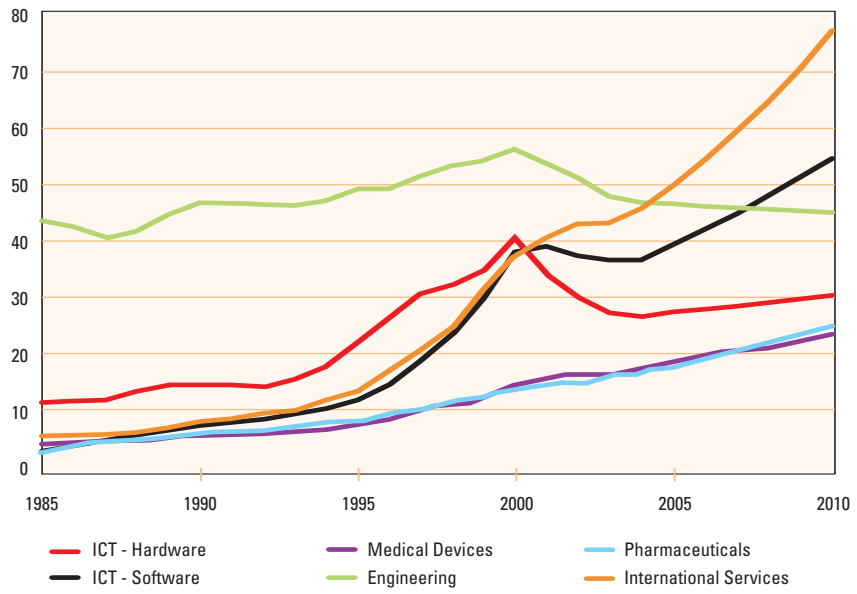
Projected employment growth in the KS

These projections are based on an analysis of past trends informed by a qualitative assessment of the main threats and opportunities each KS faces in the period 2004 to 2010.

The KS will increase their total employment by just over 60,000 to just under a quarter of a million in the period 2004 to 2010. Within this total increase it is estimated that there will be a requirement for 33,300 additional workers with 3rd level education. Employment growth in the KS will slow down from 5.1% p.a. over 1996-2004 to 4.8% p.a. over 2004-2010.

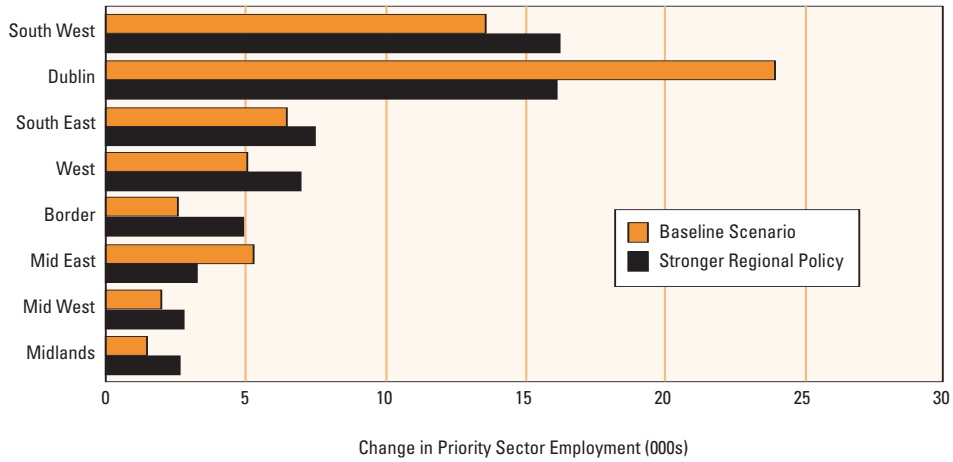
The historical and forecast employment performance of the KS is illustrated in Figure A.

FIGURE A: KEY SECTOR EMPLOYMENT TRENDS



ITS will exhibit the largest rate of employment growth over the period and will become the largest of the Key Sectors. The regional breakdown of the projected growth over the period 2004-2010, for each of the two scenarios considered, is illustrated in Figure B.

FIGURE B: KEY SECTOR REGIONAL EMPLOYMENT GROWTH SCENARIOS, 2004-2010



General observations

- In a knowledge economy, the shadow costs associated with a deficit in transport infrastructure are more significant for transporting people than for moving goods (freight).
- A Low Skill Equilibrium[1] occurs when there is an apparent balance between supply and demand for skills in a region in which firms predominantly produce low value-added goods and services. On the one hand, there is no incentive for individuals or firms to up-skill and on the other, there is no innovation or imperative to move up the value-chain. Therefore both demand and supply-side measures are necessary to raise the skill level in a region.
- The success of a Key Sector in a region is inextricably linked with the national competitiveness of the sector. Furthermore, regional skill shortages specific to a particular KS, typically reflected skill shortages confronting that sector nationally.
- Labour markets are delineated by the distances over which workers are willing to travel to work. Therefore Travel To Work Areas (TTWA) would provide a more appropriate basis for regions rather than the administrative definitions (BMW, Mid-East etc) used predominantly in this study.
- Furthermore, TTWA will evolve as new infrastructure comes online and impacts on patterns of commuting.
- Third-level institutions in the US consider regional development an integral part of their rasion d'être and act accordingly.
- Clustering is most important for industries based on new or emerging technologies as it facilitates the dissemination of tacit knowledge. As sectors mature sectors they tend to become increasingly geographically diverse.
- For optimal regional development, the relationship between cities and the towns in their hinterland, so called polycentric urban regions, should be considered. The aim is to ensure that cities grow in a manner which does not displace the hinterland town.
- Skill sets are emerging which cut across the Key Sectors at a number of occupational levels. There include process skills such as handling regulatory affairs, quality control, design, data management etc.
- There was a widely held view in regions outside Dublin and the Mid East, that skills pools are limited because sectors requiring those skills are under-represented.

1 Finegold, D. and Soskice, D. (1988). The failure of British training: analysis and prescription, Oxford Review of Economic Policy, 4, 3, 21-53.

Conclusions

In view of the small geographical size of Ireland it is likely that normal labour market adjustments across regions will, in time, partially or fully correct any imbalances. These mechanisms have proven to be highly effective historically in Ireland. In particular, migration of population across regions and commuting flows between regions are mechanisms by which regional skill surpluses and deficits are ameliorated.

Therefore, an essential role for the State in addressing any regional skills deficits should be facilitating the operation of normal labour market adjustment mechanisms and the removal of obstacles arising from market and government failure.

In this regard, for a number of regions, improved transport communications are required to facilitate increased and less costly commuting and to extend the geographical reach of the travel to work area; an upgraded and improved housing stock is necessary to accommodate in-migration to a region; an urban centre with high quality leisure amenities and local public services, such as education and health, is required if a region is to attract a high quality workforce. In addition, sites and premises appropriate for modern commercial and industrial firms are also imperative.

However, regional interventions through the Higher Education Institutes can play an important role in breaking the Low Skill Equilibrium referred to in the preceding section by infusing higher skills into a region and thereby spurring regional innovation and entrepreneurship.

The 'brain drain' of scientists and other graduates to Dublin and abroad is likely to persist without a significant deepening and widening of regional labour markets. The regions must seek to provide a wider variety of career structures and job opportunities to limit the drain to the more developed labour markets located in major cities such as Dublin and elsewhere. The solution includes ensuring that a wider range of business functions are performed in the regions outside Dublin and to a lesser extent the other major city/regions, especially by the Irish facilities of inward investors.

In certain locations such as Galway, Cork and Dublin a critical mass of capabilities and skills has been generated. Moreover as major business processes cut across several sectors (procurement, supply chain management, shared services), so do the supporting skills and capabilities. This would suggest that an industrial strategy in the regions based on the cultivation of horizontal business functions would be more appropriate than the targeting of specific sectors.

1 Introduction

1.1 Background to the study

The central aim of this study is to identify regional variations in skills, with a focus on the skill requirements confronting six key sectors in 2010. These sectors, henceforth referred to as Key Sectors (KS) are Software and ICT services; ICT hardware; Internationally Traded Business Services; Pharmaceuticals (bio- and chemical); Medical Devices; and Engineering. These sectors are promoted by IDA Ireland and Enterprise Ireland (EI) and are important sectors for enhancing regional development in the Regional Economic Strategies prepared by the Regional Authorities in Ireland. The study is to be conducted using the 8 NUTS[2] level 3 regions: Border, Midlands, West, Dublin, Mid-East, Mid-West, South East and South West.

The study is set within a policy framework that not only places great emphasis on upgrading the quality of human capital and lifelong skills development in securing national competitive advantage, but also recognises the potential contribution of each region in raising national economic performance. Thus a central thrust of government policy is to facilitate and support the development of a framework within which each region can enhance its competitive advantages and realise its full economic and social potential and at the same time, contribute to a more regionally balanced and efficient national economy. To this end the government has made a renewed commitment to a strategy for the regions through:

- A National Spatial Strategy (NSS), published in 2002 and embracing each of the eight regions of Ireland.
- Regional Economic Strategies (RES) and Regional Planning Guidelines (RPG) for each of eight Regional Authorities.
- The establishment of new Regional Assemblies within the context of the National Development Plan (2000-2006).
- Increased focus by IDA Ireland and Enterprise Ireland on regionally based initiatives to create a 'dynamic' within the regions to support the attraction of high-value sectors such as ICT, biopharmaceuticals and medical devices.
- A national plan for transport infrastructure, Transport 21.

The implementation of these strategies and their effectiveness in securing more balanced regional development and enhanced national efficiency depends critically on whether the skill requirements of the key high-value sectors can be met in the regions.

1.2 Study objectives

The specific objectives of the study are to:

- Explore the concept of regions facilitating the development of world-class competencies in high-technology/value sectors, e.g. national/international centres of excellence at regional locations, including definition of labour market and the issue of labour mobility.
- Complete a baseline assessment of Ireland's current and projected skills variations in identified regions within Ireland.
- Quantify the types of skills required to ensure regional development strategies, as outlined in strategy documents such as those by IDA Ireland and EI, can be successfully pursued.

2 Nomenclature of Territorial Units for Statistics.

1.3 Approach and methodology

To achieve the aims and objectives of the study an integrated programme of research was undertaken involving an:

- extensive literature review including central government and agency reports, academic publications and regional strategies,
- field research incorporating some 70 face-to-face interviews with policy makers, regional authorities, implementing agencies, higher educational establishments, industry representative bodies and other stakeholders in each of the eight regions,
- database assembly and analysis of national and regional labour market trends with particular reference to the six KS,
- the analysis of factors influencing regional skill requirements in the period to 2010 and projections of skill requirements under a 'Baseline' and a 'Stronger Regional Policy' scenario,
- consideration of policy implications.

This research programme was designed to provide both a qualitative and a quantitative assessment of future skills needs relevant to the six Key Sectors (KS) in each of the eight regions. The quantitative analysis and projections are set within the boundaries provided by the national and regional projections provided by the ESRI. They should not be interpreted as precise forecasts for each region. Rather the intention is to provide an indication of the likely scale of changes in employment for these sectors. The interviews with senior public sector and industry officials in each of the regions were designed to provide qualitative assessments of the skills likely to be in short supply in their regions. In addition these discussions informed the assessment of the capacity of regions to attract different KS and meet their high level skill requirements.

In making quantitative projections of employment growth arising from the growth and development of the six KS in each of the eight regions we have adopted a top down approach. Projections are made of national employment in each of the six sectors. These national projections provide an overall constraint on the regional projections (the sum of each of the eight regional projections must be equal to the national projection). In making the national projections for the sectors we made use of ESRI projections as well as our own research. These ex ante ESRI projections, published in 2004, have proven to be conservative and actually employment growth in the intervening period has exceeded the projections by a significant margin. Nevertheless, the projections developed in this study still serve to provide broad indications of the likely trends for the sectors in each of the regions.

Projections for the regions were made using a combination of evidence from past trends of each KS in a region combined with our review of regional strengths and weaknesses. Two main scenarios are presented in this study, the first is a 'baseline' assessment of the position in 2010 which takes account of past and future developments impacting on employment growth of the KS in a region assuming regional policies (including those of the IDA Ireland, EI, regional authorities and central government) continue to have regional impacts similar to those achieved in the past. The baseline projection is thus a 'no change' regional policy scenario. The second scenario reflects the impact of a much stronger regional policy including proposals in the National Development Plan, the National Spatial Strategy and the Regional Strategy Agendas. The 'strengthened regional policy' scenario therefore reflects the ex ante assessment of the impact of policy.

Some conceptual issues

In approaching the study we were aware of the important distinction between the skills of the labour force and the occupational structure of the labour force. A skill is a set of capabilities and competences to undertake a task or job and the occupation is the label given to the job. There is no neat mapping of skills into standard occupational categories. Occupational categories used in government-provided data also tend to be changed relatively infrequently and this presents problems in industries experiencing rapid technological or organisational change or where work practices are constantly evolving.

A closely related problem is that the definition of a skill is also linked to a formal academic qualification and this is an imperfect proxy for many capabilities and competencies, particularly those acquired through work experience. Notwithstanding these problems, occupational-based and qualifications-based measures of skills are widely used in 'top down' studies of skill needs.

Another very slippery concept relates to the question of what we mean when we talk of a skills gap or a skills shortage. Thus the difficulty/ease in recruiting individuals with particular skills may simply reflect the cyclical behaviour of the overall economy, stickiness in wage adjustments to bring the demand and supply of skills into balance or inadequate non-pecuniary rewards to workers. However if there is a *persistent* shortfall or surplus for a particular skill it may reflect either a failure of one or more **market adjustment mechanisms** for bringing supply and demand into balance or the fact that a long period of training is required in order to produce the skill. At a regional level, for example, the availability of suitable housing at an affordable price may limit in-migration of labour with the necessary skills. In these circumstances there may be a case for policy intervention to increase the supply of housing land. Another example of inadequate adjustment to changing conditions is insufficient student or training places in educational institutions.

The **institutional framework** within which labour markets adjust to technological progress and increasing competition provides another set of factors which give rise to 'stickiness' in the adjustment process and to persistent skill deficiencies. The institutional framework that is relevant here embraces not only the rules, regulations and norms governing industrial relations and the labour market but also the credit market, housing market and training and educational provision. Thus there are policy interactions and it is the overall institutional framework that matters when focusing on the problem of regional labour market imbalances. These interactions affect, inter alia, workers' incentives to invest in skills, the willingness or ability of firms to train employees and the mobility of labour.

Skill shortage may also not be apparent in regions currently specialising in low value-added markets requiring relatively limited supplies of skilled labour. Such regions are also likely to have a workforce that reflects these low value added market segments. Should policy be effective in catalysing or securing a restructuring away from relatively low value-added segments of the market towards high value-added markets, a serious deficiency of suitable skills might well emerge.

One further point with respect to skill shortages relates to the difficult question of **labour market boundaries** within which skill shortages are assessed. In the analysis presented in this report the focus is very much on administratively defined regions. Such boundaries do not necessarily coincide with the geographic boundaries of labour markets. Labour markets are delineated by the distances over which workers are willing to travel to work. Migration of population across regions and commuting flows between regions are mechanisms by which regional skill surpluses and deficits are ameliorated. An expansion in the demand for a particular skill in a region may result in a skills deficit which is reduced by such inter-regional adjustments as migration and commuting. Ideally therefore one would undertake the analysis at the travel-to-work geographical level when seeking to estimate skill gaps. The compromise position here is to analyse

data at both the level of the eight administrative regions and to group these regions into three groups (BMW, Dublin and Mid East and the South East, South West and Mid West) to more closely approximate a travel-to-work area.

By 2010 improved physical communications (and knowledge flows) are likely to expand the geographical reach of some regional labour markets and potentially improve the labour market adjustment process. Thus regional labour markets are not fixed entities in terms of their geographical boundaries and assessments of skill shortages must take cognisance of their spatial evolution.

1.4 Report structure

Subsequent chapters are arranged as follows. Chapter 2 analyses the current and past performance of the six KS, nationally and in each of the eight regions, in terms of employment. Chapter 3 focuses on current and past trends in the skills of regional workforces as measured by their occupational mix and educational qualifications. Chapter 4 presents estimates of KS employment growth for each of the regions for the period 2004 to 2010. Finally Chapter 5 considers some policy implications.

2 The regional distribution and performance of the Key Sectors

2.1 Introduction

An analysis of the current regional distribution and past growth of employment in each of the six 'Key Sectors' (KS) is a prerequisite for estimating their future employment growth and skill requirements in the period to 2010. A region in which a KS is heavily represented is likely to possess competitive advantages for attracting and growing that sector. Not surprisingly therefore, the future growth and development of a sector in a region will in part be determined by the current size and relative concentration of the sector in that region as well as by other factors including regional policy. This is particularly the case for firms in high-technology and knowledge-based sectors which in many countries show a strong propensity to cluster geographically in a small number of regions. This clustering may occur for a number of reasons such as labour pooling (the existence of thick markets for specialised labour), knowledge spillovers between firms, supply chain linkages and a diverse and established science base in the region providing high quality labour. The existence of substantial internal economies of scale may also encourage geographical concentrations for particular sectors.

Although, geographical clustering is a feature of certain sectors this is not to say that regions that do not currently host a particular sector/cluster cannot attract or grow that sector/cluster. What is clear is that once a cluster or 'critical mass' of a sector is established in a region there are strong reasons for believing that it may continue to grow and develop in that region with a corresponding increase in the demand for skills and labour. Of course new influences may emerge which ultimately lead to the fragmentation of a sector/cluster and its dispersal to other regions and overseas thereby releasing labour/skills from that sector into the region and redeployed in other activities.

The first part of this chapter therefore establishes the regions in which the KS are currently located, based on an analysis of the regional distribution of employment for each of the KS. We then measure the degree of specialisation of the KS in each region which reveals the propensity for regional clustering of KS. This is followed by an analysis of past growth of each KS by region which provides additional important insights into the competitive advantages of each region for attracting and growing different KS. In doing this we draw on evidence from the Forfás database on employment and the Census of Population for 1991, 1996 and 2002.

The second part of the chapter estimates the skill requirements of the KS in each region using the occupational and educational structure of employment in each of the KS. A specific aim of this part of the study is to establish the educational qualifications at 3rd level or above which are of particular importance for the KS. This provides the basis for forecasting the future educational requirements (Chapter 4) of the KS, given their projected employment growth in each of the eight regions.

2.2 The regional distribution and growth of the Key Sectors

The regional distribution of employment in the Key Sectors in 2004: an overview

In 2004 the six KS provided 186,500 jobs accounting for 10.6% of total employment in Ireland. The distribution of these jobs across the eight regions of Ireland was very uneven. Some 67,700 KS jobs were located in Dublin (36% of the total) with the South West region hosting the second largest concentration of 27,100 jobs (15% of the total). Only 4% of KS jobs are located in the Midlands and only 7% are in the Border region.

TABLE 1: TOTAL EMPLOYMENT AND EMPLOYMENT IN EACH OF THE KEY SECTORS, BY REGION, 2004

AREA	EMPLOYMENT AND EMPLOYEES IN KEY SECTORS, 2004 (000s)							
	TOTAL EMPLOYMENT	ICT HARDWARE	ICT SOFTWARE	MEDICAL DEVICES	ENGRING	PHARMA	INTL SERVICES	TOTAL KEY SECTORS
State	1,757	26.6	35.8	17.9	44.9	17.0	44.4	186.5
Border Midlands and West	**433**	**3.6**	**3.9**	**10.0**	**11.8**	**2.3**	**7.1**	**38.7**
Border	175	1.5	0.6	1.9	4.6	0.5	3.6	12.7
Midlands	92	0.7	0.8	1.4	2.4	0.0	1.4	6.8
West	166	1.4	2.6	6.6	4.7	1.7	2.2	19.2
Dublin & Mid East	**761**	**13.1**	**25.4**	**2.0**	**11.0**	**7.2**	**26.8**	**85.5**
Dublin	616	5.6	23.1	1.2	7.8	4.4	25.7	67.7
Mid East	144	7.6	2.3	0.8	3.2	2.9	1.0	17.8
Rest of State	**564**	**9.8**	**6.5**	**6.0**	**22.1**	**7.5**	**10.5**	**62.4**
Mid West	146	4.8	1.9	1.8	6.8	0.3	3.9	19.5
South East	172	0.5	1.7	1.8	8.1	2.5	1.1	15.8
South West	246	4.6	2.9	2.3	7.2	4.6	5.4	27.1

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

TABLE 2: PROPORTION OF TOTAL EMPLOYMENT, AND OF EMPLOYMENT IN THE KEY SECTORS, ACCOUNTED FOR BY EACH REGION, 2004

AREA	PROPORTION OF IRELAND EMPLOYMENT, 2004 (%)							
	TOTAL EMPLOYMENT	ICT HARDWARE	ICT SOFTWARE	MEDICAL DEVICES	ENGRING	PHARMA	INTL SERVICES	TOTAL KEY SECTORS
State	100	100	100	100	100	100	100	100
Border Midlands and West	**25**	**14**	**11**	**56**	**26**	**13**	**16**	**21**
Border	10	6	2	11	10	3	8	7
Midlands	5	3	2	8	5	0	3	4
West	9	5	7	37	11	10	5	10
Dublin & Mid East	**43**	**49**	**71**	**11**	**24**	**43**	**60**	**46**
Dublin	35	21	65	7	17	26	58	36
Mid East	8	28	6	4	7	17	2	10
Rest of State	**32**	**37**	**18**	**33**	**49**	**44**	**24**	**33**
Mid West	8	18	5	10	15	2	9	10
South East	10	2	5	10	18	15	3	8
South West	14	17	8	13	16	27	12	15

Note: Totals may not add up due to rounding
Source: Census 2002, CSO, Forfás, ESRI, PACEC

The above analysis has explored the absolute concentration of the KS in the eight regions i.e. the numbers employed and the share of the total in each region. What is also of interest is the relative concentration, i.e. the extent to which the region reveals a propensity to specialisation by comparison with the country as a whole. The Location Quotient (LQ) is widely used to identify such specialisation. The LQ measures the share of a particular sector in a region's total employment, compared with the share of that sector's employment in the country's total employment. The LQ for the country is 1.0 by definition. If the share of a particular sector in a region is 20% when nationally it was only 10%, the LQ for the region would be 2.0. This would indicate a fairly high degree of specialisation of that sector in the region. If the LQ was 1.0 i.e. the same share in region as nationally no specialisation would be indicated. Typically in coming to a view on specialisation one would also take into account the number employed in that sector in the region and the region's share of total employment in the sector nationally (see Department of Trade & Industry Report, 2001 UK Mapping Britain's Clusters).

Table 3 shows the LQs for each of the KS in each of the eight regions. Taking the six KS in aggregate the highest relative concentration is achieved in Mid West with an LQ of 1.26, indicating a regional share of KS employment some 26% above that of the nation's share of KS employment. The Border and Midland regions have the lowest LQs of 0.68 and 0.69 respectively indicating much lower shares of the KS employment compared with the nation.

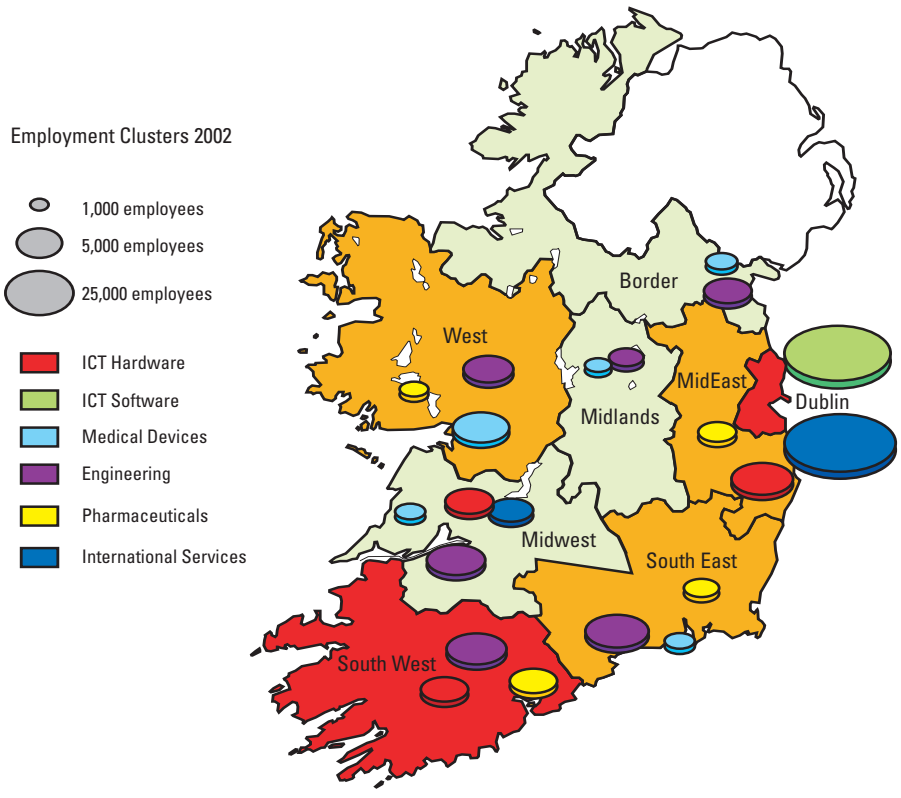
With regard to the individual KS, Dublin clearly has a specialisation in ICT software (LQ=1.84). By contrast Dublin's LQ in ICT hardware is only 0.60. The hardware ICT sector is very substantially over represented in the Mid East (LQ 3.47) and there is a high relative concentration in the Mid West region, where Dell is the major employer. The West is notable for its high concentration of Medical Devices (LQ of 3.92). The main geographical clusters of KS are shown in Figure 1; the criterion for a cluster adopted here is that the LQ for a KS in a region must be greater than 1.

TABLE 3: THE RELATIVE CONCENTRATION OF REGIONAL EMPLOYMENT (LOCATION QUOTIENT) IN THE KEY SECTORS, 2004

AREA	EMPLOYEES, 2004 (LQ BY REGION AND INDUSTRY)							
	TOTAL EMPLOYMENT	ICT HARDWARE	ICT SOFTWARE	MEDICAL DEVICES	ENGRING	PHARMA	INTL SERVICES	TOTAL KEY SECTORS
State	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Border Midlands and West	**1.00**	**0.55**	**0.45**	**2.26**	**1.07**	**0.54**	**0.65**	**0.84**
Border	1.00	0.57	0.17	1.06	1.04	0.29	0.81	0.68
Midlands	1.00	0.51	0.40	1.55	1.04	0.03	0.60	0.69
West	1.00	0.55	0.76	3.92	1.12	1.08	0.52	1.09
Dublin & Mid East	**1.00**	**1.14**	**1.64**	**0.26**	**0.57**	**0.98**	**1.39**	**1.06**
Dublin	1.00	0.60	1.84	0.19	0.49	0.73	1.65	1.04
Mid East	1.00	3.47	0.78	0.54	0.87	2.06	0.28	1.16
Rest of State	**1.00**	**1.16**	**0.56**	**1.04**	**1.53**	**1.38**	**0.74**	**1.04**
Mid West	1.00	2.16	0.64	1.24	1.81	0.24	1.07	1.26
South East	1.00	0.18	0.48	1.04	1.85	1.52	0.26	0.86
South West	1.00	1.24	0.57	0.92	1.15	1.95	0.87	1.04

Source: Census 2002, CSO, Forfás, ESRI, PACEC

FIGURE 1: CLUSTERS: LOCATION QUOTIENT FOR A KEY SECTOR IN A REGION GREATER THAN 1



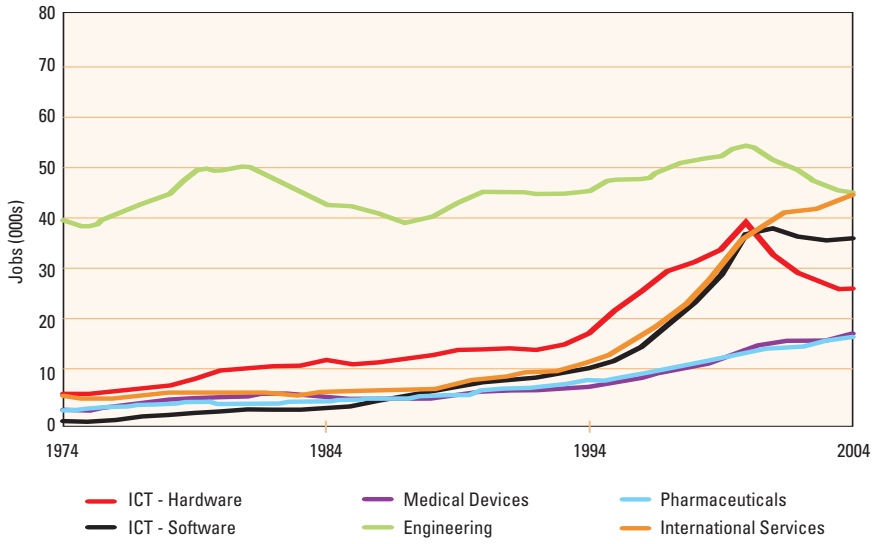
Source: Forfas, PACEC

The growth of employment by Key Sectors nationally

This section analyses the past performance of each of the six sectors nationally and in each of the eight regions. The analysis provides a picture of past trends against which the national and regional forecasts of employment growth to 2010 presented in Chapter 6 can be compared.

Figure 2 presents national employment change in each of the six KS over the past three decades. The past employment performance shows considerable variation between sectors. Employment in the engineering sector has varied between 40,000 and 50,000 jobs over the past three decades and the variations broadly reflect changes in the growth rate of the national economy. Thus the rapid growth of employment in the period of the late 1990s to 2000 reflects the outstanding performance of the national economy in that period and in 2000 employment in the sector exceeded its earlier peak of the late 1970s. More recently the slowdown in the economy has seen employment in the Engineering sector decline.

FIGURE 2: CHANGE IN EMPLOYMENT IN SIX KEY SECTORS OVER THE PERIOD 1974-2004



Source: Forfás

The three most dynamic of the KS have been International Traded Services, ICT software and ICT hardware. Employment in these three sectors increased very rapidly in the 1990s following a long period of modest growth in the 1970s and 1980s. However, since 2000 the ICT hardware and software sectors have experienced their first major shake-out with jobs being lost in both sectors, particularly in ICT hardware. This picture is confirmed by the National Software Directorate / National Informatics Directorate (Enterprise Ireland) statistics which shows for example that software employment rose rapidly in the years before 2001 (a 167% increase from 11,800 in 1995 to 31,500 in 2001).and then fell by 11% from 31,500 in 2001 to 27,900 in 2002. The rate of job loss in the indigenous sector (down 16%) was greater than the rate of job losses in foreign-owned companies (down 7%).

The growth of employment in the Pharmaceutical and Medical Devices sectors has been relatively modest by comparison with that in the computing sectors but these two sectors are much less vulnerable than either engineering or computing to changes in the overall growth performance of the Irish economy.

Key Sector growth by region: an overview

Table 4 shows that each of the eight regions benefited from the national dynamism and job creation of the KS; however there were significant differences in the extent to which regions shared in this growth. In the period from 1996 to 2004 the KS created 61,700 jobs in Ireland as a whole, an increase close to 50%. Nearly half of these jobs were located in Dublin with employment expanding by 76% over the period. By contrast the increase in the BMW regions in aggregate was much smaller with a gain of employment of 10,600, much of which was heavily concentrated in the West. The Mid West and South East regions together gained only 5,000 jobs from the growth of the KS in the eight years from 1996 to 2004.

A first and striking feature of the analysis at a sectoral level is the dominance of Dublin in expanding its share of employment in the International Traded Services and ICT software sectors, with job gains of 16,300 (+173%)and 12,300 (+113%) respectively. A second feature is the regional distribution of increased jobs in the Medical Devices sector. Here the West was the main beneficiary with an employment increase of 3,900 and the South West and South East together experienced job growth of 3,500 in this sector. The Pharmaceuticals sector enjoyed employment growth primarily in the South West, Dublin and to a lesser extent in the Mid East and South East regions. The relatively poor job creating performance of the engineering sector applied to all regions.

TABLE 4: EMPLOYMENT CHANGE IN THE KEY SECTORS BY REGION, 1996-2004

AREA	CHANGE IN EMPLOYMENT (000s)							
	TOTAL EMPLOYMENT	ICT HARDWARE	ICT SOFTWARE	MEDICAL DEVICES	ENGRING	PHARMA	INTL SERVICES	TOTAL KEY SECTORS
State	465	0.4	20.8	8.7	-2.5	7.1	27.1	61.7
Border Midlands and West	**104**	**-0.4**	**2.3**	**4.4**	**-0.7**	**0.3**	**4.7**	**10.6**
Border	39	-0.5	0.4	0.2	-0.8	0.1	2.7	2.1
Midlands	25	0.1	0.3	0.3	0.4	0.0	1.0	2.1
West	40	0.0	1.7	3.9	-0.4	0.2	1.0	6.4
Dublin & Mid East	**234**	**1.2**	**13.9**	**0.7**	**-0.5**	**3.6**	**16.7**	**35.6**
Dublin	181	-0.9	12.3	0.2	-0.8	2.2	16.3	29.2
Mid East	53	2.1	1.6	0.5	0.3	1.4	0.4	6.4
Rest of State	**127**	**-0.4**	**4.5**	**3.6**	**-1.2**	**3.2**	**5.8**	**15.5**
Mid West	31	0.5	1.2	0.1	-1.1	-0.3	1.4	1.8
South East	42	-1.3	1.5	1.7	-0.5	1.2	0.6	3.2
South West	54	0.4	1.8	1.8	0.4	2.4	3.7	10.6

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

TABLE 5: EMPLOYMENT GROWTH RATES IN THE KEY SECTORS 1996-2004

AREA	CHANGE IN EMPLOYMENT (%)							
	TOTAL EMPLOYMENT	ICT HARDWARE	ICT SOFTWARE	MEDICAL DEVICES	ENGRING	PHARMA	INTL SERVICES	TOTAL KEY SECTORS
State	36	1	138	96	-5	73	157	49
Border Midlands and West	**32**	**-11**	**145**	**80**	**-6**	**16**	**189**	**38**
Border	28	-26	163	12	-15	34	308	20
Midlands	37	18	58	30	22	-62	245	45
West	32	-2	187	143	-7	15	82	50
Dublin & Mid East	**44**	**10**	**121**	**60**	**-5**	**100**	**166**	**71**
Dublin	42	-15	113	26	-9	99	173	76
Mid East	58	39	250	173	9	101	68	56
Rest of State	**29**	**-3**	**231**	**150**	**-5**	**75**	**121**	**33**
Mid West	27	13	157	4	-14	-50	57	10
South East	32	-74	974	1032	-5	85	112	25
South West	28	10	173	398	5	108	219	64

Source: Census 2002, CSO, Forfás, ESRI, PACEC

The regional distribution and growth of each Key Sector

This section focuses more closely on each of the Key Sectors, providing a very brief sector profile, regional distribution of the sector and growth performance in the period 1988 to 2004.

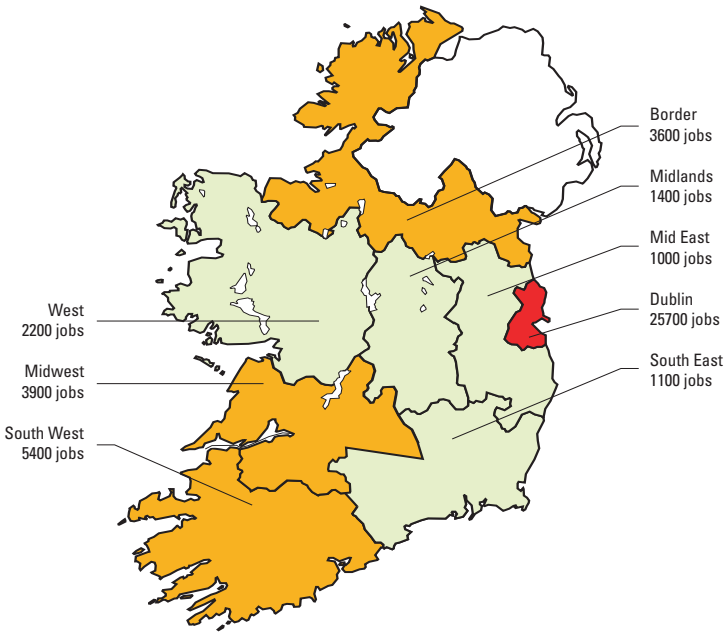
1. Internationally Traded Services

In this report the Internationally Traded Services sector covers Financial Intermediation (NACE codes 65-67), Real estate, renting, R&D and other business services NACE 70, 73 and 74). The sector is diversifying rapidly into new areas such as e-business, telemarketing, back office processing, health sciences and different technical support services.

A significant indigenous sector of mainly small companies has emerged growing exports in overseas niche market segments. Ireland also hosts a number of International Services companies offering business services at a pan-European and global level.

There is a strong tendency for both the indigenous and foreign owned sector to concentrate in the larger urban centres. As noted above, this sector is heavily concentrated in the Dublin region which in 2004 hosted 25,700 jobs, equal to 58% of national jobs in this sector. Outside Dublin the sector is primarily located in the larger cities such as Cork. Greater regionalisation of the sector, whether through the attraction of companies from Dublin and overseas or through organic development of the indigenous sector in the regions, will turn critically on the availability of high quality labour in the regions, access to high quality broadband and Internet facilities and the availability of suitable premises. The traditional locational imperatives of a reliable and modern business support infrastructure and the capacity of the regions to fulfil the lifestyle expectations of a skilled workforce do of course remain.

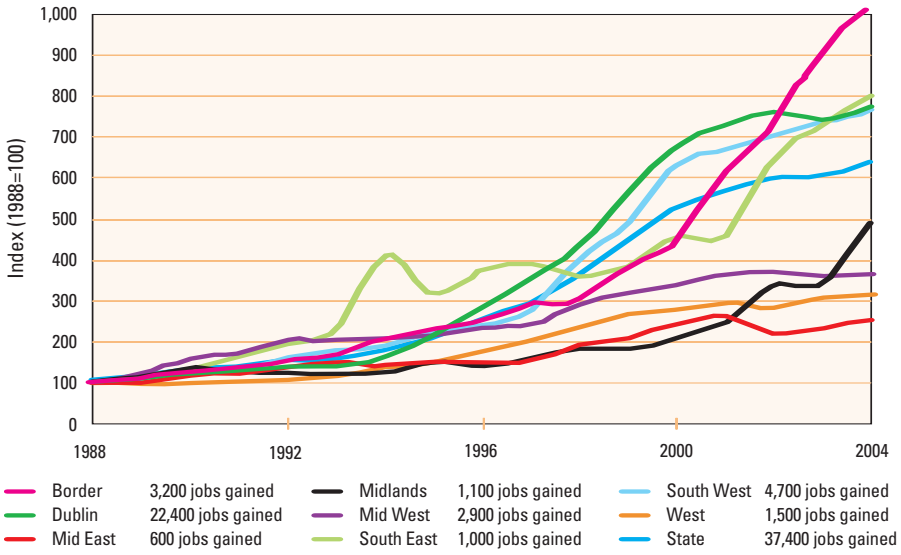
FIGURE 3 INTERNATIONALLY TRADED SERVICES: EMPLOYMENT BY REGION 2004



Source: Forfás. PACEC

The index of the growth of employment in the sector across the eight regions (Figure 4), and the associated key showing absolute employment change over the period since 1988, shows clearly the large and persistent differences in the performance of the sector across the different regions. The Mid East, the West, Midlands and Mid West have typically experienced relatively slow growth of jobs in this sector. By contrast Dublin, the South West and Border regions have experienced both rapid absolute and percentage growth of employment, particularly in the period since the mid-1990s.

FIGURE 4: INTERNATIONALLY TRADED SERVICES: INDEX OF EMPLOYMENT CHANGE BY REGION, 1988-2004 (1988=100)



Source: Forfás. PACEC

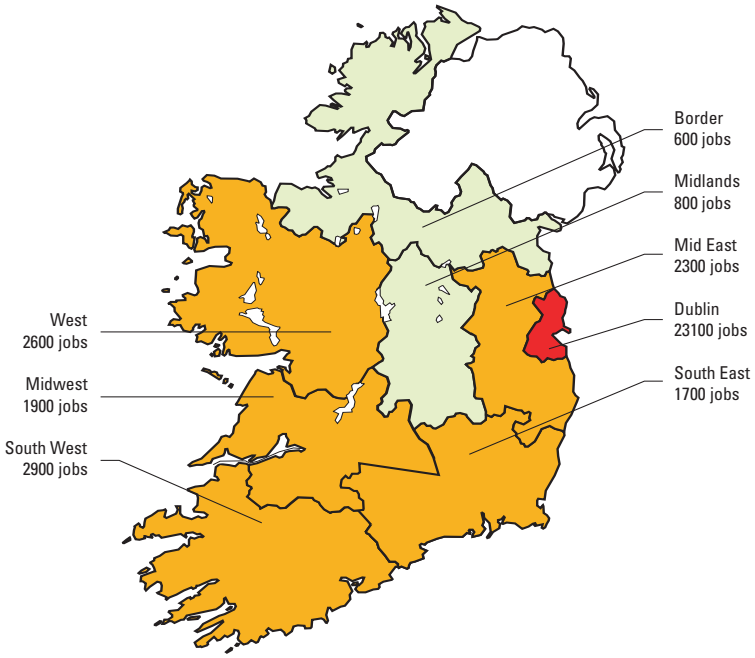
2. ICT software and hardware

The significance of the ICT software and hardware sector for the Irish economy and the challenges it faces as the industry globalises is well documented in the IBEC submission to the Enterprise Strategy Group, 2004. The report notes that Ireland has both a strong foreign owned sector, including household names such as Microsoft, Intel, IBM and Dell and a vibrant indigenous sector; the latter dominate in terms of employment, providing some 70% of the total. Hardware and Applications Software are currently the more important and mature of the sub-sectors.

Globalisation of the industry exacerbates the problem of securing a greater regionalisation of the sector within Ireland. Accession countries of the EU offering relatively low cost locations are increasingly competing for foreign owned companies wishing to locate in Europe. On the demand side, rapidly growing markets in developing countries are also encouraging international companies to locate their investment in these countries.

Dublin and the other main urban centres dominate the ICT **software** sector. In 2004, 65% of software employment was located in Dublin and at the other extreme only 2% is located in the Border region and 2% in the Midland (Table 1, Figure 5 and Figure 6). This regional pattern is of course not surprising. As with many companies operating in global markets, ICT companies locate in cities because they meet their fundamental business requirements for high quality telecommunications; access to large pools of skilled professional labour; a high quality and reliable business support infrastructure; international airports providing easy accessibility to clients in export markets and overseas suppliers and business hotels to accommodate frequent visits by HQ managers.

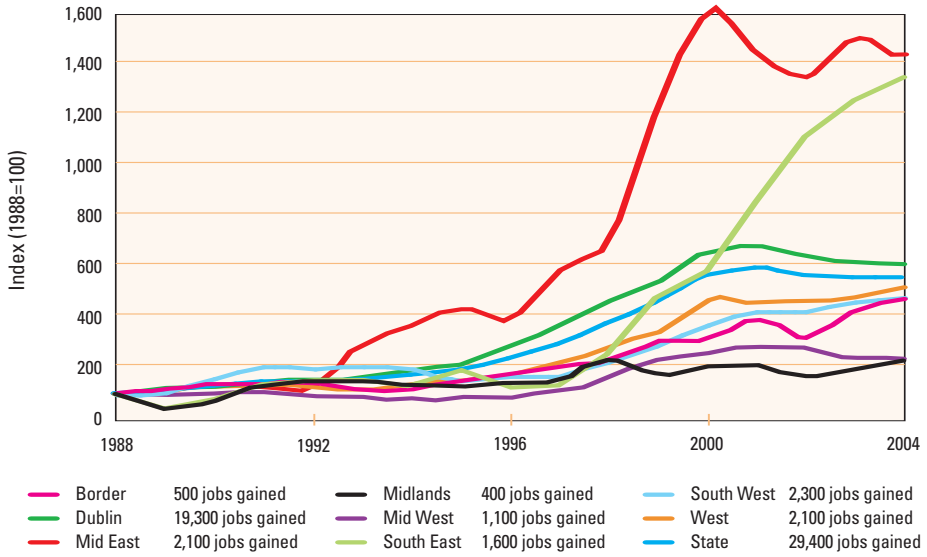
FIGURE 5 ICT SOFTWARE COMPANIES: EMPLOYMENT BY REGION 2004



Source: Forfás, PACEC

This software sector has experienced rapid growth of employment particularly in the mid to late 1990s. Dublin with 19,300 job gains accounted for two thirds of the national employment gain in the period 1988 to 2004. As Figure 6 shows, the Mid East and South East regions experienced rapid percentage growth from 1996/1997 but both from a relatively low base of employment. Other regions such as the Border and Midlands, lacking the attributes attractive to this sector gained relatively few jobs over the period.

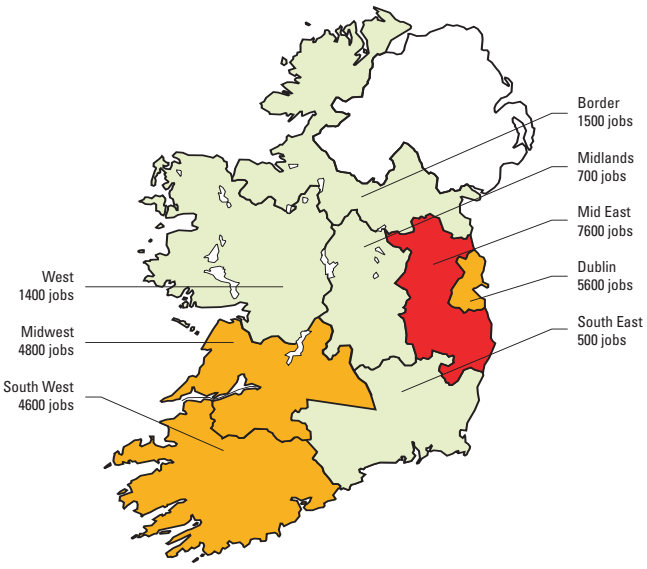
FIGURE 6: ICT SOFTWARE: INDEX OF EMPLOYMENT CHANGE BY REGION, 1988-2004 (1988=100)



Source: Forfás, PACEC

Employment in the ICT **hardware** sector tends also to be concentrated in or close to the larger urban centres (Figure 7). Dublin is less dominant as a location for the hardware sector than for software and in 2004 hosted 5,600 jobs accounting for 21% of total employment in this sector. Employment in the hardware sector in the Mid East region exceeded that of Dublin with 7,600 jobs. This may reflect the differences in the costs and availability of industrial floor space between Dublin and the Mid East. The sector is also relatively well represented in the Mid West and South West regions. Few jobs are provided by this sector in the South East, Border, Midland and West regions.

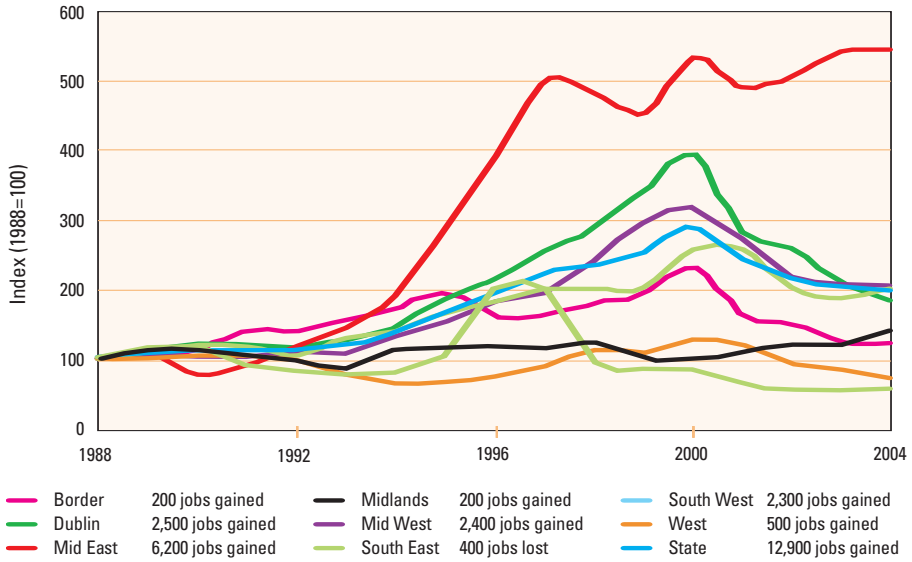
FIGURE 7 ICT HARDWARE: EMPLOYEES BY REGION 2004



Source: Forfás, PACEC

This sector has been an important job creator in four of the eight regions. These are the Mid East, Dublin, the South West and the Mid West. Dublin and the Mid-East accounted for an 8,700 job gain and this is 72% of the overall national job gain of 11,600 jobs in the period 1988 to 2004. The BMW regions hardly participated at all in the substantial employment growth of this sector. Growth was particularly rapid in the 1990s but there were significant job losses in a number of regions after 2000.

FIGURE 8: ICT HARDWARE: INDEX OF EMPLOYMENT CHANGE BY REGION, 1988-2004 (1988=100)



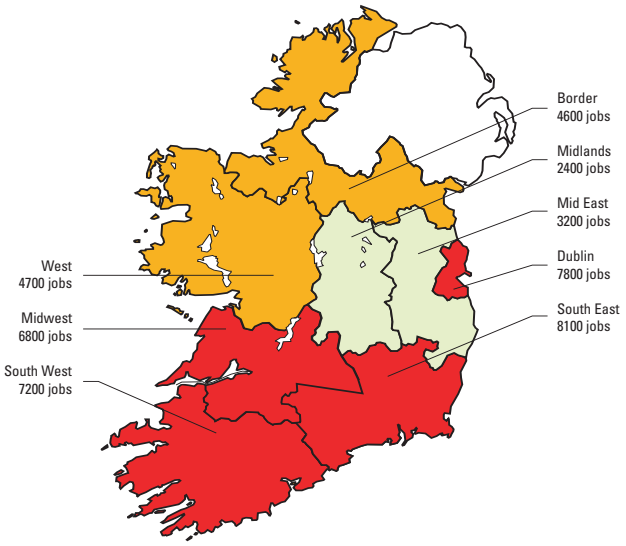
Source: Forfás, PACEC

3. Engineering

The Engineering industry in Ireland is diverse and geographically distributed. Much of it grew out of agricultural machinery and primary processing, especially in the south of the country. It now includes a diverse range of engineering sub-sectors in addition to general engineering, for example, automotive, aerospace, electrical, and mechanical engineering, the manufacture of metal products, such as machinery and transport equipment. The foreign owned and indigenous sectors are both well represented in the sector. The indigenous sector is heavily dependent on the domestic market which accounts for about two thirds of its sales. The foreign owned sector is much more active in export markets and the majority of companies have clients in overseas markets. However, owing to the relatively high costs in Ireland compared with locations in China, Russia and the accession countries in the EU both foreign and indigenous companies are facing intensifying competition. Irish owned companies also face limited growth opportunities with their current concentration on domestic markets.

The sector is much more evenly spread across the regions of Ireland than in the case of the other KS. In 2004 not one of the eight regions accounted for more than the 18% of employment in the Engineering sector located in the South East. Dublin accounted for 17%, the South West for 16%, the Mid West for 15% with the three regions of BMW accounting for 26% in aggregate. This more even regional spread of the sector may reflect the regional distribution of the customer base and the competitive advantages of firms located close to demand. It may also indicate limited economies of scale in many segments of the industry, particularly those populated by SMEs.

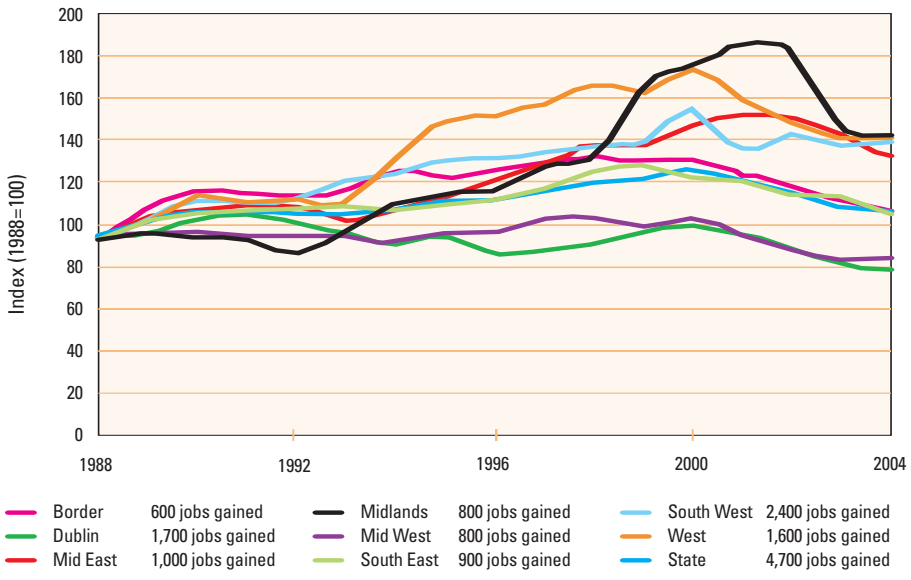
FIGURE 9 ENGINEERING: EMPLOYEES BY REGION 2004



Source: Forfás, PACEC

The engineering sector has expanded its employment over the period 1988 to 2004 by 4,700. It is a very cyclical industry and there have been periods in the past such as the period 1981 to 1987 and 2000 to 2004 when significant employment losses took place and periods such 1975 to 1981, 1987 to 1990 and 1994 to 2000 when the sector gained employment. Over the long run however, employment gains have been small. The greatest absolute job gains have been in the South West and West with job growth of 2,400 and 1,600 respectively. The South-East, which has the highest relative concentration of engineering with (an LQ of 1.85, see Table 3), recorded a small job loss over the period. Almost every region experienced a loss of jobs between 2000 and 2002.

FIGURE 10: ENGINEERING: INDEX OF EMPLOYMENT CHANGE BY REGION, 1988-2004 (1988=100)



Source: Forfás, PACEC

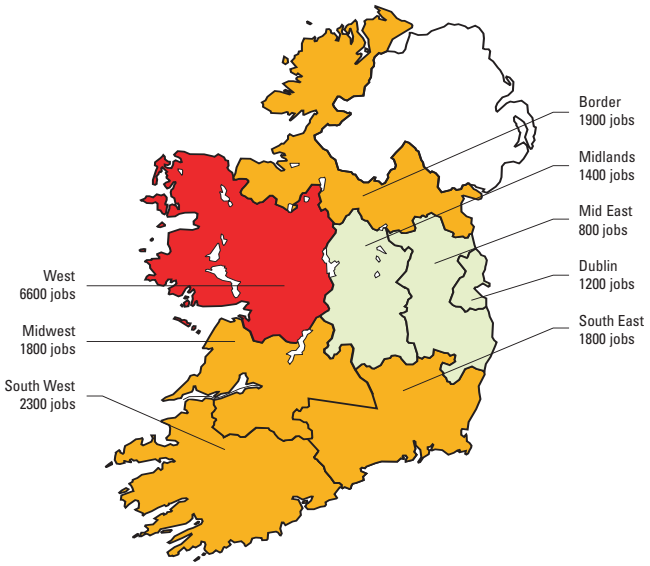
4. Medical Devices

Employment in the Medical Devices sector is concentrated around Galway. In part this reflects the past steering of inward investment by IDA Ireland to regions of high unemployment. The West region has 6,600 jobs or 37% of Ireland's total employment in the sector. A recent report for the Irish Medical Devices Association indicated that the industry has approximately 75 plants spread over 18 counties, but clustered around the Galway – Castlebar – Sligo – Athlone area (especially around Galway) and in the Limerick and Cork areas.

Companies in the sector tend to locate in cities. In Galway there is a critical mass of high quality investments and business services, a large pool of managerial, professional and technical people who regard the area as attractive, and the NUI Galway and the Galway Mayo Institute of Technology, both of which have strong links with the industry

The cluster centred on Galway is built around centres of excellence in bio-engineering, polymer technology, laser applications, tool-making and information technology. Multinationals like Abbott, Baxter, Mallinckrodt and Boston Scientific have multiple plants in that area. Other major companies in the area include Medtronic AVE, Allergan and, to the east of Athlone, Tyco Healthcare in Tullamore.

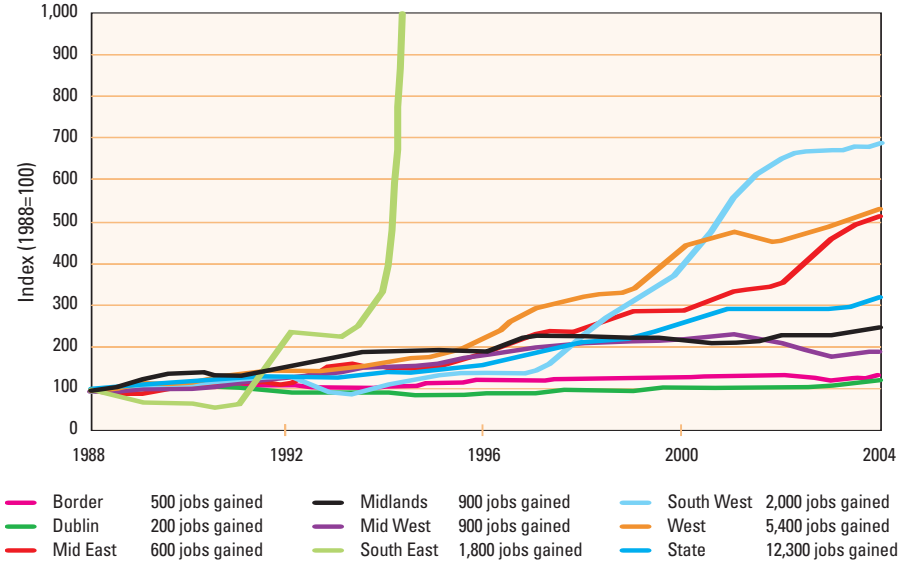
FIGURE 11 MEDICAL DEVICES: EMPLOYEES BY REGION 2004



Source: Forfás, PACEC

Over 12,300 jobs were created nationally in this sector in the period between 1988 and 2004. Of these 5,400 were located in the West and this region now has over three times the national average share of this sector (LQ=3.92, see Table 3). Other regions to experience significant growth in this sector include the South West and South East. The former experienced particularly rapid growth after the later 1990s.

FIGURE 12: MEDICAL DEVICES: INDEX OF EMPLOYMENT CHANGE BY REGION, 1988-2004 (1988=100)

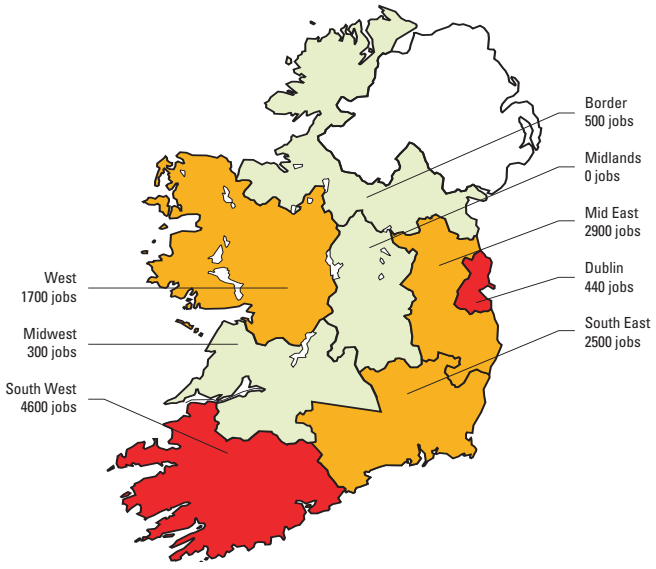


Source: Forfás, PACEC

5. Pharmaceuticals

The Dublin/Mid East and Cork areas together account for about two thirds of Ireland's employment in pharmaceuticals manufacturing. Most of the bio-processing (pharmaceuticals manufacture using biological methods) and secondary manufacture (pills, capsules etc.) are in these two areas. The rest of bulk manufacturing is scattered mainly from the North West down to Kerry and around Waterford.

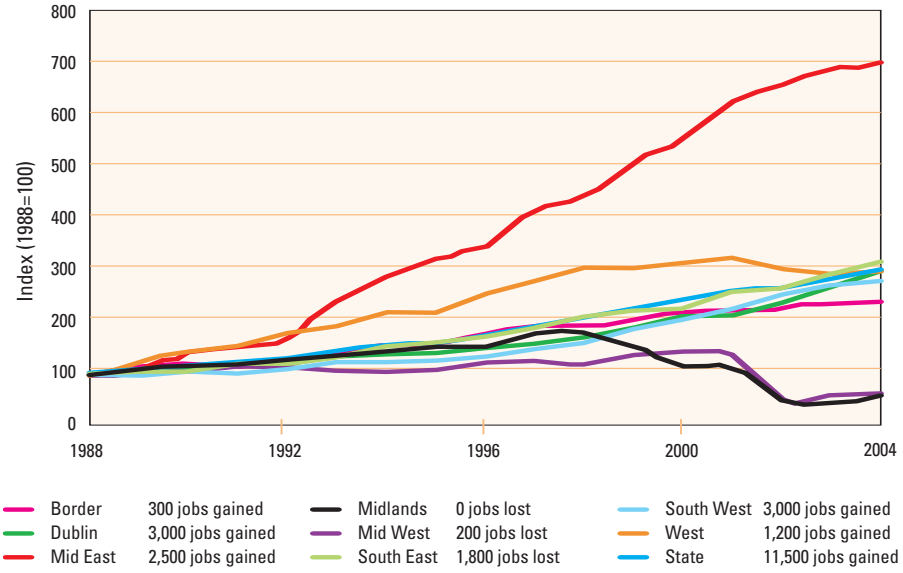
FIGURE 13 PHARMACEUTICALS: EMPLOYEES BY REGION 2004



Source: Forfás, PACEC

Employment in the Pharmaceuticals sector has grown in all but two regions (the Midlands and Mid-West regions) in the fifteen years 1988-2004. The Mid-East and South West have recorded particularly rapid growth gaining 2,500 and 3,000 jobs respectively. Dublin also experienced a gain of some 3,000 jobs.

FIGURE 14: PHARMACEUTICALS: INDEX OF EMPLOYMENT CHANGE BY REGION, 1988-2004 (1988=100)



Note: Figures quoted in the legend are rounded to the nearest 100; the number of jobs lost in the Midlands is too small to quote to this level of accuracy, but the trend is shown on the chart.
Source: Forfás, PACEC

3 The regional distribution of skills and the Key Sectors

3.1 Introduction

This chapter presents an analysis of the regional distribution of the skills of those in employment in 2004. It distinguishes the skills composition of the KS from that of the non-KS. The methodology adopted is standard in the analysis of aggregate labour market data in that the Standard Occupational Classification (SOC) and the formal 3rd level educational qualifications (by broad subject area) are used as proxy indicators for skills. Methodological details are presented in Appendix A including the approach adopted in estimating employment by region and occupation for 2004. The first part of the chapter focuses on the skills composition as measured by the SOC, and the second part of the chapter estimates the regional skills distribution using evidence on 3rd level educational qualifications. These two approaches provide alternative measures of the skill composition of the employment stock for each region.

3.2 The skill structure of employment in the regions

This section presents the skill structure of employment in the regions using the Standard Occupational Classification (SOC).

The KS employ a relatively small proportion of the total labour force in employment. As such their demand for different labour skills must be set within the context of the overall regional labour market rather than a particular segment.

The importance of the KS stems from the fact that they account for a disproportionately large share of GDP and exports and have been among the most dynamic sectors in recent years. Furthermore, they are likely to be pivotal to the transformation of the industrial landscape over the medium-term.

It should also be pointed out that the analysis here is based on spatial boundaries as determined by the administrative boundaries of each of the eight regions. Such boundaries do not necessarily correspond to the relevant boundary for labour market analysis. For example, there are major inter-regional commuting flows such as between the Mid East and Dublin. The data presented below refers to the occupational structure by place of work. Our starting point therefore is to analyse the broad occupational structure of all industries in each region within which the KS recruit much of their labour, and then to focus more specifically on the occupational structure of the KS in each region.

Table 6 and Table 7 show the occupational structure of the total workforce in each region. Table 6 reveals that of the 1,757,000 employees in Ireland, 308,000 are Managers or Senior Officials, the top occupational category. This is the largest category which implies that Ireland on the whole is a highly skilled nation. Of these Managers and Senior Officials 128,000 (nearly half) are in Dublin and the Mid-East. When the top three occupations are considered the national total is 679,000 employees of which 317,000 (47%) are in Dublin. On the other hand of the 463,000 employees in the bottom three occupations, only 176,000 (38%) are in Dublin. This shows a clear bias of the high skilled occupations towards Dublin. Figure 15 summarises the regional distribution of the workforce and its composition in terms of occupational structure.

Table 7 shows the percentage of each region's workforce engaged in the various occupations. Managers and Senior Officials, those employed in Professional occupations and Associate Professional and Technical staff, together account for 39% of the total employment in Ireland. At the other end of the occupational hierarchy 8% are in what are termed Elementary occupations and 11% are Process, Plant and Machine Operatives.

Notwithstanding the fact that Dublin is the administrative capital and seat of Government, the proportion of Managers and Senior Officials in the region at 17%, is actually lower than the national proportion at 18%. However, the absolute number in this occupational category in the Dublin region at 102,000 is more than double that in the next largest region, the SW with 43,000. The overall level of employment in the Dublin region, at almost one third of the national total, has the effect of diluting the concentration of Managers and Senior Officials in the region.

There are important regional differences in the skill composition. Taking the top three occupational categories identified above Dublin has 43% of its employment in these categories, compared with 39% nationally, whereas the Border region has only 34%. The difference between the two regions is very substantial. In part the explanation for such differences arises from differences in the structure of industry across regions. Different industries have different occupational requirements. Regions will also differ according to the locational advantages they offer for different business functions (HQ, manufacturing, marketing and distribution, R&D). Geographical concentrations of particular occupations may also reflect the residential preferences of certain segments of labour force with firms seeking to locate in regions where skilled and talented labour can be attracted.

TABLE 6: TOTAL EMPLOYMENT BY BROAD OCCUPATION BY REGION, 2004

OCCUPATION	EMPLOYEES BY BROAD OCCUPATION (000s)											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	308	80	31	17	32	128	102	26	100	26	31	43
Professional occupations	196	39	15	7	17	101	85	16	56	14	15	26
Associate Professional and Technical	175	37	15	7	15	88	73	15	50	13	14	23
Administrative and Secretarial	219	46	20	9	17	112	96	16	61	17	17	27
Skilled Trades Occupations	232	65	26	14	24	84	63	22	83	21	27	35
Personal Service Occupations	166	41	17	9	14	71	58	13	54	14	16	24
Sales and Customer Service Occupations	124	31	12	6	12	50	42	8	43	10	13	19
Process, Plant and Machine Operatives	201	57	24	12	21	72	54	18	72	20	22	30
Elementary Occupations	138	38	15	9	14	54	44	11	46	11	15	19
Total	1,757	433	175	92	166	761	616	144	564	146	172	246

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

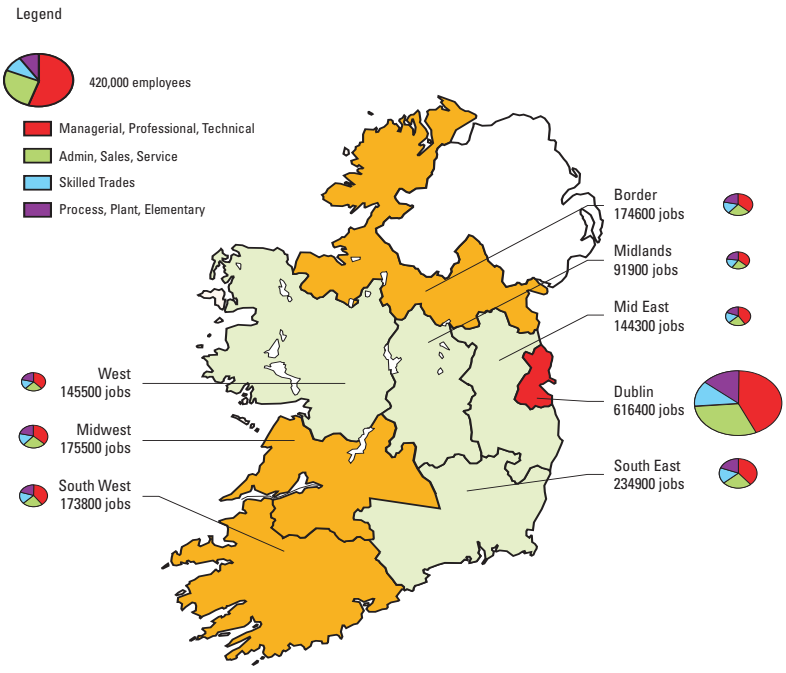
TABLE 7: PROPORTION OF TOTAL EMPLOYMENT THAT IS IN EACH BROAD OCCUPATION, BY REGION, 2004

DESCRIPTION	PROPORTION OF TOTAL EMPLOYMENT BY BROAD OCCUPATION (%)											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	18	18	18	19	19	17	17	18	18	18	18	18
Professional occupations	11	9	8	8	10	13	14	11	10	10	9	11
Associate Professional and Technical	10	9	8	8	9	12	12	10	9	9	8	9
Administrative and Secretarial	12	11	11	10	10	15	16	11	11	12	10	11
Skilled Trades Occupations	13	15	15	16	15	11	10	15	15	14	16	14
Personal Service Occupations	9	9	10	10	9	9	9	9	10	10	10	10
Sales and Customer Service Occupations	7	7	7	7	7	7	7	6	8	7	8	8
Process, Plant and Machine Operatives	11	13	13	13	13	9	9	13	13	14	13	12
Elementary Occupations	8	9	9	9	8	7	7	7	8	8	9	8
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

FIGURE 15: THE REGIONAL DISTRIBUTION OF SKILLS IN ALL INDUSTRIES AS MEASURED BY EMPLOYMENT IN 4 BROAD OCCUPATIONAL GROUPS, 2004



Source: Census 2002, CSO, Forfás, ESRI, PACEC

The relative concentration of different occupations is shown in Table 8 and is measured by the LQ for each occupation in each region. The LQ measures the share of employment in the occupational group of total employment in the region relative to the share of that occupation nationally in total employment nationally. If the regional share is greater than the national share the ratio of the region to the nation (i.e. the LQ) is greater than 1 and the region has a relative concentration of that occupation. LQs greater than 1 exist for a number of occupational categories in different regions, for example for Professional occupations in Dublin, for Skilled Trades in BMW and other regions outside Dublin and for Process, Plant and Machine Operatives in BMW.

TABLE 8: RELATIVE CONCENTRATION (LQ) OF TOTAL EMPLOYMENT BY BROAD OCCUPATION BY REGION, 2004

OCCUPATION	EMPLOYMENT LQ BY OCCUPATIONS AND REGION, 2004											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	1.00	1.06	1.01	1.07	1.10	0.96	0.95	1.02	1.01	1.01	1.02	1.00
Professional occupations	1.00	0.81	0.76	0.72	0.90	1.19	1.24	1.00	0.89	0.88	0.78	0.97
Associate Professional and Technical	1.00	0.86	0.85	0.78	0.93	1.16	1.19	1.02	0.89	0.89	0.82	0.94
Administrative and Secretarial	1.00	0.85	0.91	0.83	0.81	1.18	1.25	0.89	0.87	0.94	0.81	0.87
Skilled Trades Occupations	1.00	1.13	1.14	1.18	1.10	0.84	0.77	1.13	1.11	1.07	1.21	1.07
Personal Service Occupations	1.00	0.99	1.03	1.05	0.92	0.99	0.99	0.99	1.01	1.01	1.01	1.02
Sales and Customer Service Occupations	1.00	1.00	1.01	1.00	1.00	0.94	0.97	0.78	1.08	1.01	1.09	1.12
Process, Plant and Machine Operatives	1.00	1.15	1.18	1.17	1.12	0.83	0.76	1.10	1.12	1.18	1.14	1.06
Elementary Occupations	1.00	1.11	1.12	1.19	1.06	0.91	0.90	0.94	1.04	0.97	1.14	1.00
Total	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

Source: Census 2002, CSO, Forfás, ESRI, PACEC

The occupational structure of the KS sectors of each region by nine broad categories in absolute terms and as a proportion of the total employment in the region is shown in Table 9 and 10. The first column of Table 9 shows the occupational breakdown of the 186,500 employees in the KS in Ireland and the other columns show their regional distribution by occupation. There are an estimated 22,200 employees in the Professional occupational category of which about half (11,000) are in Dublin and only 3,300 in the BMW regions. A similar picture prevails for the Managerial and Associate Professional and Technical. Figure 16 summarises the regional distribution of the Key Sector workforce and it's composition in terms of occupational structure.

TABLE 9: KEY SECTOR EMPLOYMENT BY BROAD OCCUPATION BY REGION, 2004

DESCRIPTION	EMPLOYMENT IN EACH OCCUPATION IN EACH REGION (000s), 2004											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	26.6	3.7	1.2	0.6	1.9	16.3	13.7	2.7	6.6	2.0	1.6	2.9
Professional occupations	22.2	3.3	0.8	0.5	2.1	13.0	11.0	2.0	5.9	1.7	1.1	3.1
Associate Professional and Technical	26.6	3.9	1.3	0.6	2.0	16.0	13.4	2.6	6.7	1.9	1.4	3.3
Administrative and Secretarial	29.2	5.5	2.4	1.0	2.1	15.2	13.4	1.8	8.5	2.9	1.6	4.0
Skilled Trades Occupations	25.9	6.1	2.2	1.3	2.5	8.9	6.2	2.7	11.0	3.6	3.3	4.0
Personal Service Occupations	1.1	0.2	0.1	0.0	0.1	0.6	0.5	0.1	0.3	0.1	0.1	0.1
Sales and Customer Service Occupations	5.7	1.1	0.4	0.2	0.5	2.7	2.2	0.5	1.9	0.5	0.4	0.9
Process, Plant and Machine Operatives	43.0	13.5	3.8	2.2	7.4	10.3	5.6	4.7	19.3	6.0	5.6	7.7
Elementary Occupations	6.2	1.5	0.5	0.3	0.7	2.4	1.8	0.5	2.3	0.7	0.7	1.0
Total	**186.5**	**38.7**	**12.7**	**6.8**	**19.2**	**85.5**	**67.7**	**17.8**	**62.4**	**19.5**	**15.8**	**27.1**

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

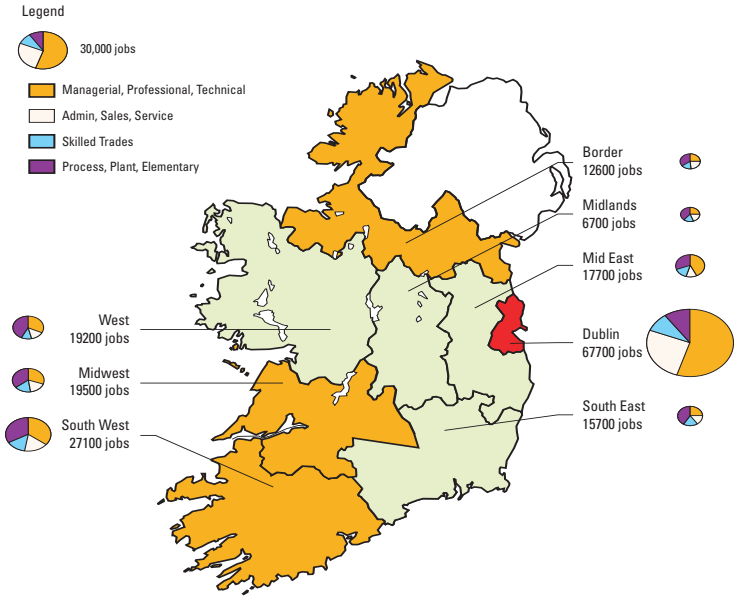
TABLE 10: KEY SECTOR EMPLOYMENT BY BROAD OCCUPATION, PERCENTAGE BY REGION, 2004

DESCRIPTION	PROPORTION OF EMPLOYMENT IN EACH OCCUPATION IN EACH REGION (%), 2004											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	14	10	10	9	10	19	20	15	11	10	10	11
Professional occupations	12	9	6	7	11	15	16	11	9	9	7	11
Associate Professional and Technical	14	10	10	9	10	19	20	15	11	10	9	12
Administrative and Secretarial	16	14	19	15	11	18	20	10	14	15	10	15
Skilled Trades Occupations	14	16	18	19	13	10	9	15	18	19	21	15
Personal Service Occupations	1	0	0	0	0	1	1	1	0	0	0	1
Sales and Customer Service Occupations	3	3	3	3	2	3	3	3	3	3	3	3
Process, Plant and Machine Operatives	23	35	30	33	39	12	8	27	31	31	35	28
Elementary Occupations	3	4	4	5	3	3	3	3	4	3	4	4
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

FIGURE 16: THE REGIONAL DISTRIBUTION OF SKILLS IN THE SIX KEY SECTORS AS MEASURED BY EMPLOYMENT IN 4 BROAD OCCUPATIONAL GROUPS, 2004



Source: Census 2002, CSO, Forfás, ESRI, PACEC

The above analysis provides a broad brush picture of the regional distribution of skills as reflected in estimates based on occupational data. The question to be addressed next is that of the share of each occupation accounted for by the KS in each region. Insofar as this share is relatively small any future expansion of employment growth in the KS may be partially or fully met by redeployment of labour from sectors in the region releasing labour with skills demanded by the KS. There is no presumption that labour in these other sectors will actually be a source of supply of labour to the KS in the future but such labour is potentially available. Where there are non-KS sectors in decline they are likely to be releasing some labour in vital occupations that can, with training, be redeployed to the KS. The purpose of the analysis is to highlight, for given regions and occupations where such potential may exist or be very limited. Where KS account for a very high proportion of a particularly occupational group other adjustment mechanisms may have to come into play to meet any increase in demand for a particular occupation. For example, insofar as there are relatively limited sources of labour supply in a particular occupation/region, any increase in a Key Sector's labour requirements for that occupation may have to be met by (a) movement of workers out of other occupations, (b) inward migration of people in those occupations, (c) inter-regional commuting or (d) increased activity rates (e) direct recruitment from the educational system. Typically, where there is excess demand for a particular occupation a number of these adjustment mechanisms will operate. Where the KS account for a relatively large proportion of employment in a particular occupation in a region, future expansion of the KS may put upward pressure on wage costs in this segment of the regional labour market or require other labour market adjustments to meet increased labour demand, e.g. commuting, migration, training. To identify the potential for such pressures Table 11 shows the proportion (%) of total jobs in an occupation in a region that are in the Key Sectors. For example, 35% of Process; Plant and Machine Operatives, in the West region, are in the KS. The other 65% of employees in that occupation in the Midland region work in other sectors. The KS account for only 30% of the total employment in that occupation in the Mid West and 25% in the South East. Associate Professionals and Technical employment in the KS in Dublin and the Mid East also account for a relatively high proportion of employment in this occupational category.

TABLE 11: KEY SECTORS' SHARE OF ALL EMPLOYMENT IN EACH OCCUPATION, BY REGION, 2004

OCCUPATION	KEY SECTOR'S SHARE OF ALL EMPLOYMENT (%)											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	9	5	4	4	6	13	13	10	7	8	5	7
Professional occupations	11	9	5	7	12	13	13	13	10	12	7	12
Associate Professional and Technical	15	10	8	9	13	18	18	18	13	15	10	14
Administrative and Secretarial	13	12	12	11	13	14	14	11	14	17	9	15
Skilled Trades Occupations	11	9	9	9	11	11	10	13	13	18	12	12
Personal Service Occupations	1	0	0	0	1	1	1	1	1	1	0	1
Sales and Customer Service Occupations	5	4	4	3	4	5	5	6	4	5	3	5
Process, Plant and Machine Operatives	21	24	16	18	35	14	10	26	27	30	25	26
Elementary Occupations	4	4	3	4	5	4	4	5	5	6	5	5
Total	**11**	**9**	**7**	**7**	**12**	**11**	**11**	**12**	**11**	**13**	**9**	**11**

Source: Census 2002, CSO, Forfás, ESRI, PACEC

To identify the distinctive occupational specialisations of the KS at a more finely grained level it is necessary to analyse the occupational structure for 227 SOCs. The Tables presented below focus only on those occupations for which the KS have a share of that occupation which exceeds the share of that occupation in the economy as a whole. In other words we focus on the occupations in which the KS specialise (e.g. the ICT sector has a higher proportion of 'Computer Systems Managers' in its workforce than the average sector has, so this is a Key Occupation).

Each of the occupations is ranked according to the scale of specialisation (i.e., the number of jobs there are in the occupation in excess of what there would have been if the KS had the same occupational breakdown as the national economy has). Thus 'assemblers and lineworkers (metal goods and other goods)' is ranked as the most important of the occupations for the KS on this basis (largely because Engineering is the largest of the KS). The following tables show only the top 32 such occupations. Computer analysts and programmers, for example, are ranked second.

TABLE 12: KEY SECTORS' SHARE OF ALL EMPLOYMENT IN EACH OCCUPATION, BY REGION, 2004

OCCUPATION		KEY SECTOR'S SHARE OF ALL EMPLOYMENT (%)											
		STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
850	Assemblers and lineworkers (electrical and electronic goods)	17.5	4.2	1.6	1.0	1.6	4.6	2.4	2.2	8.6	3.6	1.4	3.6
320	Computer analyst programmers	10.9	1.2	0.3	0.2	0.6	7.7	6.8	0.9	2.0	0.6	0.5	0.9
411/2	Cashiers, bank and counter clerks; Debt, rent and other cash collectors	10.6	2.2	1.1	0.4	0.7	5.4	5.1	0.3	3.0	1.1	0.4	1.5
516	Metal working production and maintenance fitters	10.4	2.0	0.7	0.5	0.8	3.7	2.6	1.2	4.7	1.9	1.3	1.6
851	Assemblers and lineworkers (metal goods and other goods)	9.1	5.0	1.0	0.7	3.3	0.5	0.3	0.3	3.5	0.9	1.6	1.1
214	Software engineers	7.5	0.9	0.1	0.1	0.6	5.2	4.7	0.5	1.5	0.4	0.3	0.8
430	Filing, computer, library and other clerks n.e.s.	7.4	1.3	0.6	0.2	0.5	3.9	3.2	0.6	2.1	0.7	0.4	1.0
361	Underwriters, claims assessors, brokers and investment analysts	5.2	0.7	0.3	0.1	0.2	3.4	3.3	0.1	1.1	0.4	0.1	0.6
110	Production and works managers	5.2	1.0	0.3	0.2	0.6	2.3	1.5	0.8	1.9	0.6	0.5	0.8
410	Accounts and wages clerks, book-keepers and other financial clerks	4.9	0.8	0.4	0.1	0.3	2.9	2.6	0.3	1.3	0.4	0.2	0.6
126	Computer systems managers	4.4	0.4	0.1	0.1	0.2	3.3	2.9	0.4	0.7	0.2	0.2	0.3
250	Chartered and certified management accountants (incl. taxation experts)	4.2	0.5	0.2	0.1	0.2	2.8	2.5	0.3	1.0	0.3	0.2	0.5
899	Other plant, machine and process operatives n.e.s.	3.6	1.0	0.2	0.1	0.6	1.1	0.5	0.6	1.6	0.4	0.4	0.7
537	Welders and steel erectors	3.7	1.3	0.5	0.3	0.5	0.7	0.4	0.3	1.7	0.3	0.7	0.7
121	Marketing managers	3.5	0.4	0.1	0.1	0.2	2.4	2.1	0.4	0.7	0.2	0.2	0.3
000	Gainfully occupied but occupation not stated	3.5	0.9	0.2	0.2	0.5	1.6	1.2	0.4	1.1	0.3	0.3	0.4
820	Chemical, gas, petroleum, paper, wood and related process plant operatives	3.3	0.5	0.1	0.0	0.3	1.4	0.8	0.6	1.4	0.1	0.4	0.9
139	Other financial managers n.e.s.	3.3	0.5	0.2	0.1	0.2	2.0	1.7	0.3	0.8	0.2	0.2	0.4
131	Bank and building society managers	3.1	0.4	0.2	0.1	0.2	2.0	1.9	0.1	0.7	0.2	0.1	0.4
309	Other scientific technicians n.e.s.	2.6	0.5	0.1	0.1	0.3	1.2	0.6	0.6	0.8	0.3	0.2	0.3
526	Computer engineers (installation and maintenance)	2.4	0.2	0.1	0.0	0.1	1.5	1.2	0.3	0.7	0.2	0.1	0.4
459	Secretaries, medical, legal, personal assistants, typists & word processor operators	2.2	0.4	0.1	0.1	0.2	1.1	1.0	0.2	0.6	0.2	0.2	0.3
839	Other metal making and treating process operatives n.e.s.	2.1	0.5	0.2	0.1	0.2	0.4	0.3	0.1	1.2	0.4	0.4	0.4
710	Technical and wholesale sales representatives	2.1	0.4	0.1	0.0	0.2	1.1	0.9	0.2	0.6	0.1	0.2	0.3
441	Stores, storekeepers, warehousemen/women, despatch and production control clerks	2.0	0.4	0.1	0.1	0.2	0.7	0.5	0.2	0.8	0.3	0.2	0.3
215	Chemical, production, planning and quality control engineers	2.0	0.5	0.1	0.1	0.3	0.7	0.4	0.3	0.8	0.2	0.1	0.4
252	Actuaries, economists, statisticians, management consultants and business analysts	1.9	0.1	0.0	0.0	0.1	1.5	1.4	0.1	0.2	0.1	0.0	0.1
219	Other engineers and technologists n.e.s.	1.9	0.4	0.1	0.0	0.3	0.8	0.5	0.3	0.7	0.2	0.2	0.3
515	Toolmakers	1.8	0.7	0.3	0.1	0.3	0.2	0.1	0.1	0.9	0.4	0.3	0.2
719	Auctioneers, estimators, valuers and other sales representatives n.e.s.	1.7	0.3	0.1	0.1	0.1	0.8	0.7	0.1	0.6	0.2	0.1	0.3
829	Synthetic fibre and other chemical, paper, plastics and related operatives	1.6	0.5	0.1	0.0	0.3	0.5	0.2	0.2	0.7	0.1	0.4	0.2
860	Inspectors, viewers and laboratory testers	1.6	0.7	0.1	0.0	0.5	0.4	0.3	0.2	0.5	0.1	0.1	0.2

Note: Totals may not add up due to rounding
Source: Census 2002, CSO, Forfás, ESRI, PACEC

TABLE 13: KEY SECTOR SHARE OF EMPLOYMENT BY OCCUPATION BY REGION, 2004 (%)

SOC	DESCRIPTION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
850	Assemblers and lineworkers (electrical and electronic goods)	93	93	91	92	96	89	83	96	95	95	93	95
320	Computer analyst programmers	61	59	48	54	70	61	60	65	61	62	60	61
411/2	Cashiers, bank and counter clerks; Debt, rent and other cash collectors	57	57	62	53	54	57	58	37	57	66	33	62
516	Metal working production and maintenance fitters	31	25	22	22	30	31	29	36	36	44	34	31
851	Assemblers and lineworkers (metal goods and other goods)	74	84	76	72	91	35	27	51	75	73	78	72
214	Software engineers	76	78	62	64	85	75	75	78	76	77	78	74
430	Filing, computer, library and other clerks n.e.s.	11	9	9	8	10	11	10	13	11	13	8	12
361	Underwriters, claims assessors, brokers and investment analysts	80	81	83	82	78	80	81	62	81	83	71	82
110	Production and works managers	25	23	17	15	34	25	22	35	28	31	26	28
410	Accounts and wages clerks, book-keepers and other financial clerks	18	16	17	13	16	19	20	14	18	23	11	20
126	Computer systems managers	55	53	37	47	65	55	56	55	53	59	52	51
250	Chartered and certified management accountants (incl. taxation experts)	16	13	12	10	16	17	17	16	15	18	11	16
899	Other plant, machine and process operatives n.e.s.	32	28	18	18	44	33	24	46	34	28	29	42
537	Welders and steel erectors	59	60	61	49	68	51	49	55	61	59	63	61
121	Marketing managers	14	12	10	11	15	14	14	16	14	17	14	13
000	Gainfully occupied but occupation not stated	10	10	7	8	15	10	10	14	10	13	9	10
820	Chemical, gas, petroleum, paper, wood and related process plant operatives	62	64	53	37	78	67	60	79	57	18	75	61
139	Other financial managers n.e.s.	16	14	12	12	16	17	17	15	17	20	14	17
131	Bank and building society managers	71	49	50	45	49	85	88	44	60	69	33	64
309	Other scientific technicians n.e.s.	37	34	23	30	43	38	27	63	37	40	37	35
526	Computer engineers (installation and maintenance)	65	58	51	53	65	65	62	75	70	66	63	74
459	Secretaries, medical, legal, personal assistants, typists & word processor operators	6	5	4	4	6	7	7	6	6	7	5	6
839	Other metal making and treating process operatives n.e.s.	55	52	58	34	60	56	65	42	56	58	46	70
710	Technical and wholesale sales representatives	9	7	7	5	8	11	10	13	9	8	8	9
441	Stores, storekeepers, warehousemen/women, despatch and production control clerks	11	12	9	10	17	8	6	19	15	18	15	13
215	Chemical, production, planning and quality control engineers	57	66	51	54	76	53	45	72	55	62	54	53
252	Actuaries, economists, statisticians, management consultants and business analysts	28	20	15	18	26	30	30	25	23	32	13	24
219	Other engineers and technologists n.e.s.	27	32	25	21	41	23	18	38	32	36	30	30
515	Toolmakers	76	75	71	66	83	57	57	57	84	80	88	85
719	Auctioneers, estimators, valuers and other sales representatives n.e.s.	14	12	13	11	11	13	14	8	16	19	11	17
829	Synthetic fibre and other chemical, paper, plastics and related operatives	19	17	8	3	36	22	18	29	20	6	39	16
860	Inspectors, viewers and laboratory testers	48	63	41	31	78	39	35	49	42	44	46	39

Note: Orange highlighting denotes a 50-75% share, dark orange highlighting 75-100%. Totals may not add up due to rounding
Source: Census 2002, CSO, Forfás, ESRI, PACEC

Table 12 shows employment by occupation in the KS for each of the regions. It shows employment for the 32 Key Occupations in which the KS reveal a share exceeding that of the economy generally (i.e., the occupational specialisations of the KS).

Assemblers and line workers are the largest of the Key occupational categories in the KS with an estimated 17,500 jobs. This reflects the large employment contribution of the Engineering sector to total employment in the six KS.

Table 12 also shows that the Border and Mid-West have relatively few KS employees in the Key Occupations and many are hardly represented (note figures are rounded up to 100 and fewer than 50 is recorded as zero). The number of Computer Analysts and Programmers is in a range of 200 (Border and Midlands) to 6,800 (Dublin), the only region with over 1,000 jobs in this occupational category. Software Engineers are again heavily concentrated in Dublin with 4,700 employees of a KS total of 7,500. By contrast Assemblers and Line workers are largely concentrated in the BMW regions and the other regions outside Dublin and the Mid East.

Table 13 extends the analysis to show the share of KS employment of total regional employment in a particular occupation. For example, row one (SOC 850) shows that the KS account for 93% of employment in that occupation in the BMW region, but they account for only 89% in Dublin and the Mid East. The shaded cells show where the KS' share of an occupation exceeds either 50% or 75%. It will be seen that in the Midlands and West the KS typically accounts for more than 50% of the share of particular occupations and in a number of cases more than 75%. For example 75% of Software Engineers in Dublin are in the KS and 54% of Computer Analysts and Programmers in the West are in the KS, which compares with 61% in Dublin and the 60% in the Mid East region. The potential for redeployment of Software Engineers from KS to non-KS sectors is therefore quite limited in the Dublin region as it is for Computer Analysts in the West. Any significant expansion of the KS sectors in this region might require that alternative adjustment mechanisms come into play if skill shortages and upward pressure on wages are to be avoided.

3.3 Past changes in the occupational structure of the regions, 1996 -2002

The rapid growth of the mid to late 1990s has been associated with significant changes in the occupational structure of the regions. At a broad occupational level the period 1996 to 2004 has witnessed very substantial national increases in the demand for the higher occupational categories including Professional/Associate professional and Managers and Senior Officials. Table 14 shows that of the 465,000 increase in the workforce 211,000 were in these three occupational categories. About half of the increase in employment in the Professional and Associate Professional/ technical occupations has been located in Dublin and the Mid East. BMW accounts for 39,000 of the increase in these occupational categories and the Mid West, South East and South West 50,000.

TABLE 14: EMPLOYMENT CHANGE BY BROAD OCCUPATION IN ALL SECTORS 1996-2004

OCCUPATION	CHANGE IN NUMBER OF EMPLOYEES (000s)											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	71	11	4	3	3	47	36	10	14	2	5	7
Professional occupations	68	12	4	2	6	41	33	7	16	4	4	8
Associate Professional and Technical	72	16	6	3	7	36	29	7	20	5	6	9
Administrative and Secretarial	49	11	4	2	4	26	21	5	12	3	4	5
Skilled Trades Occupations	35	9	2	2	5	17	11	5	10	2	4	4
Personal Service Occupations	60	15	6	3	5	24	18	6	21	6	7	9
Sales and Customer Service Occupations	33	10	4	2	4	11	8	3	12	3	4	5
Process, Plant and Machine Operatives	63	18	6	4	8	24	17	7	21	6	7	8
Elementary Occupations	13	4	2	2	0	8	7	1	2	-1	1	1
Total	**465**	**104**	**39**	**25**	**40**	**234**	**181**	**53**	**127**	**31**	**42**	**54**

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

The analysis for the KS reveals a similar story as for the economy as a whole. Table 15 shows that of the 61,700 increase in the workforce of the KS, 39,100 are Professional/Associate professional and Managers and Senior Officers. Of the increase in these three occupational categories an estimated 24,900 are located in Dublin/Mid East, 5,100 in BMW and 9,100 in the three remaining regions. At the more disaggregated SOC level substantial increases have occurred in assemblers and line workers (SOC 850), computer analyst programmers (SOC 320) and financial services staff such as cashiers, bank and counter clerks (SOC 411/12); see Tables 16 and 17. The engineering and metal working skills increases were spread across the regions but the computing and financial related occupations increases were very much concentrated in Dublin.

TABLE 15: EMPLOYMENT CHANGE IN THE KS BY BROAD OCCUPATION 1996-2004

DESCRIPTION	CHANGE IN NUMBER OF EMPLOYEES (000s)											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	13.1	1.5	0.5	0.3	0.7	8.9	7.5	1.4	2.7	0.4	0.6	1.6
Professional occupations	11.6	1.6	0.4	0.1	1.2	7.0	5.9	1.1	3.0	0.6	0.6	1.8
Associate Professional and Technical	14.4	2.0	0.7	0.3	1.0	9.0	7.4	1.5	3.4	0.7	0.8	2.0
Administrative and Secretarial	12.1	2.3	1.3	0.5	0.6	6.8	6.2	0.7	2.9	0.3	0.5	2.1
Skilled Trades Occupations	1.6	-0.2	-0.3	0.1	0.0	1.3	0.7	0.6	0.5	-0.1	0.0	0.6
Personal Service Occupations	0.6	0.1	0.0	0.0	0.1	0.4	0.3	0.1	0.2	0.0	0.0	0.1
Sales and Customer Service Occupations	2.8	0.5	0.3	0.1	0.2	1.3	1.0	0.3	1.0	0.2	0.2	0.5
Process, Plant and Machine Operatives	13.6	5.4	0.5	0.9	4.1	2.5	0.7	1.8	5.7	1.1	1.6	3.0
Elementary Occupations	-8.3	-2.8	-1.3	-0.2	-1.4	-1.6	-0.6	-1.0	-3.9	-1.5	-1.3	-1.1
Total	**61.7**	**10.6**	**2.1**	**2.1**	**6.4**	**35.6**	**29.2**	**6.4**	**15.5**	**1.8**	**3.2**	**10.6**

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

TABLE 16: TOTAL EMPLOYMENT CHANGE BY OCCUPATION BY REGION, 1996-2004 (000s)

SOC	DESCRIPTION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
850	Assemblers and lineworkers (electrical and electronic goods)	6.1	1.8	0.4	0.5	0.9	0.7	-0.2	0.9	3.5	1.9	0.4	1.3
320	Computer analyst programmers	9.0	1.1	0.5	0.2	0.4	6.2	5.3	0.9	1.7	0.4	0.5	0.9
411/2	Cashiers, bank and counter clerks; Debt, rent and other cash collectors	6.6	1.6	0.9	0.4	0.3	3.4	3.2	0.2	1.7	0.3	0.4	1.0
516	Metal working production and maintenance fitters	10.1	2.3	0.8	0.7	0.9	3.6	2.3	1.3	4.2	1.3	1.3	1.6
851	Assemblers and lineworkers (metal goods and other goods)	5.7	3.7	0.4	0.6	2.7	0.1	0.2	-0.1	1.9	0.0	0.9	1.0
214	Software engineers	5.2	0.6	0.1	0.0	0.5	3.4	3.1	0.3	1.2	0.2	0.3	0.7
430	Filing, computer, library and other clerks n.e.s.	28.1	6.1	2.6	1.1	2.4	15.1	12.5	2.7	6.9	2.1	1.9	2.9
361	Underwriters, claims assessors, brokers and investment analysts	4.5	0.6	0.3	0.1	0.2	3.1	3.0	0.1	0.8	0.2	0.1	0.5
110	Production and works managers	8.6	1.8	0.6	0.5	0.7	4.1	2.9	1.2	2.6	0.8	0.9	0.9
410	Accounts and wages clerks, book-keepers and other financial clerks	8.5	1.5	0.6	0.3	0.6	5.0	4.1	1.0	1.9	0.5	0.4	1.0
126	Computer systems managers	4.8	0.4	0.1	0.1	0.2	3.6	3.1	0.5	0.8	0.2	0.3	0.3
250	Chartered and certified management accountants (incl. taxation experts)	10.6	1.3	0.4	0.3	0.6	7.4	6.4	1.0	1.8	0.5	0.5	0.8
899	Other plant, machine and process operatives n.e.s.	8.5	2.6	1.0	0.6	1.0	2.5	1.3	1.2	3.5	1.1	1.0	1.5
537	Welders and steel erectors	-1.4	-0.4	-0.2	0.0	-0.3	-0.3	-0.2	-0.1	-0.6	-0.1	-0.3	-0.2
121	Marketing managers	9.1	1.4	0.5	0.3	0.6	5.8	4.7	1.1	1.9	0.4	0.6	0.9
000	Gainfully occupied but occupation not stated	26.4	6.3	2.5	1.9	1.9	12.9	11.1	1.8	7.2	1.9	2.4	2.9
820	Chemical, gas, petroleum, paper, wood and related process plant operatives	1.5	0.1	-0.1	0.0	0.2	1.0	0.5	0.5	0.5	-0.1	0.2	0.3
139	Other financial managers n.e.s.	12.4	2.3	0.9	0.5	0.9	7.0	5.8	1.2	3.1	0.7	1.0	1.5
131	Bank and building society managers	1.0	0.0	0.0	0.0	-0.1	1.1	1.1	0.0	-0.1	-0.1	-0.1	0.1
309	Other scientific technicians n.e.s.	4.1	1.1	0.3	0.2	0.5	1.8	1.0	0.8	1.3	0.5	0.4	0.4
526	Computer engineers (installation and maintenance)	0.9	0.1	0.0	0.0	0.0	0.5	0.4	0.0	0.4	0.1	0.1	0.3
459	Secretaries, medical, legal, personal assistants, typists & word processor operators	-7.0	-1.4	-0.7	-0.2	-0.5	-2.6	-2.8	0.2	-2.9	-0.8	-0.6	-1.5
839	Other metal making and treating process operatives n.e.s.	3.2	0.8	0.3	0.2	0.3	0.6	0.3	0.3	1.8	0.5	0.8	0.4
710	Technical and wholesale sales representatives	4.4	1.7	0.6	0.3	0.7	0.9	0.4	0.5	1.9	0.4	0.8	0.6
441	Stores, storekeepers, warehousemen/women, despatch and production control clerks	3.0	0.6	0.2	0.2	0.3	1.4	1.2	0.3	0.9	0.3	0.2	0.4
215	Chemical, production, planning and quality control engineers	1.2	0.3	0.0	0.0	0.2	0.5	0.3	0.2	0.5	0.1	0.0	0.4
252	Actuaries, economists, statisticians, management consultants and business analysts	4.2	0.4	0.1	0.1	0.2	3.3	2.9	0.4	0.5	0.1	0.1	0.3
219	Other engineers and technologists n.e.s.	4.2	0.9	0.4	0.2	0.4	2.0	1.5	0.5	1.3	0.3	0.4	0.6
515	Toolmakers	0.6	0.2	0.1	0.0	0.0	0.1	0.1	0.0	0.3	0.1	0.1	0.1
719	Auctioneers, estimators, valuers and other sales representatives n.e.s.	4.7	1.1	0.4	0.3	0.4	2.2	1.7	0.5	1.4	0.4	0.3	0.7
829	Synthetic fibre and other chemical, paper, plastics and related operatives	5.0	1.8	1.0	0.4	0.5	0.9	0.6	0.3	2.3	0.8	0.7	0.9
860	Inspectors, viewers and laboratory testers	-2.0	-0.8	-0.6	-0.1	-0.1	-0.5	-0.5	0.0	-0.7	-0.2	-0.3	-0.1

Note: Totals may not add up due to rounding
Source: Census 2002, CSO, Forfás, ESRI, PACEC

TABLE 17: KEY SECTOR EMPLOYMENT CHANGE BY OCCUPATION BY REGION, 1996-2004 (000s)

SOC	DESCRIPTION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
850	Assemblers and lineworkers (electrical and electronic goods)	6.0	1.9	0.3	0.5	1.0	0.8	-0.1	0.9	3.4	1.8	0.3	1.2
320	Computer analyst programmers	5.7	0.6	0.2	0.1	0.2	4.0	3.4	0.6	1.1	0.2	0.3	0.6
411/2	Cashiers, bank and counter clerks; Debt, rent and other cash collectors	5.5	1.3	0.7	0.3	0.3	2.9	2.8	0.1	1.4	0.2	0.2	1.0
516	Metal working production and maintenance fitters	2.9	0.3	0.1	0.1	0.1	1.5	1.0	0.5	1.1	0.3	0.3	0.5
851	Assemblers and lineworkers (metal goods and other goods)	3.9	3.2	0.3	0.5	2.5	-0.5	-0.3	-0.2	1.2	-0.1	0.6	0.7
214	Software engineers	3.6	0.4	0.0	-0.1	0.4	2.3	2.1	0.2	0.9	0.1	0.2	0.5
430	Filing, computer, library and other clerks n.e.s.	4.2	0.7	0.4	0.1	0.2	2.3	1.9	0.4	1.2	0.3	0.3	0.6
361	Underwriters, claims assessors, brokers and investment analysts	3.8	0.5	0.3	0.1	0.1	2.6	2.5	0.1	0.7	0.2	0.1	0.4
110	Production and works managers	2.2	0.4	0.1	0.1	0.2	1.1	0.7	0.4	0.7	0.1	0.2	0.4
410	Accounts and wages clerks, book-keepers and other financial clerks	2.4	0.4	0.2	0.1	0.1	1.5	1.3	0.1	0.6	0.1	0.1	0.4
126	Computer systems managers	3.0	0.2	0.0	0.0	0.2	2.2	2.0	0.3	0.5	0.1	0.2	0.2
250	Chartered and certified management accountants (incl. taxation experts)	3.0	0.3	0.1	0.1	0.1	2.1	1.9	0.2	0.6	0.2	0.1	0.3
899	Other plant, machine and process operatives n.e.s.	2.8	0.7	0.1	0.1	0.5	0.9	0.3	0.6	1.1	0.2	0.2	0.7
537	Welders and steel erectors	-2.1	-0.7	-0.3	-0.1	-0.3	-0.4	-0.2	-0.1	-1.0	-0.2	-0.5	-0.3
121	Marketing managers	1.6	0.1	0.0	0.0	0.0	1.2	1.0	0.2	0.3	0.0	0.1	0.2
000	Gainfully occupied but occupation not stated	0.6	0.1	-0.1	0.1	0.0	0.7	0.6	0.1	-0.2	0.0	0.0	-0.2
820	Chemical, gas, petroleum, paper, wood and related process plant operatives	1.8	0.1	0.0	-0.1	0.1	1.0	0.5	0.4	0.7	-0.1	0.3	0.5
139	Other financial managers n.e.s.	1.9	0.3	0.1	0.0	0.1	1.2	1.0	0.2	0.5	0.1	0.1	0.3
131	Bank and building society managers	1.8	0.2	0.1	0.0	0.1	1.3	1.2	0.0	0.3	0.0	0.0	0.2
309	Other scientific technicians n.e.s.	2.2	0.5	0.1	0.1	0.3	1.0	0.5	0.6	0.7	0.2	0.2	0.3
526	Computer engineers (installation and maintenance)	0.5	0.1	0.0	0.0	0.1	0.2	0.2	0.0	0.3	0.0	0.0	0.2
459	Secretaries, medical, legal, personal assistants, typists & word processor operators	-0.7	-0.2	-0.1	0.0	-0.1	-0.1	0.0	0.0	-0.4	-0.2	-0.1	-0.1
839	Other metal making and treating process operatives n.e.s.	1.7	0.4	0.2	0.1	0.2	0.3	0.2	0.1	0.9	0.3	0.3	0.3
710	Technical and wholesale sales representatives	0.7	0.1	0.1	0.0	0.1	0.4	0.2	0.1	0.2	0.0	0.1	0.1
441	Stores, storekeepers, warehousemen/women, despatch and production control clerks	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.1
215	Chemical, production, planning and quality control engineers	0.9	0.3	0.0	0.0	0.2	0.4	0.2	0.2	0.3	0.0	0.0	0.2
252	Actuaries, economists, statisticians, management consultants and business analysts	1.5	0.1	0.0	0.0	0.1	1.2	1.1	0.1	0.2	0.1	0.0	0.1
219	Other engineers and technologists n.e.s.	1.1	0.3	0.1	0.0	0.2	0.4	0.2	0.2	0.4	0.1	0.1	0.2
515	Toolmakers	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.1
719	Auctioneers, estimators, valuers and other sales representatives n.e.s.	0.9	0.1	0.1	0.0	0.0	0.4	0.4	0.0	0.3	0.1	0.0	0.2
829	Synthetic fibre and other chemical, paper, plastics and related operatives	0.7	0.2	0.1	0.0	0.2	0.2	0.1	0.1	0.3	0.0	0.3	0.1
860	Inspectors, viewers and laboratory testers	-0.5	-0.1	-0.1	0.0	0.0	0.0	0.0	0.0	-0.4	-0.2	-0.1	0.0

Note: Totals may not add up due to rounding. Source: Census 2002, CSO, Forfás, ESRI, PACEC

3.4 The regional distribution of educational qualifications

This section considers the regional distribution of skills, as measured by the formal educational qualifications of the workforce.

As indicated above, an alternative approach in analysing the regional skills distribution is to assess the skill structure of each region on the basis of the formal qualifications required of each occupation. The analysis of formal qualifications starts with an overview of the regional distribution of the total workforce and then proceeds to assess the KS' share of each region's qualified labour by broad subject area.

Tables 18 and 19 show estimates for 2004 of the absolute numbers and the percentage share of the workforce with 3rd level qualifications in each region. Of a total national workforce of 1.757 million, 192,000 (11%) had a 3rd level science qualification and 347,000 (20%) a 3rd level, non-science qualification, with 1.219 million (69%) without 3rd level qualifications. There exist substantial regional differences in the share of the workforce with 3rd level qualifications. In Dublin 37% of the workforce possessed a 3rd level qualification compared with 22% in the Midlands, 24 % in the South East and 25% in the Border. Significant regional differences are apparent for both the science and non-science qualified workforce.

TABLE 18: THE NUMBER IN THE WORKFORCE IN IRELAND WITH 3RD LEVEL QUALIFICATIONS, BY SUBJECT AREA, BY REGION, 2004

	NUMBER IN WORKFORCE WITH 3RD LEVEL QUALIFICATIONS (000s)											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Total workers	1,757	433	175	92	166	761	616	144	564	146	172	246
Total without 3rd Level	1,219	322	131	72	120	487	386	100	409	107	131	172
Total with 3rd level	539	110	43	20	46	274	230	44	154	39	41	74
Computing and Information Technology	35	7	3	1	3	20	17	3	9	3	2	4
Engineering and Architecture	63	13	5	2	5	31	25	6	19	5	5	9
Life Sciences and Medical Laboratory Science	12	2	1	0	1	6	5	1	4	1	1	2
Mathematics and Stats	4	1	0	0	0	3	2	0	1	0	0	1
Medical and related	62	16	6	3	6	26	22	5	20	5	6	9
Physical Sciences and Chemistry	15	3	1	1	1	7	5	1	5	1	1	3
Total science	**192**	**41**	**16**	**7**	**17**	**93**	**76**	**16**	**58**	**15**	**15**	**28**
Agriculture, Forestry, Fishery and Veterinary	14	5	2	1	2	4	2	2	6	1	2	2
Art	17	3	1	0	1	10	9	1	4	1	1	2
Education	33	9	3	2	3	13	10	3	11	3	3	5
Humanities	33	5	2	1	3	19	17	2	8	2	2	4
Social Sciences, Business and Law	95	15	6	3	6	58	51	7	23	6	6	11
Tourism and other	27	7	3	1	3	11	9	2	9	2	2	5
Other third level	50	10	4	2	4	25	20	4	14	4	4	7
Multiple subjects	78	15	6	3	7	41	35	6	21	5	6	10
Total non-science	**347**	**69**	**27**	**13**	**29**	**181**	**154**	**28**	**97**	**24**	**26**	**46**

Note: Totals may not add up due to rounding. Source: Census 2002, CSO, Forfás, ESRI, PACEC

TABLE 19: THE PROPORTION IN THE WORKFORCE WITH 3RD LEVEL QUALIFICATIONS, BY SUBJECT AREA, BY REGION, 2004

	% SHARE OF PERSONS ACROSS ALL QUALIFICATIONS IN EACH REGION											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Total workers	100	100	100	100	100	100	100	100	100	100	100	100
Total without 3rd Level	69	75	75	78	72	64	63	69	73	73	76	70
Total with 3rd level	31	25	25	22	28	36	37	31	27	27	24	30
Computing and Information Technology	2	2	2	1	2	3	3	2	2	2	1	2
Engineering and Architecture	4	3	3	3	3	4	4	4	3	4	3	4
Life Sciences and Medical Laboratory Science	1	1	0	0	1	1	1	1	1	1	1	1
Mathematics and Statistics	0	0	0	0	0	0	0	0	0	0	0	0
Medical and related	4	4	4	3	4	3	4	3	4	3	3	4
Physical Sciences and Chemistry	1	1	1	1	1	1	1	1	1	1	1	1
Total science	**11**	**10**	**9**	**8**	**10**	**12**	**12**	**11**	**10**	**10**	**9**	**11**
Agriculture, Forestry, Fishery and Veterinary	1	1	1	1	1	0	0	1	1	1	1	1
Art	1	1	1	0	1	1	1	1	1	1	1	1
Education	2	2	2	2	2	2	2	2	2	2	2	2
Humanities	2	1	1	1	2	3	3	2	1	1	1	2
Social Sciences, Business and Law	5	3	3	3	4	8	8	5	4	4	3	5
Tourism and other	2	2	2	1	2	1	2	1	2	1	1	2
Other third level	3	2	3	2	2	3	3	3	3	3	2	3
Multiple subjects	4	4	3	3	4	5	6	4	4	4	3	4
Total non-science	**20**	**16**	**15**	**14**	**17**	**24**	**25**	**19**	**17**	**17**	**15**	**19**

Source: Census 2002, CSO, Forfás, ESRI, PACEC

The location quotients (LQs) for the different categories of 3rd level formal educational qualifications are shown in Table 20. The relative concentration of the workforce in Dublin with 3rd level qualifications stands out very clearly. Relative concentrations in Dublin are particularly high in Social Sciences; Business and Law; Art; Humanities; Maths and Stats; and Computing and information Technology. The more rural regions, for example the BMW regions and the South East not surprisingly have relatively high concentration of the workforce with 3rd level qualifications in Agriculture, Forestry, Fishing and Veterinary studies.

TABLE 20: RELATIVE CONCENTRATION (LQ) IN THE WORKFORCE OF 3RD LEVEL QUALIFICATIONS, BY SUBJECT AREA, BY REGION, 2004

	LQ BY QUALIFICATION											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	**STATE**	**BMW**	**BORD**	**MID**	**W**	**DME**	**DUB**	**ME**	**REST**	**MW**	**SE**	**SW**
Total workers	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Total without 3rd Level	1.00	1.08	1.08	1.12	1.04	0.92	0.90	1.00	1.05	1.05	1.10	1.01
Total with 3rd level	1.00	0.83	0.81	0.72	0.91	1.18	1.22	1.00	0.89	0.88	0.78	0.98
Computing and Information Technology	1.00	0.76	0.83	0.62	0.76	1.29	1.37	0.94	0.80	0.94	0.65	0.81
Engineering and Architecture	1.00	0.83	0.80	0.72	0.92	1.14	1.13	1.19	0.94	1.00	0.75	1.04
Life Sciences and Medical Laboratory Science	1.00	0.81	0.68	0.60	1.06	1.16	1.20	0.97	0.93	0.75	0.75	1.16
Mathematics and Statistics	1.00	0.65	0.63	0.50	0.74	1.39	1.50	0.93	0.74	0.74	0.61	0.84
Medical and related	1.00	1.03	1.04	0.88	1.11	0.98	0.99	0.96	1.00	0.92	0.98	1.06
Physical Sciences and Chemistry	1.00	0.76	0.61	0.68	0.96	1.05	1.05	1.09	1.11	1.00	0.83	1.38
Total science	**1.00**	**0.87**	**0.86**	**0.74**	**0.96**	**1.12**	**1.13**	**1.04**	**0.94**	**0.94**	**0.81**	**1.03**
Agriculture, Forestry, Fishery and Veterinary	1.00	1.32	1.29	1.58	1.19	0.59	0.38	1.46	1.32	1.07	1.70	1.19
Art	1.00	0.65	0.63	0.50	0.76	1.37	1.50	0.84	0.76	0.70	0.66	0.87
Education	1.00	1.05	1.04	0.98	1.11	0.93	0.87	1.18	1.05	1.11	1.02	1.05
Humanities	1.00	0.68	0.59	0.52	0.86	1.36	1.49	0.83	0.76	0.75	0.59	0.88
Social Sciences, Business and Law	1.00	0.64	0.62	0.56	0.70	1.40	1.52	0.85	0.74	0.74	0.61	0.83
Tourism and other	1.00	1.02	1.01	0.83	1.14	0.95	0.97	0.88	1.04	0.92	0.92	1.20
Other third level	1.00	0.86	0.89	0.77	0.87	1.16	1.17	1.10	0.90	0.89	0.76	1.00
Multiple subjects	1.00	0.80	0.76	0.69	0.91	1.23	1.28	0.99	0.85	0.83	0.73	0.94
Total non-science	**1.00**	**0.81**	**0.78**	**0.72**	**0.88**	**1.21**	**1.26**	**0.97**	**0.87**	**0.85**	**0.77**	**0.95**

Source: Census 2002, CSO, Forfás, ESRI, PACEC

Table 21 shows the workforce with formal 3rd level qualifications employed in the six KS. Significant regional differences are found. Of the total KS workforce of 186,500; 68,900 have 3rd level qualifications. The numbers employed with 3rd level science qualifications was 31,500 of which 16,600 worked in Dublin and the Mid East regions. Within the broad area of 3rd level science, Computing and Information Technology; and Engineering and Architecture; graduates were particularly heavily concentrated in Dublin and the Mid East. Dublin and the Mid East region also dominated the region distribution of the 37,400 non-science 3rd level graduates working in the KS in 2004 with an estimated 22,800 working there.

TABLE 21: NUMBER EMPLOYED IN THE KEY SECTORS, BY 3RD LEVEL QUALIFICATION SUBJECT AREA, BY REGION, 2004

	NUMBER EMPLOYED IN KS (000s)											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Total workers	186.5	38.7	12.7	6.8	19.2	85.5	67.7	17.8	62.4	19.5	15.8	27.1
Total without 3rd Level	117.7	27.8	9.4	5.2	13.1	46.1	34.7	11.4	43.8	14.0	12.0	17.8
Total with 3rd level	68.9	10.9	3.3	1.6	6.1	39.4	33.1	6.3	18.6	5.6	3.7	9.3
Computing and Info Tech	12.3	1.7	0.5	0.3	0.9	7.7	6.7	1.0	2.8	0.9	0.6	1.3
Eng and Arch	12.5	2.5	0.7	0.4	1.4	5.6	3.9	1.7	4.4	1.4	0.9	2.1
Life Sci and Med Lab Science	1.7	0.4	0.1	0.0	0.2	0.8	0.6	0.2	0.6	0.1	0.1	0.3
Maths and Stats	0.9	0.1	0.0	0.0	0.1	0.6	0.6	0.1	0.2	0.1	0.0	0.1
Medical and related	0.9	0.2	0.1	0.0	0.1	0.4	0.3	0.1	0.3	0.1	0.1	0.1
Physical Sciences and Chemistry	3.2	0.5	0.1	0.1	0.3	1.4	1.1	0.4	1.2	0.2	0.3	0.8
Total science	**31.5**	**5.4**	**1.5**	**0.8**	**3.1**	**16.6**	**13.2**	**3.4**	**9.5**	**2.8**	**2.0**	**4.8**
Agri, Forest, Fish and Vet	0.8	0.2	0.1	0.0	0.1	0.2	0.1	0.1	0.3	0.1	0.1	0.1
Art	1.4	0.2	0.1	0.0	0.1	0.9	0.8	0.1	0.3	0.1	0.1	0.2
Education	0.6	0.1	0.0	0.0	0.1	0.3	0.2	0.1	0.2	0.1	0.0	0.1
Humanities	2.8	0.3	0.1	0.0	0.2	1.9	1.8	0.2	0.6	0.2	0.1	0.3
Social Sciences, Business and Law	14.3	1.7	0.6	0.3	0.9	9.6	8.6	0.9	3.0	0.9	0.5	1.5
Tourism and other	1.7	0.4	0.1	0.1	0.2	0.7	0.6	0.2	0.6	0.2	0.1	0.3
Other third level	5.8	1.0	0.4	0.2	0.5	3.1	2.5	0.6	1.7	0.5	0.3	0.9
Multiple subjects	9.9	1.5	0.4	0.2	0.9	6.0	5.2	0.8	2.4	0.7	0.5	1.2
Total non-science	**37.4**	**5.5**	**1.7**	**0.8**	**3.0**	**22.8**	**19.8**	**2.9**	**9.1**	**2.8**	**1.8**	**4.6**

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

Table 22 shows the percentage share by region for each qualification. Over half of the total with third level computing and information technology, mathematics and statistics, art and social sciences business and law are located in Dublin. Overall there is a very uneven distribution of the skills base across Ireland in every subject area, with Dublin dominating in every subject except agriculture, forestry, fishery and veterinary. However, most of those with no third level qualification are also located in Dublin. Dublin's dominance across nearly every category reflects the size of its workforce.

TABLE 22: % WITH QUALIFICATIONS IN EACH SUBJECT AREA WHO ARE EMPLOYED IN EACH REGION, 2004

	PROPORTION OF THOSE EMPLOYED IN EACH REGION WITH QUALIFICATIONS (%)											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	**STATE**	**BMW**	**BORD**	**MID**	**W**	**DME**	**DUB**	**ME**	**REST**	**MW**	**SE**	**SW**
Total workers	100	25	10	5	9	43	35	8	32	8	10	14
Total without 3rd Level	100	26	11	6	10	40	32	8	34	9	11	14
Total with 3rd level	100	20	8	4	9	51	43	8	29	7	8	14
Computing and Information Technology	100	19	8	3	7	56	48	8	26	8	6	11
Engineering and Architecture	100	20	8	4	9	49	40	10	30	8	7	15
Life Sciences and Medical Laboratory Science	100	20	7	3	10	50	42	8	30	6	7	16
Mathematics and Statistics	100	16	6	3	7	60	53	8	24	6	6	12
Medical and related	100	25	10	5	10	43	35	8	32	8	10	15
Physical Sciences and Chemistry	100	19	6	4	9	46	37	9	36	8	8	19
Total science	**100**	**21**	**9**	**4**	**9**	**48**	**40**	**9**	**30**	**8**	**8**	**14**
Agriculture, Forestry, Fishery and Veterinary	100	32	13	8	11	25	13	12	42	9	17	17
Art	100	16	6	3	7	60	53	7	24	6	6	12
Education	100	26	10	5	10	40	31	10	34	9	10	15
Humanities	100	17	6	3	8	59	52	7	24	6	6	12
Social Sciences, Business and Law	100	16	6	3	7	61	53	7	24	6	6	12
Tourism and other	100	25	10	4	11	41	34	7	34	8	9	17
Other third level	100	21	9	4	8	50	41	9	29	7	7	14
Multiple subjects	100	20	8	4	9	53	45	8	27	7	7	13
Total non-science	**100**	**20**	**8**	**4**	**8**	**52**	**44**	**8**	**28**	**7**	**7**	**13**

Source: Census 2002, CSO, Forfás, ESRI, PACEC

The past growth in the workforce with 3rd level qualifications of the workforce in each region provides important insights into the extent to which different regions have enhanced their stock of highly qualified workers. The changes in the period 1996 to 2004 shown in Table 23 reflect both the changing regional pattern of demand, as well as the capacity of the Universities and IoTs to produce more 3rd level graduates to meet that demand. In the period 1996 to 2004 the workforce with 3rd level qualifications increased by 223,000 some of which increase originated overseas. The national change in the workforce with scientific 3rd level qualifications was 83,000 of which about half were located in Dublin and the Mid East. The national increase in those with non-scientific 3rd level qualifications was also heavily concentrated in Dublin and the Mid East.

TABLE 23: INCREASE IN NUMBER OF THOSE IN THE WORKFORCE, BY SUBJECT AREA OF 3RD LEVEL QUALIFICATION, BY REGION, 1996-2004

	INCREASE IN NUMBER IN WORKFORCE (000s)											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Total workers	465	104	39	25	40	234	181	53	127	31	42	54
Total without 3rd Level	243	59	21	16	22	114	84	31	69	17	25	27
Total with 3rd level	223	45	17	9	19	120	97	22	58	14	16	28
Computing and Information Technology	16	3	1	0	1	9	8	1	4	1	1	2
Engineering and Architecture	27	6	2	1	2	14	11	3	7	2	2	4
Life Sciences and Medical Laboratory Science	5	1	0	0	1	3	2	0	1	0	0	1
Mathematics and Statistics	2	0	0	0	0	1	1	0	0	0	0	0
Medical and related	27	8	3	1	3	11	8	3	9	2	3	4
Physical Sciences and Chemistry	6	1	0	0	1	3	2	1	2	0	0	1
Total science	**83**	**19**	**7**	**3**	**8**	**41**	**32**	**8**	**24**	**6**	**7**	**11**
Agriculture, Forestry, Fishery and Veterinary	5	2	1	0	1	2	1	1	2	0	1	1
Art	7	1	0	0	0	4	4	1	2	0	0	1
Education	10	2	1	1	1	5	4	1	3	1	1	1
Humanities	12	2	1	0	1	8	7	1	3	1	1	1
Social Sciences, Business and Law	41	6	2	1	3	27	23	4	8	2	2	4
Tourism and other	12	3	1	1	1	5	4	1	4	1	1	2
Other third level	21	4	2	1	2	11	9	2	6	1	2	3
Multiple subjects	31	6	2	1	3	18	15	3	8	2	2	4
Total non-science	**140**	**26**	**10**	**5**	**11**	**79**	**65**	**14**	**34**	**8**	**10**	**16**

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

Tables 24 and 25 provide estimates of regional changes in the KS workforce with 3rd level qualifications. The KS workforce with 3rd level qualifications increased by 36,000 in the period 1996 to 2004, an increase of 108% and which greatly exceeded the 28% growth in the workforce without 3rd level qualifications. Of the estimated national increase of 14,600 (87%) with scientific qualifications, 8,200 were located in Dublin and the Mid East and only an estimated 2,400 in BMW. The increase in the number of non-science 3rd level graduates of 21,200 (131%) significantly exceeded that of the science graduates and was heavily concentrated in Dublin and the Mid East where the growth was 154%.

TABLE 24: INCREASE IN NUMBER OF THOSE IN THE WORKFORCE IN THE KEY SECTORS, BY SUBJECT AREA OF 3RD LEVEL QUALIFICATION, BY REGION, 1996-2004

	INCREASE IN NUMBER IN WORKFORCE IN KEY SECTORS (000s)											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	**STATE**	**BMW**	**BORD**	**MID**	**W**	**DME**	**DUB**	**ME**	**REST**	**MW**	**SE**	**SW**
Total workers	61.7	10.6	2.1	2.1	6.4	35.6	29.2	6.4	15.5	1.8	3.2	10.6
Total without 3rd Level	25.9	5.4	0.5	1.5	3.4	13.7	10.6	3.0	6.9	0.1	1.4	5.4
Total with 3rd level	35.8	5.2	1.6	0.7	3.0	22.0	18.6	3.3	8.7	1.7	1.8	5.2
Computing and Information Technology	6.3	0.8	0.3	0.1	0.5	4.0	3.5	0.5	1.5	0.3	0.4	0.8
Engineering and Architecture	4.8	1.0	0.2	0.1	0.6	2.3	1.5	0.7	1.5	0.3	0.3	0.9
Life Sciences and Medical Laboratory Science	0.9	0.2	0.0	0.0	0.1	0.5	0.4	0.1	0.3	0.0	0.1	0.2
Mathematics and Statistics	0.6	0.1	0.0	0.0	0.0	0.4	0.4	0.0	0.1	0.0	0.0	0.1
Medical and related	0.4	0.1	0.0	0.0	0.1	0.2	0.2	0.0	0.1	0.0	0.0	0.1
Physical Sciences and Chemistry	1.6	0.2	0.0	0.0	0.2	0.8	0.6	0.2	0.6	0.1	0.1	0.4
Total science	**14.6**	**2.4**	**0.6**	**0.2**	**1.5**	**8.2**	**6.5**	**1.7**	**4.1**	**0.7**	**0.9**	**2.5**
Agriculture, Forestry, Fishery and Veterinary	0.4	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1
Art	0.8	0.1	0.0	0.0	0.1	0.5	0.4	0.1	0.2	0.0	0.0	0.1
Education	0.3	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.0
Humanities	1.6	0.2	0.0	0.0	0.1	1.1	1.0	0.1	0.3	0.1	0.0	0.2
Social Sciences, Business and Law	8.9	1.0	0.4	0.2	0.4	6.3	5.7	0.6	1.6	0.4	0.3	1.0
Tourism and other	0.9	0.2	0.1	0.0	0.1	0.4	0.3	0.1	0.3	0.1	0.1	0.1
Other third level	3.0	0.5	0.2	0.1	0.2	1.8	1.5	0.3	0.8	0.2	0.1	0.5
Multiple subjects	5.3	0.7	0.2	0.1	0.5	3.4	2.9	0.5	1.2	0.2	0.2	0.7
Total non-science	**21.2**	**2.9**	**0.9**	**0.4**	**1.5**	**13.8**	**12.2**	**1.6**	**4.5**	**1.0**	**0.9**	**2.7**

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

TABLE 25: PROPORTIONAL GROWTH IN KEY SECTOR WORKFORCE AND IN NUMBER OF WORKERS WITH EACH QUALIFICATION, BY REGION 1996-2004

	GROWTH IN NUMBERS OF WORKERS (%)											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Total workers	49	38	20	45	50	71	76	56	33	10	25	64
Total without 3rd Level	28	24	6	39	35	42	44	36	19	1	13	43
Total with 3rd level	108	92	92	72	97	126	129	110	87	43	93	126
Computing and Information Technology	106	97	112	37	115	108	108	111	106	51	174	141
Engineering and Architecture	62	62	46	51	76	68	64	79	54	26	55	81
Life Sciences and Medical Laboratory Science	111	91	67	50	109	131	130	137	99	23	97	145
Mathematics and Statistics	156	122	144	123	112	177	181	147	110	49	115	187
Medical and related	90	77	60	69	87	109	111	102	73	36	69	104
Physical Sciences and Chemistry	106	88	75	52	101	118	113	133	101	32	102	141
Total science	**87**	**78**	**70**	**47**	**92**	**96**	**96**	**97**	**77**	**35**	**90**	**110**
Agriculture, Forestry, Fishery and Veterinary	93	91	73	108	98	131	128	135	75	34	85	99
Art	123	113	88	113	132	141	144	126	90	52	94	123
Education	95	82	68	118	82	115	118	100	78	42	76	115
Humanities	132	110	134	94	105	143	145	125	112	68	101	158
Social Sciences, Business and Law	164	130	166	157	104	191	196	148	120	63	109	186
Tourism and other	110	117	112	118	119	127	128	123	88	59	85	112
Other third level	109	94	101	117	83	134	139	114	83	44	79	121
Multiple subjects	114	95	92	56	108	129	130	120	95	46	104	138
Total non-science	**131**	**107**	**117**	**105**	**102**	**154**	**158**	**128**	**99**	**53**	**96**	**145**

Source: Census 2002, CSO, Forfás, ESRI, PACEC

4 Future skill requirements in the regions

4.1 Introduction

Earlier chapters of this report have analysed the current position and recent trends in regional employment and skills composition for each of the KS. The emphasis in this chapter is on the future to 2010. The first part of the chapter presents national employment projections for each of the KS in the period to 2010. These national projections provide a 'control' total within which the regional projections are estimated. The projections are based on an analysis of past trends informed by a qualitative assessment of the main threats and opportunities each KS faces in the period 2004 to 2010.

The second part of this chapter focuses on the regional KS employment projections and their evolving regional labour skill requirements. Quantitative estimates of future employment are presented based on past trends and qualitative evidence of important drivers of regional KS employment derived from an extensive interviewing programme across the eight regions and a literature review. These projections present a possible scenario over the period to 2010, based on this methodology, and do not represent targets for the development agencies.

The study has confined itself to developing projections for total employment in each of the KS and has not attempted to quantify skills gaps. However, the chapter concludes with a qualitative assessment of current and persistent skills and capabilities gaps based on interviews conducted in the regions.

A degree of caution is always prudent when assessing projections. Developing quantified projections of skills deficits for a sector nationally is fraught with difficulty due to the complex, non-linear interplay between supply and demand both within, and between, economic sectors, as well as demographic factors such as birth-rates and migration. These difficulties are compounded when one moves to the regional level by the impact of commuting and the relative ease of inter-regional migration. Furthermore, structural changes will have a pronounced impact over the medium-term evolution of the six Key Sectors selected for this study. Consequently, the figures presented in this chapter should be interpreted as an indication of a likely scenario which is underpinned by probabilities rather than certainties. Any number of plausible contingencies (global energy price shock, sharp decline in the value of the dollar etc.) could serve to undermine these projections.

4.2 Employment in the Key Sectors to 2010

Our starting point is to provide national employment projections for each of the KS. These national projections provide a control total for the regional projections such that the sum of the regional employment projections to 2010 equals the national projection.

Official projections of employment in each of the six KS to 2010 are not available. Econometric modelling for forecasting purposes is outside the scope of this project and given the structural changes taking place with intensifying competition for foreign direct investment and in trade from recently joined members of the EU and from China and India, unlikely to produce robust and reliable forecasts. Moreover, uncertainty surrounding the future development of the different sectors is compounded by different public/private initiatives designed to support the development of the sectors. In these circumstances, our preferred approach is to base projections on past trends informed by interviews with senior industry representatives and evidence obtained from relevant sector reports.

Figure 17 shows historical and projected (baseline) national employment for each of the six KS from 1985 to 2010. Table 26 shows the annualised growth rates over this period.

In general the rate of employment growth in each sector is set to be lower in the future than it has been in the past. Employment in the engineering sector[3] is projected to fall absolutely from its current level as international competition, particularly from Central Europe and Asia intensifies and margins are further squeezed. The IBEC submission to the Enterprise Strategy Group (2004) makes salutary reading. The Report points out that although opportunities exist for both the indigenous and foreign-owned segments of the sector, they are mainly in export markets where Irish-owned companies have made limited penetration in the past and the foreign-owned sector faces growing competition from low cost countries. Foreign direct investment in the Engineering sector is also predicted to be more difficult to capture with increased attractiveness and increased grant and tax offerings by competitors for internationally mobile investment. Increased low cost outsourcing and the movement of mid-quality/value products to lower cost competitors further threaten the future of the sector.

The past decade has witnessed very rapid growth in the ICT sectors with the foreign-owned sector contributing substantially to employment growth and to the opening up of export markets. Indigenous companies have also developed in selected niche markets such as the Enterprise Application Integration and eBusiness sub-sectors. The competitiveness of the sector has however been eroded recently as costs have increased and the foreign-owned sector focuses on raising their investment in and marketing in the emerging markets. These trends threaten the flow of foreign direct investment to Ireland. The recent downturn in ICT hardware employment in part reflects these pressures on the sector but it also reflects a cyclical downturn shared by other countries. Nevertheless, the future opportunities for Ireland in the sector will lie in high value-added manufacturing and R&D, activities for which the labour costs are a small proportion of the overall investment.

The sector continues to globalise. It is becoming more sector and customer focused with new market opportunities emerging, in for example integrated supply chain management. Those interviewed were typically pessimistic regarding the prospects for the low added-value hardware sector with a number anticipating transfers to the Far East and Eastern Europe. Although we project a recovery of employment in ICT hardware from its recent sharp downturn, it is projected to grow much less rapidly than in the 1990s and fails to return to its previous (2000) peak by 2010. Niche markets nevertheless will continue to provide growth opportunities for some firms in this sector and this is particularly the case in the ICT software sector which has emerged as a major growth sector in Ireland in the past decade. Further significant growth is expected in the period to 2010, albeit at a slower rate than in the past.

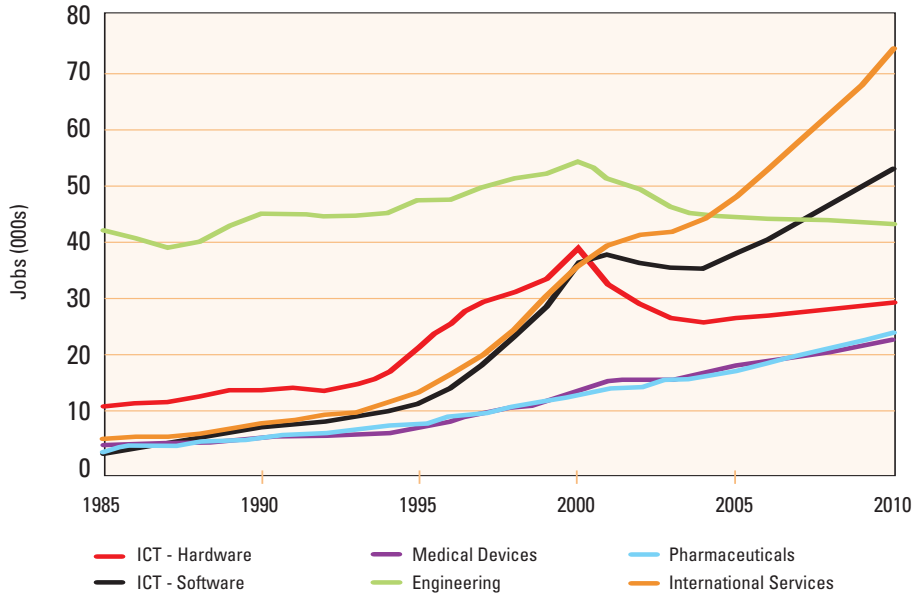
Employment in the International Traded Services sector has grown rapidly in the past two decades. International Services is defined here to include Financial Services (NACE 65, 66 and 67); Real estate; R&D; and Other Business (NACE 70, 73 and 74). The Enterprise Strategy Group publication Ahead of the Curve (2004) identified Financial Services and Business Services as sectors with significant potential for future growth. Ireland has successfully captured a significant flow of inward investment in these sectors in the past. Many of the factors responsible for this remain and indeed have been strengthened as clusters in sub-sectors such as that of financial services have matured. In addition, the extension of the 12.5% corporation tax rate to all traded activities provides new opportunities for foreign direct investment. A number of niche opportunities were identified in the 2004 review of the sector carried out by PricewaterhouseCoopers on behalf of the Enterprise Strategy Group, including IP Management, Franchising Management, HQ functions and professional business services. Our expectation is for continued growth of this amorphous sector but at a slower rate than in the 1990s.

3 Projections for employment in the Engineering Sector should not be confused with employment prospects for Engineering Professionals across the economy, for which the outlook is extremely positive.

The Medical Devices sector has grown steadily in the past two decades largely as a result of foreign direct investment, although more recently a number of new technology-based indigenous firms have emerged as well as corporate spin-offs from overseas multi-nationals. Globally the industry is dominated by a few large companies producing both low and high margin products. Production in the former is increasing shifting to low cost locations. In Ireland the industry is dominated by overseas multi-nationals and although some low cost manufacturing remains it has made progress in restructuring towards more technology driven production. The indigenous sector is primarily operating in the high-value proprietary segment of the market and accounts for about one sixth of employment. Figure 17 reveals a slowdown in growth from 2001 to 2003. This is partly cyclical but may also herald the loss of low margin activities vulnerable to competition from low cost locations. The projections here reflect the industry's challenging predicament and as a consequence growth in the period 2004 to 2010 is likely to be significantly lower than that achieved in the period 1995 to 2004.

As with a number of the other KS, prospects for the growth of the Pharmaceutical industry in Ireland are clouded by increasing competition for foreign direct investment from relatively low cost locations such as India and China, as well as locations operating extremely favourable corporate taxation regimes, such as Singapore and Puerto Rico. The issue is particularly important for Ireland because of the embryonic stage of development of the indigenous sector and because the competitive threat relates to both high and low value added activities. In the period to 2010 the contribution of the indigenous sector to employment growth, although likely to be positive, will be small and our projections turn heavily on the prospects for the foreign-owned sector. Mandatory EU scrutiny of capital projects in receipt of state aid may hamper efforts to attract further FDI, intensifying overseas competition for internationally mobile projects and concerns by the industry on skills availability all suggest less rapid growth of the sector in the short to medium term. At the same time market growth has slowed in recent years compared with the late 1990s. Notwithstanding these concerns Ireland retains a major cluster of multinational companies, a competitive tax regime, a respected regulatory framework and favourable conditions for patents and IP transfer. Table 26 shows that the growth of employment in the period to 2010 is projected to be positive, but at a lower rate than in the period from 1995 to 2004[4].

FIGURE 17: KEY SECTOR EMPLOYMENT IN IRELAND, BY SECTOR, 1985-2004 AND PROJECTIONS FOR 2004-2010



4 The annualised growth rates are calculated over the six year period 2004-2010 using compound growth rates.

TABLE 26: ANNUALISED EMPLOYMENT GROWTH RATES OF TOTAL EMPLOYMENT AND KEY SECTOR EMPLOYMENT

PERIOD	ANNUALISED GROWTH RATES (% PER ANNUM)							
	TOTAL EMPLOYMENT	ICT HARDWARE	ICT SOFTWARE	MEDICAL DEVICES	ENGRING	PHARMA	INTL SERVICES	TOTAL KEY SECTORS
1985-1996	n/a	8.1	14.4	5.7	1.1	7.3	10.7	5.3
1996-2004	3.9	0.2	11.4	8.8	-0.7	7.1	12.5	5.1
2004-2010	1.9	2.0	6.6	4.6	-0.6	6.2	8.7	4.8

Source: Forfás, PACEC

4.3 Regional employment scenarios for the Key Sectors to 2010

Given the national employment projections for the KS presented in Section 4.2, the aim of this section is to provide estimates of the regional distribution of KS employment 2004 to 2010. Our approach is to combine a 'top down' quantitative analysis of past trends in the share of KS employment in each region with a 'bottom up' qualitative analysis of regional influences on the growth of KS employment. The latter is based on an extensive interviewing program in which a wide variety of agencies and other organisations in each of the eight regions were interviewed. Evidence presented in regional strategy reports and other official sources also proved valuable in the individual regional appraisals.

Key drivers of change of KS employment in the regions

We begin with the 'bottom up' qualitative analysis of the principal factors influencing the future growth of KS employment in the regions.

The attractiveness of a region for the KS, both foreign-owned and indigenous, will be determined by the extent to which the region's capabilities and competences meet the requirements of firms in the KS. In making employment projections it must be recognised that the localised capabilities of regions and the needs and requirements of firms change through time. Technological change, innovation and government policy for example may shift the balance of competitive advantage from one region to another. The NRA's current strategic programme for the upgrading of road communications and changes in accessibility provides an example of a potentially important influence on regional competitiveness. Localised capabilities may also erode through time (e.g. the availability and cost of labour) or may be replicated in other regions thereby reducing a region's competitiveness. However, notwithstanding such changes, the locational preferences of firms in the KS will be heavily influenced by their perceptions of the current strengths and weaknesses of a region relative to other regions.

The factors influencing the location of the KS vary across the six sectors and by corporate function, although there are many commonalities. The literature review and interviewing programme identified a number of important regional characteristics influencing the locational choice of the KS, of which the following were particularly important both for the foreign owned sector and indigenous firms:

1. The presence of an existing concentration or cluster of firms in the KS providing access to markets, suppliers, business networks and skills.
2. The accessibility of the main cities and towns in the region, both to centres of population and economic activity outside Ireland and within Ireland.

3. The degree of urbanisation of the region and urban critical mass.
4. The capacity of the region to provide a distinctive quality of life including for example, a high quality physical environment, leisure facilities and health and educational facilities.
5. The presence of high quality Universities/Institutes of Technology providing opportunities for recruitment of high quality labour.

The regional characteristics identified above have been important influences driving the regional location of the KS and their past growth of employment. They will continue to influence the regional location of employment in the KS in the period to 2010.

Existing regional concentration and clusters of firms in one or more of the KS, will continue to be an important locational influence for KS firms in the future. One important reason for this is the potential benefit to KS firms provided by the availability of a wide range of relevant skills and the 'depth' of the regional/local labour market that concentration of KS firms support. Localised labour pools also improve the quality of job-worker matching, reduce search costs and through labour turnover/job mobility they enhance the diffusion of knowledge across the regional economy. The earlier analysis in Chapter 2 identified a strong tendency for the KS to be unevenly distributed across the eight regions of Ireland with geographical concentrations in a number of regions. For example, employment in Internationally Traded Services and ICT Software is very heavily concentrated in Dublin. Despite the success of the North West in attracting some financial back office functions such as the MBNA facility and Prumerica, a software development subsidiary of the Prudential Insurance Company, Dublin will remain the preferred location for these sectors. Medical Devices in the West with Galway City at the centre of one of the biggest Medical Devices clusters in Europe, will continue to be an important location for the growth of employment in this sector. Pharmaceuticals employment is likely to stay concentrated in the Mid East, South West and South East. Engineering will continue to be an important KS in the South East and South West but these regions are vulnerable to the potential loss of jobs in the Engineering sector as a whole.

Accessibility is the second of the main factors influencing the regional distribution of employment growth in the KS. Much of the recent dynamism of the KS can be attributed to the foreign-owned sector. These firms are typically heavily export-orientated and with extensive overseas networks requiring good accessibility by senior managers and other staff to airports serving global destinations. Imports of materials and components are also important for these sectors and good air road and sea communications are vital.

Many factors influencing the relative accessibility of different regions will not change significantly in the period to 2010 and as such will not impact on the regional distribution of the KS. However some changes such as the recent completion of motorway now connecting Dundalk and Dublin and the motorway and road upgrading now underway as part of the NRA's current strategy for improving inter-regional (city) road communications will improve accessibility for a number of regions. The upgrading of Dublin to Galway, Dublin to Cork, Dublin to Limerick road communications in the period to 2010, for example will change the locational attractions of regions affected by these developments. They will also change the travel to work areas of the workforce as commuting times shorten. However, the outcomes for the regional distribution of the KS in the period to 2010 are likely to be small. Those KS such as ICT hardware and Engineering engaged in moving goods to market or obtaining supplies of components and other such inputs will benefit from such transport improvements. But equally the costs associated with movement of people by road will be reduced and this will benefit all the KS, including those primarily engaged in providing services and where face-to-face business interaction is important. The regional implications for the location and growth of employment in the KS are uncertain and the outcome depends on the regional and sectoral circumstances.

Cities provide firms and the workforce with a range of benefits that have made them important locations for the KS. For large cities such as Dublin (which is the dominant location for Internationally Traded Services and ICT Software), these benefits derive from a wide range of factors including access to a wide variety of differentiated goods and services based on the greater specialisation that larger cities can sustain; from labour pooling and access to a wide range of skills; from knowledge spillovers within and across sectors and from accessibility to large and diverse markets. At the same time some regions possess smaller cities with different specialisms such as Medical Devices located in and around the City of Galway. In the period to 2010 the pattern of urban development, the competitive advantages and the different degrees of sector specialisation across the regions cities will change only marginally as will their influence on the locational choices of firms in the KS. The balance between the benefits of a Dublin location and the costs associated with congestion, environmental pollution and relatively high input costs will shift but in the short run the impacts on the location of the KS in that city are likely to be much the same as in the recent past.

Outside Dublin cities such as Cork, Limerick and Galway (designated 'Gateways' in the National Spatial Strategy) which are focal points for the location of firms in the KS in their regions will remain so. These cities compete for inward investment (physical and human capital) in the KS and other sectors, including the public sector. Waterford, the smallest of the 'Gateways' arguably provides less of an urban 'critical mass' than the other 'Gateway' cities and because of the existence of other relatively large towns in the South East, the city been somewhat less of a focal point for the KS than the other Gateway cities in their regions. Although the planned upgrading of local and intercity road communications will support population and economic growth in Waterford, a significant shift in urban critical mass will not occur in the period to 2010. Cork is well established as a major urban centre and Galway and Limerick are developing rapidly as regional foci for the KS.

The capacity of a region to provide a distinctive quality of life is the next important factor influencing both the location of a highly skilled workforce and internationally mobile investment. The KS recruit a relatively high proportion of the more highly qualified and high earnings members of the workforce compared with many other sectors. For these workers a high quality lifestyle embracing their physical environment (including the quality of the housing stock and place of work), good health and education facilities and relatively easy access to a variety of leisure facilities are important factors influencing where they live and work. The interviewing programme revealed a wide diversity in the quality and nature of lifestyle factors across the regions and although each region is seeking to upgrade its attractiveness in this respect, no significant regional differentiation is likely to occur in the near future.

The final factor considered as part of this analysis of regional drivers influencing the location and growth of the KS is the role of higher education institutions (HEI). HEIs are particularly relevant for the analysis of regional skills because they impact on both the demand and supply side of the labour market for highly qualified workers. The capacity of a region's HEI to provide a flow of 3rd level entrants suitable for recruitment by the KS and the opportunities the HEIs provide for mutually beneficial academic–industry links with 'local' KS companies have a major bearing on the development of the KS in the region.

HEIs are an important regional asset and potentially a central element in the portfolio of assets that contribute to a regions competitive advantage and enterprising capability. As knowledge becomes increasingly important for firms' competitiveness, so too do HEIs in meeting their knowledge needs. Most obviously they produce a steady output of qualified and skilled labour, they increase the stock of codified, useful knowledge and they also play a role in the process of innovation by interacting with the business community through formal and informal channels. HEIs with high quality research capabilities attract first class scientists, talented graduates and post-docs to the local area. In turn these graduates and staff start new technology-based companies, are recruited by existing companies, upgrade the local/regional labour

market and become the conduits for technology transfer from the HEIs to the business community. High quality research in HEIs and a pool of labour with advanced technical and scientific training also attracts research functions of multinational companies, public sector R&D funding and encourages collaborative research activity.

The capacity for technology transfer between HEIs and regionally based businesses is also, not surprisingly, very unevenly distributed across the regions. Dublin, Galway, Cork and Limerick benefit from the presence of Universities/specialised research centres and mechanisms for the commercialisation of their science base as well as being able to offer advanced educational programs and an ample output of high quality graduates which make them attractive for MNCs.

There are also important regional differences in the research strengths of the major HEIs which potentially influence the locational choices of firms in the KS. For example, Limerick University (UL) has traditionally had strengths in electrical, electronic and aeronautical engineering and to these it has added microelectronics, software and industrial chemistry, thermofluids, materials and Advanced Manufacturing Technology. The main theme running through research is industrial relevance, and this applies to non-technical subjects such as European studies, humanities and education, which are often geared towards work and productivity. A large proportion of the faculty at Limerick has industrial experience and is continuously building bridges to companies, especially larger concerns and progressive SMEs. UL has a network of 1,500 Co-operative Education Employers who collaborate with the university to provide a range of career-relevant work experience. About 70 of these companies are Irish and the rest are fairly evenly divided between the EU and the US, with some in South East Asia. Under the Co-operative Education initiative about 2,000 undergraduate placements are secured annually in industry, commerce, public services and the professions.

By contrast, Cork has leading research capabilities in photonics, in areas where there is an interface between electronics and biotechnology, advanced design of integrated circuits, and in biotechnology / medical areas such as smart drugs, genetics, molecular biology and bacterial processes. UCC probably has greater research links and collaboration with food / nutrition than it has with any other industry. CIT has a very strong relationship with UCC and the economic development agencies regarding the co-ordination of the provision of third level education in the region and addressing its economic development requirements. These links are strengthened by the Tyndall National Institute in Cork.

In conclusion the regional distribution of skills demands by the KS will continue to change in the period to 2010. The emerging regional distribution of KS is towards one of increasing regional specialisation. If the strengthened regional policy is effective, the balance of competitive advantage may shift across the regions but such impacts are unlikely to be substantial in the period under consideration.

Baseline scenario

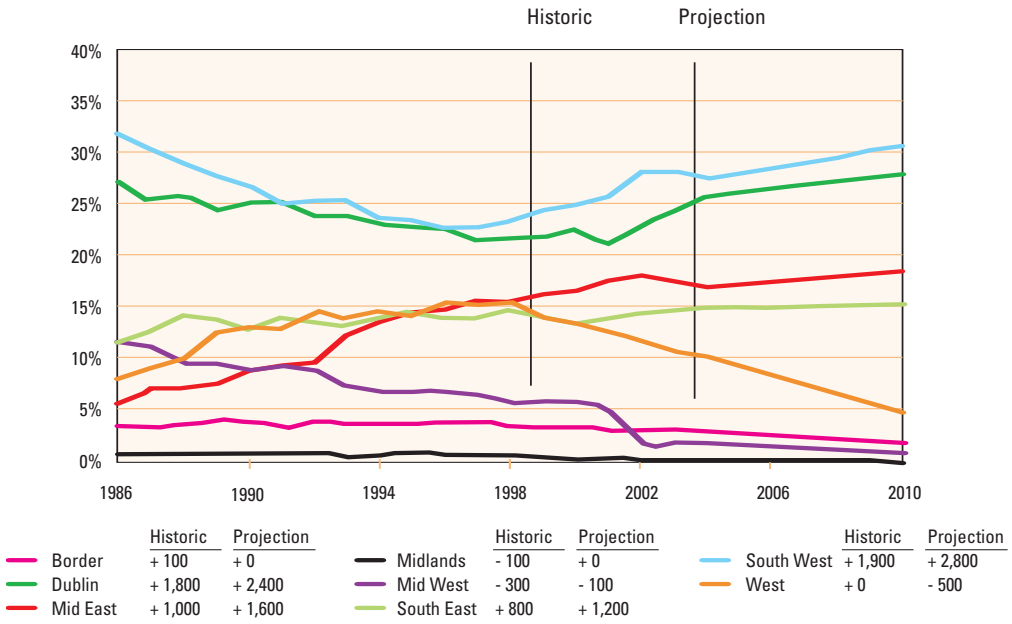
Two scenarios are presented in the projections of KS employment and skill requirements. These are a 'Baseline' scenario and a 'Stronger Regional Policy' scenario that reflects a more effective regional policy. The latter represents an assessment of what regional policy might plausibly hope to achieve with respect to raising the growth performance of the KS in each of the regions. It is obviously **not possible to provide precise estimates of future employment change under the different scenarios and there is a sense in which the estimates are 'What if'** estimates which provide broad indications of the scale and nature of regional labour requirements by the KS under different assumptions.

The 'Baseline' scenarios for each KS in each of the eight regions are derived from past trends in employment growth in each sector and the analysis of regional drivers of change undertaken for each region. They also take into account the more aggregated regional sectoral projections presented in the ESRI (2004) study.

Nationally, total employment in the **Pharmaceuticals** sector grew by 11,500 over the period 1988-2003; employment grew in absolute terms in all regions over the period, apart from the Midlands, where it remained static (Figure 18).

Figure 18 shows the historical and 'baseline' projected (2004-2010) relative share of employment for the **Pharmaceuticals** sector in the regions. Even though total employment grew in Dublin over the period from 1986 to 2002, the share of Pharmaceutical employment in Dublin fell steadily due to the faster growth recorded in other regions. This decline in the share of employment has recovered in the very recent past and a modest increase is projected to continue to 2010. Employment in the region increased in the period to 2004 and under the baseline scenario further increases are expected in the period to 2010. The South West also experienced a declining share of this sector through to the late 1990s but thereafter its share of national employment increased and is projected to increase in the period to 2010. By contrast the Mid East share has steadily increased throughout the period to 2002 and further increases are projected in the future. The Mid West and West have been losing share and this decline is projected to continue.

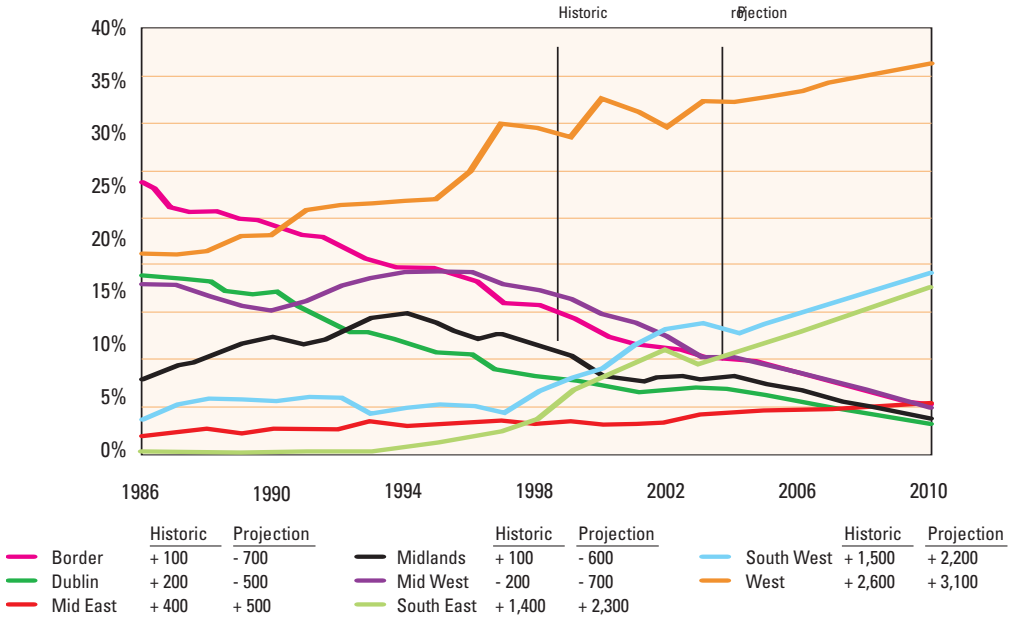
FIGURE 18: PROPORTION OF IRELAND'S TOTAL PHARMACEUTICALS EMPLOYMENT THAT IS IN EACH REGION, 1986-2004, AND BASELINE SCENARIO PROJECTION, 2004-2010



Source: Forfás, PACEC

Changes in the regions' shares of national employment in the Medical Devices sector (Figure 19) have been quite large. The West increased its share from just over 20% to over 35% over the 18-year period while the Border region's share declined from about 30% in 1985 to 10% in 2004. The Mid West and Midlands also lost share in the mid to late 1990s. The benefits to firms from increased clustering of the sector in and near Galway City, may be one important reason for these regional shifts.

FIGURE 19: PROPORTION OF IRELAND'S TOTAL MEDICAL DEVICES EMPLOYMENT THAT IS IN EACH REGION, 1986-2004, AND BASELINE SCENARIO PROJECTION, 2004-2010

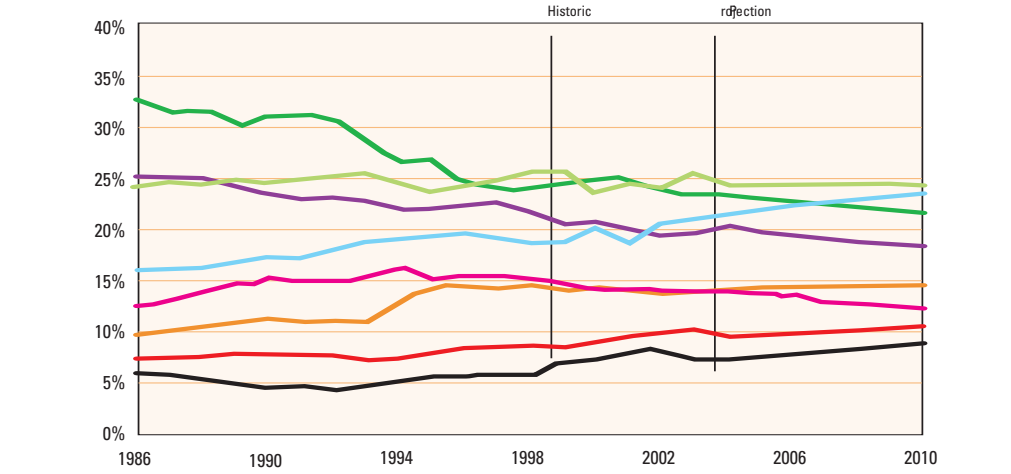


	Historic	Projection
Border	+ 100	- 700
Dublin	+ 200	- 500
Mid East	+ 400	+ 500
Midlands	+ 100	- 600
Mid West	- 200	- 700
South East	+ 1,400	+ 2,300
South West	+ 1,500	+ 2,200
West	+ 2,600	+ 3,100

Source: Forfás, PACEC

Regional shares of employment in the **Engineering** sector (Figure 20) have been relatively stable compared with the other five KS. Dublin's employment share has declined significantly as the capital city's locational advantages for this sector have declined. The cost of industrial premises and labour costs have risen faster in Dublin than in some other regions and this, combined with intensifying competition and falling margins in many sub-sectors within Engineering, has encouraged location and expansion in other regions. This urban-rural shift of manufacturing from Dublin parallels the experience of many other European cities in the past few decades. Dublin's share is now projected to continue the trend established in the period since 1997. The other regional shares are projected to follow past trends.

FIGURE 20: PROPORTION OF IRELAND'S TOTAL EMPLOYMENT IN THE ENGINEERING SECTOR THAT IS IN EACH REGION, 1986-2004, AND BASELINE SCENARIO PROJECTION, 2004-2010

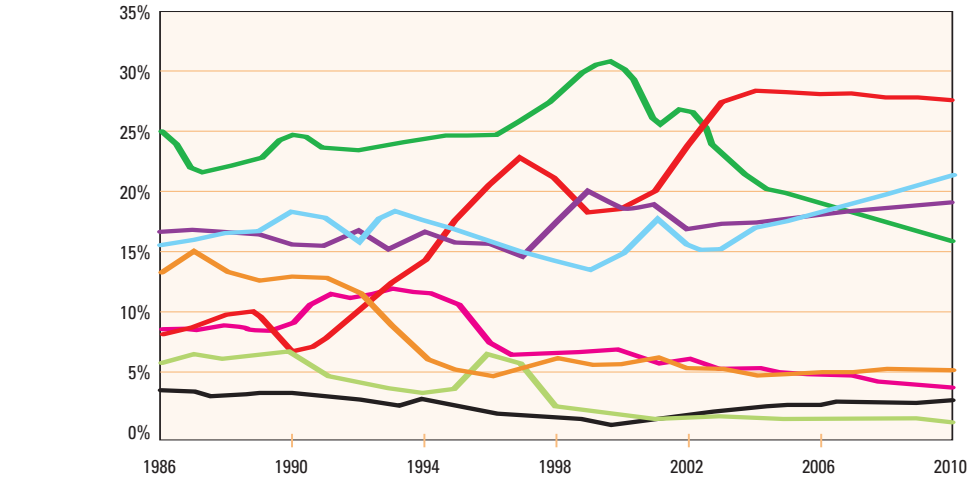


	Historic	Projection
Border	+ 1,100	-700
Dublin	- 1,300	-800
Mid East	-100	+200
Midlands	+200	+400
Mid West	- 1,600	-900
South East	- 1,600	-300
South West	+ 100	+ 400
West	-900	+ 0

Source: Forfás, PACEC

The regional shares of the **ICT hardware** sector (Figure 21) have varied considerably over the period since 1986. This possibly reflects MNC openings and closures in different regions. At a national level we have indicated that we expect employment growth in this sector to slow in the future by comparison with the 1990s. The projections indicate regional shares remaining at or close to current levels. The Mid East, which has experienced absolute employment growth of 900 since 1998, and a rise in its share of national employment to just under 30%, is projected to maintain this share. This implies an absolute increase of 700 jobs in the period to 2010.

FIGURE 21: PROPORTION OF IRELAND'S TOTAL ICT HARDWARE EMPLOYMENT THAT IS IN EACH REGION, 1986-2004, AND BASELINE SCENARIO PROJECTION, 2004-2010

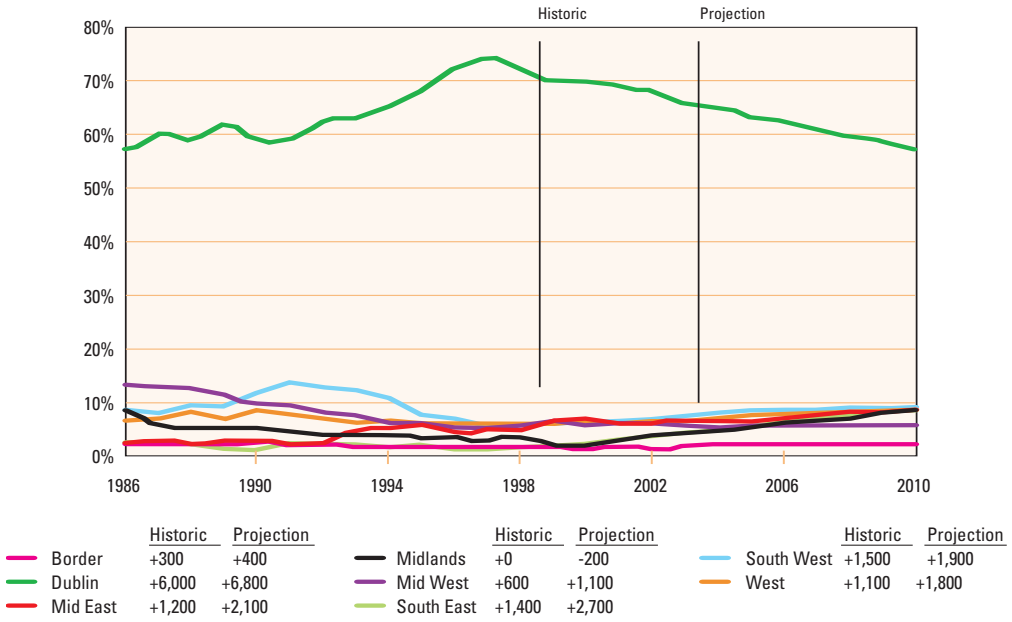


	Historic	Projection
Border	-700	-200
Dublin	-3,100	-700
Mid East	+900	+700
Midlands	+100	+200
Mid West	-900	+1,000
South East	-400	+0
South West	+0	+1,900
West	-800	+300

Source: Forfás, PACEC

Dublin accounts for about two thirds of employment in **ICT software** (Figure 22). Since the late-1990s Dublin's share has fallen slightly as the shares of the Mid East and South East have increased. In part this may reflect the growth of the indigenous sector and particularly small firms. This segment of the industry is likely to grow and be seeking lower cost and smaller premises outside Dublin. With intensifying overseas competition these factors will be of increasing importance and recent trends are projected to continue in the future. The Mid West steadily lost share of this sector until about 1997 but has since experienced a bottoming-out.

FIGURE 22: PROPORTION OF IRELAND'S TOTAL ICT SOFTWARE EMPLOYMENT THAT IS IN EACH REGION, 1986-2004, AND BASELINE SCENARIO PROJECTION, 2004-2010

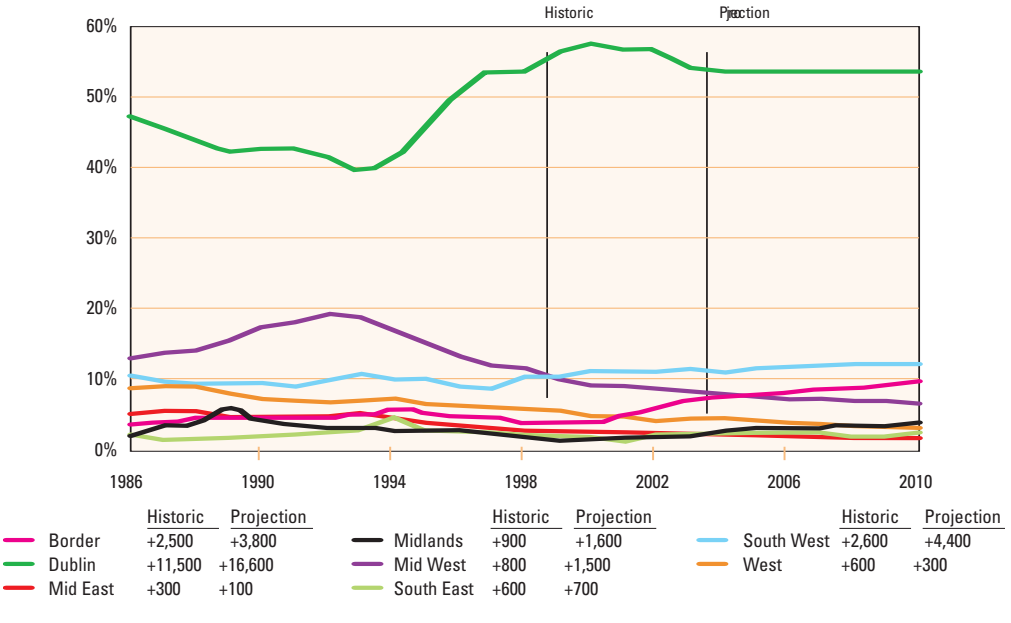


	Historic	Projection
Border	+300	+400
Dublin	+6,000	+6,800
Mid East	+1,200	+2,100
Midlands	+0	-200
Mid West	+600	+1,100
South East	+1,400	+2,700
South West	+1,500	+1,900
West	+1,100	+1,800

Source: Forfás, PACEC

The Internationally Traded Services sector (Figure 23) is very heavily concentrated in Dublin and this concentration increased in the 1990s with the rapid and sustained increase in employment nationally. However since the late 1990s Dublin's share of employment in this sector has fallen slightly and is projected to stabilise in the period to 2010. This would still imply a very substantial employment increase in the capital city of 16,600.

FIGURE 23: PROPORTION OF IRELAND'S TOTAL INTERNATIONALLY TRADED SERVICE EMPLOYMENT THAT IS IN EACH REGION, 1986-2004, AND BASELINE SCENARIO PROJECTION, 2004-2010



	Historic	Projection
Border	+2,500	+3,800
Dublin	+11,500	+16,600
Mid East	+300	+100
Midlands	+900	+1,600
Mid West	+800	+1,500
South East	+600	+700
South West	+2,600	+4,400
West	+600	+300

Source: Forfás, PACEC

Tables 27 and 28 summarise the 'Baseline' scenario projections. Substantial regional differences are projected in the scale of employment growth of the KS and in the regional location of future growth of different KS. In part this reflects our view that future growth of individual KS will take place to a significant extent in regions in which the KS is already concentrated. An effective regional policy can influence this regional distribution and this is considered below, but such policy impacts take a long time to mature. Overall under the 'Baseline' scenario, employment in the KS is projected to reach 246,900 by 2010, an increase of just over 60,000 jobs on the 2004 total of 186,500. Internationally Traded Services has the largest projected increase (just over 29,000 jobs, about half of the estimated total increase) (Table 28). ICT Software is projected to expand its employment by 16,600. Dublin is projected to benefit substantially from the growth of employment in these two sectors with projected increases of 16,600 jobs in Internationally Traded Services and 6,800 in ICT-Software. Of the national employment increase of 5,600 in Medical Devices, the West enjoys employment growth of 3,100 and there are also projected increases in the South West and South East. The growth of the Pharmaceutical sector is projected to provide an additional 2,800 jobs in the South West, 2,400 jobs in Dublin and 1,600 jobs in the Mid East. Engineering remains a major source of jobs provided by the KS despite a projected decrease of 1,600 jobs nationally (Table 28).

TABLE 27: PROJECTED EMPLOYMENT IN ALL SECTORS AND IN THE KEY SECTORS IN 2010, BY SECTOR, BY REGION (BASELINE SCENARIO)

AREA	PROJECTED EMPLOYEES IN 2010 (000s)							
	TOTAL EMPLOYMENT	ICT HARDWARE	ICT SOFTWARE	MEDICAL DEVICES	ENGRING	PHARMA	INTL SERVICES	TOTAL KEY SECTORS
State	1,963	29.8	52.5	23.5	43.3	24.3	73.5	246.9
Border Midlands and West	**465**	**4.0**	**5.9**	**11.8**	**11.6**	**1.7**	**12.8**	**47.8**
Border	186	1.3	1.0	1.2	4.0	0.5	7.4	15.3
Midlands	100	0.9	0.6	0.9	2.9	0.0	2.9	8.2
West	179	1.7	4.4	9.7	4.7	1.2	2.5	24.3
Dublin & Mid East	**884**	**13.1**	**34.4**	**2.0**	**10.4**	**11.3**	**43.5**	**114.7**
Dublin	715	4.8	30.0	0.7	7.0	6.8	42.3	91.6
Mid East	169	8.3	4.4	1.2	3.4	4.5	1.2	23.0
Rest of State	**615**	**12.7**	**12.1**	**9.8**	**21.3**	**11.4**	**17.1**	**84.4**
Mid West	159	5.8	3.0	1.1	5.9	0.2	5.4	21.5
South East	188	0.5	4.4	4.1	7.8	3.7	1.8	22.2
South West	268	6.5	4.7	4.5	7.6	7.4	9.9	40.7

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

TABLE 28: PROJECTED EMPLOYMENT CHANGE IN ALL SECTORS AND IN THE KEY SECTORS, 2004-2010, BY SECTOR, BY REGION (BASELINE SCENARIO)

AREA	PROJECTED INCREASE IN EMPLOYEES, 2004-2010 (000s)							
	TOTAL EMPLOYMENT	ICT HARDWARE	ICT SOFTWARE	MEDICAL DEVICES	ENGRING	PHARMA	INTL SERVICES	TOTAL KEY SECTORS
State	206	3.3	16.6	5.6	-1.6	7.4	29.1	60.3
Border Midlands and West	**33**	**0.4**	**2.0**	**1.8**	**-0.2**	**-0.6**	**5.7**	**9.1**
Border	11	-0.2	0.4	-0.7	-0.7	0.0	3.8	2.6
Midlands	8	0.2	-0.2	-0.6	0.4	0.0	1.6	1.5
West	13	0.3	1.8	3.1	0.0	-0.5	0.3	5.0
Dublin & Mid East	**123**	**0.0**	**9.0**	**0.0**	**-0.6**	**4.1**	**16.7**	**29.2**
Dublin	98	-0.7	6.8	-0.5	-0.8	2.4	16.6	23.9
Mid East	24	0.7	2.1	0.5	0.2	1.6	0.1	5.3
Rest of State	**51**	**2.9**	**5.7**	**3.8**	**-0.8**	**3.9**	**6.6**	**22.1**
Mid West	13	1.0	1.1	-0.7	-0.9	-0.1	1.5	2.0
South East	16	0.0	2.7	2.3	-0.3	1.2	0.7	6.5
South West	22	1.9	1.9	2.2	0.4	2.8	4.4	13.6

Note: Totals may not add up due to rounding.
Source: Census 2002, CSO, Forfás, ESRI, PACEC

The projected proportion of employment in each Key Sector accounted for by each region is shown in Table 29. Dublin remains the most important location for the KS accounting for over one third of total KS employment. Dublin is projected to retain its dominance in the regional distribution of the ICT-Software and Internationally Traded Service Sectors. ICT is projected to remain a strong sector in the Mid East, South West and Mid West. The Medical Devices concentration in the West also stands out. The Pharmaceuticals sector is projected to remain important for the South West region but is also very significant for Dublin, the Mid East and South East. The Border and Midlands regions have low shares of employment in the KS.

TABLE 29: PROJECTED PROPORTION OF IRELAND'S EMPLOYMENT THAT IS IN EACH REGION, BY ALL SECTORS AND BY KEY SECTORS, IN 2010 (BASELINE SCENARIO)

AREA	PROJECTED PROPORTION OF EMPLOYMENT IN EACH REGION (%)							
	TOTAL EMPLOYMENT	ICT HARDWARE	ICT SOFTWARE	MEDICAL DEVICES	ENGRING	PHARMA	INTL SERVICES	TOTAL KEY SECTORS
State	100	100	100	100	100	100	100	100
Border Midlands and West	**24**	**13**	**11**	**50**	**27**	**7**	**17**	**19**
Border	9	4	2	5	9	2	10	6
Midlands	5	3	1	4	7	0	4	3
West	9	6	8	41	11	5	3	10
Dublin & Mid East	**45**	**44**	**66**	**8**	**24**	**46**	**59**	**46**
Dublin	36	16	57	3	16	28	58	37
Mid East	9	28	8	5	8	19	2	9
Rest of State	**31**	**43**	**23**	**42**	**49**	**47**	**23**	**34**
Mid West	8	19	6	5	14	1	7	9
South East	10	2	8	17	18	15	2	9
South West	14	22	9	19	18	31	13	16

Source: Census 2002, CSO, Forfás, ESRI, PACEC

Stronger Regional Policy scenario

The second scenario presented below is based on the assumption that the government, the agencies and local and regional authorities implement a more effective regional policy. The main aims of such a policy would be to secure a more balanced regional distribution of economic activity and national economic growth. Such a policy would influence the regional distribution of all sectors but the focus here is on the KS. We have assumed that the projected increase in national employment in each KS is the same as it is under the Baseline scenario. It should be recognised that regional policy may also increase the overall inflow of foreign direct investment and raise the performance of the indigenous sector without displacement from overheated locations such as Dublin. Whilst accepting this as a desirable aim of regional policy, our assumption here is that in the context of greatly intensifying global competition for internationally mobile investment, the main outcome of policy will primarily be a regional redistribution of employment growth rather than a change in the overall generation of KS employment growth nationally. The main impact of policy therefore would be to change the regional distribution of the KS. This would happen in a variety of ways, for example through more effective steering of future inward FDI to the regions outside Dublin and the Mid East; through the relocation of existing firms in the KS to regional locations outside Dublin and the Mid East as regional policy raises the competitive advantage of these regions and through more effective measures to grow the indigenous firms in the KS in the regions, particularly high-technology SMEs. It is assumed that existing regional 'clusters' outside of Dublin, such as Medical Devices in the West (centred on Galway) and Pharmaceuticals in the South West (centred on Cork) will benefit disproportionately from the more effective regional policy relative to regions where significant concentrations of a KS do not currently exist. In total 10,000 KS jobs are redistributed under this scenario to the regions outside Dublin and the Mid East in the period from 2004 to 2010 as a result of a more effective regional policy. The indirect job consequences for other non-KS in the regions are not estimated here.

Table 30 shows the projected employment, in all sectors and in the Key Sectors, in Ireland in 2010 under this scenario. Table 31 and Figure 24 show the change in employment, in all sectors and in the Key Sectors, between 2004 and 2010, under this scenario. What is interesting is that the growth of employment in the KS in the South West is on a par with the growth of employment in Dublin. It is also very apparent from the analysis that even with a more effective regional policy, growth of the KS in the Mid East, Mid West and Midlands is very modest in the period to 2010.

TABLE 30: TOTAL EMPLOYMENT AND KEY SECTOR EMPLOYMENT IN 2010, UNDER THE STRONGER REGIONAL POLICY SCENARIO

AREA	TOTAL PROJECTED EMPLOYMENT UNDER STRONGER REGIONAL POLICY SCENARIO, 2010 (000s)							
	TOTAL EMPLOYMENT	ICT HARDWARE	ICT SOFTWARE	MEDICAL DEVICES	ENGRING	PHARMA	INTL SERVICES	TOTAL KEY SECTORS
State	1,963	29.8	52.5	23.5	43.3	24.3	73.5	246.9
Border Midlands and West	**471**	**5.5**	**8.0**	**12.3**	**12.9**	**1.7**	**12.8**	**53.2**
Border	188	1.9	1.5	1.5	4.9	0.5	7.4	17.6
Midlands	102	1.2	1.1	0.9	3.3	0.0	2.9	9.4
West	181	2.3	5.5	9.9	4.7	1.2	2.5	26.2
Dublin & Mid East	**874**	**10.3**	**30.2**	**1.5**	**9.1**	**10.3**	**43.5**	**104.9**
Dublin	707	3.3	25.8	0.4	5.7	6.3	42.3	83.8
Mid East	167	7.0	4.4	1.0	3.4	4.0	1.2	21.0
Rest of State	**619**	**14.0**	**14.2**	**9.8**	**21.3**	**12.4**	**17.1**	**88.8**
Mid West	160	6.1	3.5	1.1	5.9	0.2	5.4	22.3
South East	189	0.8	4.9	4.1	7.8	3.9	1.8	23.2
South West	270	7.2	5.8	4.5	7.6	8.2	9.9	43.3

Note: Totals may not add up due to rounding. Source: Census 2002, CSO, Forfás, ESRI, PACEC

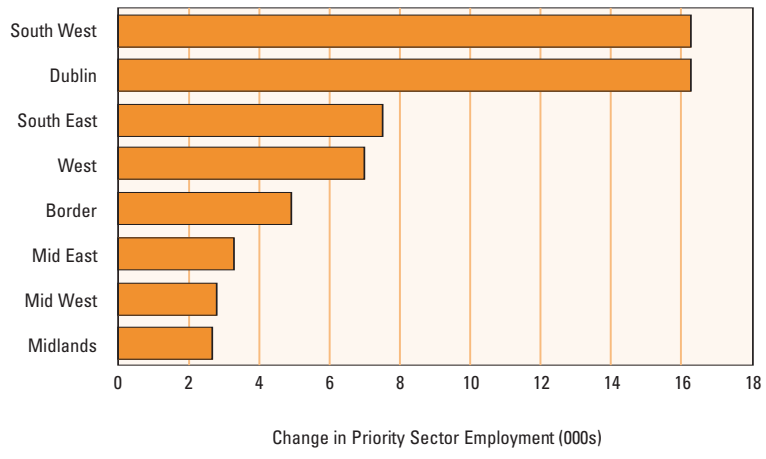
TABLE 31: TOTAL EMPLOYMENT CHANGE AND KEY SECTOR EMPLOYMENT CHANGE, 2004-2010, UNDER THE STRONGER REGIONAL POLICY SCENARIO

AREA	CHANGE IN EMPLOYMENT UNDER STRONGER REGIONAL POLICY SCENARIO, 2004-2010 (000s)							
	TOTAL EMPLOYMENT	ICT HARDWARE	ICT SOFTWARE	MEDICAL DEVICES	ENGRING	PHARMA	INTL SERVICES	TOTAL KEY SECTORS
State	206	3.3	16.6	5.6	-1.6	7.4	29.1	60.3
Border Midlands and West	**38**	**1.9**	**4.1**	**2.3**	**1.1**	**-0.6**	**5.7**	**14.5**
Border	13	0.4	0.9	-0.4	0.2	0.0	3.8	4.9
Midlands	10	0.5	0.3	-0.6	0.8	0.0	1.6	2.7
West	15	0.9	2.9	3.3	0.0	-0.5	0.3	6.9
Dublin & Mid East	**113**	**-2.8**	**4.8**	**-0.5**	**-1.9**	**3.1**	**16.7**	**19.4**
Dublin	90	-2.2	2.6	-0.8	-2.1	1.9	16.6	16.1
Mid East	22	-0.6	2.1	0.3	0.2	1.1	0.1	3.3
Rest of State	**55**	**4.2**	**7.8**	**3.8**	**-0.8**	**4.9**	**6.6**	**26.5**
Mid West	14	1.3	1.6	-0.7	-0.9	-0.1	1.5	2.8
South East	17	0.3	3.2	2.3	-0.3	1.4	0.7	7.5
South West	24	2.6	3.0	2.2	0.4	3.6	4.4	16.2

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

FIGURE 24: STRONGER REGIONAL POLICY SCENARIO: KEY SECTOR EMPLOYMENT CHANGE, 2004-2010 (000s)



Source: Forfas, PACEC

4.4 Regional occupation scenarios for the Key Sectors

Occupations Baseline scenario – all sectors

This section presents estimates of the projected regional distribution of skills using occupations (the SOC) as our proxy indicator of skills. The focus here is on projecting employment in each occupation in the KS but the analysis starts by presenting SOC projections for all sectors. This is important because the KS will be competing for skills in the context of changing demand for such skills from the non-KS. Some non-KS will be releasing labour with skills required by the KS, whereas other non-KS expanding their employment will be increasing their requirement for such skills.

Tables 32 and 33 show the projected change in the number employed in each occupation, in each region in absolute and relative terms, respectively. These tables indicate that a high proportion of the jobs increase between 2004 and 2010 will come in the high level occupations: Professional/Associate Professional; and Managers and Senior Officials together account for about one half of the total growth of employment in the period to 2010. Much of this growth in these three occupational categories is located in Dublin, where these occupations are projected to increase by 52,000 jobs compared with an increase of 101,000 jobs in these occupations for the country as a whole. The projected increase in the BMW region is 14,000 and in the remaining three regions (MW, SE, SW) it is 23,000.

TABLE 32: PROJECTED ABSOLUTE CHANGE IN EMPLOYMENT, ALL SECTORS, BY REGION, BY OCCUPATION 2004-2010 UNDER THE BASELINE SCENARIO

OCCUPATION	PROJECTED CHANGE IN EMPLOYMENT UNDER BASELINE SCENARIO, 2004-2010 (000s)											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	27	3	1	1	0	20	16	4	4	1	2	2
Professional occupations	35	4	1	1	2	23	19	4	8	2	2	4
Associate Professional and Technical	39	7	3	1	3	21	17	4	11	3	3	5
Administrative and Secretarial	25	4	2	1	1	16	14	2	5	2	1	2
Skilled Trades Occupations	5	2	0	1	1	3	2	1	0	0	0	0
Personal Service Occupations	37	7	3	2	3	17	13	4	12	3	4	5
Sales and Customer Service Occupations	10	2	1	0	0	5	4	1	3	1	1	1
Process, Plant and Machine Operatives	16	2	-1	1	2	9	7	3	5	1	1	2
Elementary Occupations	11	1	0	0	1	8	7	1	2	1	1	1
Total	**206**	**33**	**11**	**8**	**13**	**123**	**98**	**24**	**51**	**13**	**16**	**22**

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

TABLE 33: PROJECTED PROPORTIONAL BREAKDOWN OF EMPLOYMENT, BY REGION, BY OCCUPATION 2004-2010 UNDER THE BASELINE SCENARIO

OCCUPATION	PROJECTED CHANGE IN EMPLOYMENT UNDER BASELINE SCENARIO, 2004-2010 (%)											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	13	9	13	12	2	16	16	16	9	7	10	9
Professional occupations	17	13	11	9	17	19	19	18	16	15	14	18
Associate Professional and Technical	19	23	26	17	23	17	17	17	22	20	21	24
Administrative and Secretarial	12	12	17	14	6	13	14	9	10	12	8	11
Skilled Trades Occupations	3	7	1	11	8	3	2	6	-1	0	0	-2
Personal Service Occupations	18	22	27	20	19	14	14	16	24	24	26	23
Sales and Customer Service Occupations	5	5	7	5	3	4	4	4	7	7	8	6
Process, Plant and Machine Operatives	8	6	-7	6	18	8	7	10	9	10	9	8
Elementary Occupations	5	4	4	5	4	6	7	4	5	5	4	4
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: Census 2002, CSO, Forfás, ESRI, PACEC

Table 33 shows the new jobs in each occupational category, expressed as a percentage of the total new jobs created in each region, in the period 2004 to 2010. At the state level the Profession/Associate Professional and Technical account for 36% of the total growth in employment (206,000; Table 31). The share of employment change in these two occupations is greatest in the Border, South West and West regions (37%, 42% and 40% respectively) and lowest in the Mid East and South East.

Table 34 shows the projected change in the number of jobs in each occupational category between 2004 and 2010 nationally and for each region, as a percentage of the existing employment in 2004. The Professional, Associate Professional & Technical and the Personal Service occupations are set to increase more rapidly than other occupations. The number of jobs in these occupations is set to grow faster in Dublin and the Mid East than elsewhere, although comparatively fast growth of Associate Professionals and Technical staff is projected for all regions.

TABLE 34: PROJECTED PROPORTIONAL CHANGE IN EMPLOYMENT IN EACH OCCUPATION, BY REGION, 2004-2010 UNDER THE BASELINE SCENARIO

OCCUPATION	PROPORTIONAL CHANGE IN EMPLOYMENT UNDER BASELINE SCENARIO, 2004-2010 (%)											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	9	4	5	6	1	16	16	15	4	4	5	4
Professional occupations	18	11	8	11	14	23	22	27	14	14	15	15
Associate Professional and Technical	22	20	19	20	20	24	23	28	22	20	24	22
Administrative and Secretarial	11	8	9	12	4	14	14	14	8	9	7	9
Skilled Trades Occupations	2	3	1	7	5	4	3	7	0	0	0	-1
Personal Service Occupations	22	18	18	19	17	24	23	29	23	23	25	21
Sales and Customer Service Occupations	8	5	6	7	3	10	10	12	8	9	9	6
Process, Plant and Machine Operatives	8	4	-3	4	11	13	13	14	6	7	7	6
Elementary Occupations	8	4	3	5	4	14	15	9	5	6	5	5
Total	**12**	**8**	**6**	**9**	**8**	**16**	**16**	**17**	**9**	**9**	**9**	**9**

Source: Census 2002, CSO, Forfás, ESRI, PACEC

Occupations Baseline scenario – Key Sectors

Of the extra 206,000 jobs in all sectors projected for Ireland in the period 2004-2010 (Table 32, above) 60,300 are projected to be in the Key Sectors (Table 35). An increase of 30,000 is projected for the Managers and Senior Officials; Professional; and Associate Professional/Technical occupations. About half of this increase (17,200), will be located in the Dublin and Mid-East region. The BMW is projected to increase its employment in these three categories by 3,700 and the remaining three regions (MW, SE, SW) by 9,100. The projected requirement by the KS for Process, Plant and Machine Operatives is significant and concentrated in the South East and South West regions.

TABLE 35: PROJECTED CHANGE IN EMPLOYMENT IN THE KEY SECTORS, BY REGION, BY OCCUPATION 2004-2010, UNDER THE BASELINE SCENARIO

OCCUPATION	CHANGE IN EMPLOYMENT UNDER BASELINE SCENARIO 2004-2010 (000s)											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	10.3	1.2	0.5	0.2	0.5	6.4	5.4	0.9	2.7	0.3	0.8	1.6
Professional occupations	8.3	1.0	0.2	0.0	0.8	4.5	3.7	0.8	2.8	0.3	0.7	1.7
Associate Professional and Technical	11.4	1.5	0.6	0.2	0.7	6.3	5.4	0.9	3.6	0.4	1.1	2.0
Administrative and Secretarial	12.9	2.8	1.7	0.7	0.3	6.5	6.1	0.4	3.6	0.6	0.7	2.4
Skilled Trades Occupations	3.0	0.5	-0.2	0.2	0.4	1.2	0.6	0.6	1.4	-0.2	0.5	1.1
Personal Service Occupations	0.6	0.1	0.0	0.0	0.0	0.3	0.3	0.0	0.2	0.0	0.0	0.1
Sales and Customer Service Occupations	2.7	0.6	0.3	0.1	0.1	1.1	0.9	0.2	1.0	0.1	0.3	0.6
Process, Plant and Machine Operatives	8.9	1.1	-0.7	-0.2	1.9	1.8	0.6	1.2	6.1	0.3	2.1	3.6
Elementary Occupations	2.3	0.4	0.1	0.1	0.2	1.1	0.9	0.2	0.8	0.1	0.2	0.5
Total	**60.3**	**9.1**	**2.6**	**1.5**	**5.0**	**29.2**	**23.9**	**5.3**	**22.1**	**2.0**	**6.5**	**13.6**

Note: Totals may not add up due to rounding. Source: Census 2002, CSO, Forfás, ESRI, PACEC

TABLE 36: PROJECTED PROPORTIONAL CHANGE IN EMPLOYMENT IN EACH OCCUPATION, BY REGION, 2004-2010, UNDER THE BASELINE SCENARIO

OCCUPATION	PROPORTIONAL CHANGE IN EMPLOYMENT UNDER BASELINE SCENARIO, 2004-2010 (%)											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	39	33	39	35	28	39	40	35	41	16	48	53
Professional occupations	37	31	20	10	40	34	34	37	47	18	67	56
Associate Professional and Technical	43	38	46	26	37	39	40	36	53	22	77	62
Administrative and Secretarial	44	51	74	75	13	43	46	23	42	20	43	59
Skilled Trades Occupations	12	7	-8	18	16	13	9	23	13	-6	15	28
Personal Service Occupations	52	50	75	84	22	52	58	26	53	27	57	67
Sales and Customer Service Occupations	48	52	79	74	18	41	42	34	55	26	71	65
Process, Plant and Machine Operatives	21	8	-18	-7	26	17	10	25	31	5	39	47
Elementary Occupations	37	27	28	25	28	46	48	39	33	13	32	47
Total	**32**	**24**	**20**	**22**	**26**	**34**	**35**	**30**	**35**	**10**	**41**	**50**

Source: Census 2002, CSO, Forfás, ESRI, PACEC

Occupations Baseline Scenario – Key Occupations in the Key Sectors

For the Key Sectors as a whole, Table 37 shows the baseline projections for the Key Occupations at a finer level of SOC disaggregation to the one presented in Table 36. It will be recalled that the Key Occupations are those in which the KS have a share which exceeds the share of that occupation in the economy as a whole. Table 37 shows the KS's projected requirements for these occupations for the period to 2004 to 2010. Significant Key Occupational requirements are identified for example for Computer Analysts Programmers (SOC 490), financial services staff (SOCs 411/412 and 361) and Computer Systems Manager (126). The regional distribution of these important occupations reflects the mix of KS in each region. For example, the requirements for computer analysts and programmers are heavily concentrated in Dublin as are future requirements for software engineers. By contrast the requirements for Assemblers and Lineworkers are more evenly spread across the country.

TABLE 37: PROJECTED CHANGE IN KEY SECTOR EMPLOYMENT BY OCCUPATION BY REGION (000s), BASELINE SCENARIO 2004-2010

SOC	DESCRIPTION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
850	Assemblers and lineworkers (electrical and electronic goods)	2.6	0.1	-0.3	-0.1	0.5	0.1	-0.2	0.2	2.4	0.6	0.4	1.5
320	Computer analyst programmers	4.2	0.5	0.2	0.0	0.4	2.5	2.1	0.4	1.3	0.2	0.6	0.5
411/2	Cashiers, bank and counter clerks; Debt, rent and other cash collectors	6.3	1.6	1.1	0.5	0.1	3.0	3.0	0.0	1.7	0.3	0.2	1.1
516	Metal working production and maintenance fitters	0.4	0.1	-0.1	0.1	0.1	0.1	-0.1	0.2	0.2	-0.2	0.1	0.3
851	Assemblers and lineworkers (metal goods and other goods)	2.2	0.8	-0.3	-0.1	1.2	0.0	-0.1	0.1	1.4	-0.2	0.9	0.7
214	Software engineers	2.3	0.3	0.0	0.0	0.3	1.2	0.9	0.2	0.8	0.1	0.3	0.4
430	Filing, computer, library and other clerks n.e.s.	2.8	0.6	0.3	0.1	0.1	1.4	1.3	0.2	0.8	0.1	0.2	0.5
361	Underwriters, claims assessors, brokers and investment analysts	3.6	0.6	0.4	0.1	0.0	2.3	2.3	0.0	0.7	0.2	0.1	0.5
110	Production and works managers	1.1	0.1	0.0	0.0	0.1	0.5	0.3	0.2	0.5	0.0	0.1	0.3
410	Accounts and wages clerks, book-keepers and other financial clerks	2.1	0.4	0.3	0.1	0.0	1.2	1.1	0.1	0.5	0.1	0.1	0.4
126	Computer systems managers	1.9	0.2	0.0	0.0	0.1	1.3	1.0	0.3	0.5	0.1	0.2	0.2
250	Chartered and certified management accountants (incl. taxation experts)	2.2	0.2	0.1	0.1	0.1	1.5	1.4	0.1	0.5	0.1	0.1	0.3
899	Other plant, machine and process operatives n.e.s.	1.0	0.1	0.0	0.0	0.2	0.3	0.1	0.2	0.6	0.0	0.2	0.4
537	Welders and steel erectors	-0.1	0.0	-0.1	0.1	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0
121	Marketing managers	1.2	0.1	0.0	0.0	0.1	0.8	0.7	0.2	0.3	0.0	0.1	0.2
000	Gainfully occupied but occupation not stated	1.9	0.3	0.1	0.0	0.2	0.9	0.7	0.2	0.6	0.1	0.2	0.3
820	Chemical, gas, petroleum, paper, wood and related process plant operatives	1.5	-0.1	0.0	0.0	0.0	0.8	0.4	0.3	0.8	0.0	0.2	0.6
139	Other financial managers n.e.s.	1.5	0.2	0.1	0.0	0.0	0.9	0.8	0.1	0.4	0.0	0.1	0.2
131	Bank and building society managers	2.1	0.3	0.2	0.1	0.0	1.3	1.3	0.0	0.4	0.1	0.0	0.3
309	Other scientific technicians n.e.s.	0.7	0.1	0.0	0.0	0.1	0.3	0.1	0.1	0.3	0.0	0.1	0.2
526	Computer engineers (installation and maintenance)	1.4	0.1	0.0	0.0	0.1	0.7	0.5	0.2	0.5	0.1	0.2	0.3
459	Secretaries, medical, legal, personal assistants, typists & word processor operators	0.7	0.1	0.0	0.0	0.0	0.5	0.4	0.1	0.2	0.0	0.0	0.1
839	Other metal making and treating process operatives n.e.s.	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.1	0.0	0.0
710	Technical and wholesale sales representatives	0.8	0.1	0.1	0.0	0.0	0.4	0.3	0.1	0.3	0.0	0.1	0.2
441	Stores, storekeepers, warehousemen/women, despatch and production control clerks	0.3	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.1
215	Chemical, production, planning and quality control engineers	0.7	0.1	0.0	0.0	0.1	0.2	0.1	0.1	0.3	0.0	0.1	0.3
252	Actuaries, economists, statisticians, management consultants and business analysts	1.0	0.1	0.0	0.0	0.0	0.8	0.7	0.1	0.1	0.0	0.0	0.1
219	Other engineers and technologists n.e.s.	0.5	0.1	0.0	0.0	0.1	0.2	0.1	0.1	0.3	0.0	0.1	0.2
515	Toolmakers	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
719	Auctioneers, estimators, valuers and other sales representatives n.e.s.	1.1	0.2	0.1	0.1	0.0	0.4	0.4	0.0	0.4	0.1	0.1	0.2
829	Synthetic fibre and other chemical, paper, plastics and related operatives	0.5	-0.1	0.0	0.0	-0.1	0.3	0.1	0.1	0.3	0.0	0.2	0.1
860	Inspectors, viewers and laboratory testers	0.5	0.2	0.0	0.0	0.2	0.1	0.1	0.0	0.2	0.0	0.1	0.1

Note: Totals may not add up due to rounding. Source: Census 2002, CSO, Forfás, ESRI, PACEC

Key Sector occupational change: stronger regional policy scenario

Under the Stronger Regional Policy Scenario (with a 10,000 jobs shift in Key Sector employment away from Dublin and the Mid East in the period 2004 to 2010), there is a change in the occupational structure of the regions. Table 38 shows this regional distribution of occupations. By comparison with the 'Baseline ' scenarios of Table 32 there is a shift in the Professional/Associate Professional and Managers and Senior Officials away from Dublin and the Mid East to BMW and the three regions of Mid West, South East and South West.

TABLE 38: PROJECTED GROWTH OF EMPLOYMENT IN THE KEY SECTORS BY BROAD OCCUPATION, 2004-2010, STRONGER REGIONAL POLICY SCENARIO

OCCUPATION	CHANGE IN EMPLOYMENT UNDER STRONGER REGIONAL POLICY SCENARIO 2004-2010 (000s)											
	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Managers and Senior Officials	10.3	2.2	0.9	0.4	0.9	4.6	3.9	0.7	3.4	0.5	0.9	2.0
Professional occupations	8.3	2.0	0.5	0.3	1.2	2.8	2.3	0.5	3.5	0.4	0.9	2.2
Associate Professional and Technical	11.4	2.5	1.0	0.4	1.1	4.5	3.8	0.6	4.4	0.6	1.3	2.5
Administrative and Secretarial	12.9	3.2	1.9	0.8	0.4	5.8	5.6	0.3	3.9	0.6	0.7	2.6
Skilled Trades Occupations	3.0	1.2	0.1	0.4	0.7	-0.2	-0.6	0.4	2.0	-0.1	0.6	1.5
Personal Service Occupations	0.6	0.1	0.1	0.0	0.0	0.3	0.3	0.0	0.2	0.0	0.0	0.1
Sales and Customer Service Occupations	2.7	0.7	0.4	0.2	0.1	0.8	0.7	0.1	1.2	0.2	0.3	0.7
Process, Plant and Machine Operatives	8.9	2.1	-0.3	0.1	2.3	-0.1	-0.5	0.5	6.9	0.4	2.3	4.1
Elementary Occupations	2.3	0.6	0.2	0.1	0.2	0.8	0.7	0.2	0.9	0.1	0.3	0.5
Total	**60.3**	**14.5**	**4.9**	**2.7**	**6.9**	**19.4**	**16.1**	**3.3**	**26.5**	**2.8**	**7.5**	**16.2**

Note: Totals may not add up due to rounding
Source: Census 2002, CSO, Forfás, ESRI, PACEC

To identify where significant regional labour market adjustments are required the analysis identifies changes in occupations which will be required under the stronger regional policy scenario in the period 2004 to 2010. There is of course no presumption that regional labour markets will not be able to meet the implied occupation requirements but rather the analysis serves to highlight potential skill problem segments. Table 39 shows for example, potentially significant growth required across the regions for financial services staff (SOC 411/412/361,131), for Computer Systems Managers (SOC 126) and for Computer Engineers (SOC 526) in the period 2004 to 2010.

TABLE 39: EMPLOYMENT GROWTH BY OCCUPATION BY REGION, 2004-2010 (%), STRONGER POLICY SCENARIO

SOC	DESCRIPTION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
850	Assemblers and lineworkers (electrical and electronic goods)	14	3	-16	-5	26	1	-7	11	26	16	24	37
320	Computer analyst programmers	27	25	22	-4	39	24	23	35	39	24	74	31
411/2	Cashiers, bank and counter clerks; Debt, rent and other cash collectors	35	42	62	58	4	35	37	11	32	23	18	44
516	Metal working production and maintenance fitters	0	0	-4	5	2	3	1	8	-2	-3	-1	-1
851	Assemblers and lineworkers (metal goods and other goods)	19	14	-20	-12	34	8	1	22	29	-14	44	43
214	Software engineers	24	28	25	-17	41	18	16	40	41	22	94	32
430	Filing, computer, library and other clerks n.e.s.	10	7	7	9	6	13	13	15	7	7	6	7
361	Underwriters, claims assessors, brokers and investment analysts	58	70	97	101	16	57	59	20	54	36	44	69
110	Production and works managers	5	3	-4	6	9	8	7	11	2	6	0	1
410	Accounts and wages clerks, book-keepers and other financial clerks	9	6	7	9	1	13	13	9	5	7	0	7
126	Computer systems managers	30	27	21	2	41	28	25	43	40	26	71	30
250	Chartered and certified management accountants (incl. taxation experts)	20	10	7	16	10	25	26	23	11	14	7	11
899	Other plant, machine and process operatives n.e.s.	8	5	-5	8	14	9	5	14	9	6	5	15
537	Welders and steel erectors	-6	-4	-12	7	-4	-6	-10	0	-7	-11	-10	-3
121	Marketing managers	10	5	3	7	7	12	12	14	5	8	7	3
000	Gainfully occupied but occupation not stated	30	25	24	24	27	33	34	33	28	29	28	27
820	Chemical, gas, petroleum, paper, wood and related process plant operatives	26	-7	-4	-2	-10	37	34	43	28	3	35	32
139	Other financial managers n.e.s.	14	9	8	13	7	18	18	17	10	11	7	11
131	Bank and building society managers	50	39	55	59	10	58	61	22	40	30	20	53
309	Other scientific technicians n.e.s.	17	12	2	11	20	20	19	23	16	4	24	21
526	Computer engineers (installation and maintenance)	45	37	27	12	54	40	38	47	63	43	107	58
459	Secretaries, medical, legal, personal assistants, typists & word processor operators	7	1	-1	6	1	12	12	13	2	5	1	1
839	Other metal making and treating process operatives n.e.s.	-5	-1	-10	11	-1	-4	-8	1	-7	-5	-11	-4
710	Technical and wholesale sales representatives	8	6	7	9	4	11	10	13	7	9	9	5
441	Stores, storekeepers, warehousemen/women, despatch and production control clerks	1	-4	-6	-3	-2	3	2	9	0	1	-1	-1
215	Chemical, production, planning and quality control engineers	23	21	-4	8	36	20	18	25	26	10	28	32
252	Actuaries, economists, statisticians, management consultants and business analysts	27	15	12	17	17	30	30	30	18	20	13	19
219	Other engineers and technologists n.e.s.	16	12	1	11	21	18	17	23	15	9	18	18
515	Toolmakers	-1	0	-9	14	6	2	-3	9	-2	-9	-1	14
719	Auctioneers, estimators, valuers and other sales representatives n.e.s.	15	8	11	14	0	22	23	16	8	11	4	9
829	Synthetic fibre and other chemical, paper, plastics and related operatives	4	-2	-2	10	-8	12	9	18	3	9	11	-8
860	Inspectors, viewers and laboratory testers	18	18	-7	9	31	18	18	20	16	9	24	16

Note: Totals may not add up due to rounding. Source: Census 2002, CSO, Forfás, ESRI, PACEC

4.5 Regional educational scenarios for the Key Sectors

Key Sector education baseline scenario

Table 40 shows the 'Baseline' projections by region for jobs by type of qualification, distinguishing 3rd level educational requirements by broad subject area from other requirements. Nationally, the projected requirement for 3rd level graduates in the period 2004 to 2010 is 141,000 of which 52,000 will be science graduates. Major increases in employment for 3rd level graduates are also projected for social sciences, businesses and law, medical and related and engineering and architecture. With respect to the requirement for scientists at a regional level, again Dublin and the Mid East dominate, accounting for half the nations increased demand for scientists. Dublin and Mid East's projected requirement for social scientists/lawyers/business is an even higher proportion of the national total.

TABLE 40: BASELINE SCENARIO CHANGE IN EMPLOYMENT BY QUALIFICATIONS ALL SECTORS, 2004-2010

	CHANGE IN NUMBER OF PERSONS, 2004-2010 (000s)											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Total workers	206	33	11	8	13	123	98	24	51	13	16	22
Total without 3rd Level	65	8	2	4	3	43	33	10	13	4	5	4
Total with 3rd level	141	24	9	5	11	79	65	14	37	9	10	17
Computing and Information Technology	10	2	1	0	1	6	5	1	3	1	1	1
Engineering and Architecture	13	2	1	0	1	7	6	2	3	1	1	2
Life Sciences and Medical Laboratory Science	3	1	0	0	0	2	2	0	1	0	0	0
Mathematics and Statistics	1	0	0	0	0	1	1	0	0	0	0	0
Medical and related	21	5	2	1	2	9	7	2	7	2	2	3
Physical Sciences and Chemistry	4	1	0	0	0	2	2	0	1	0	0	1
Total science	**52**	**10**	**4**	**2**	**5**	**26**	**21**	**5**	**16**	**4**	**5**	**8**
Agriculture, Forestry, Fishery and Veterinary	3	1	0	0	0	1	1	0	1	0	0	0
Art	4	1	0	0	0	3	2	0	1	0	0	0
Education	8	2	1	0	1	4	3	1	2	1	1	1
Humanities	8	1	0	0	1	5	5	1	2	0	0	1
Social Sciences, Business and Law	26	3	1	1	1	18	16	2	5	1	1	2
Tourism and other	7	1	1	0	1	3	2	1	2	1	1	1
Other third level	12	2	1	0	1	7	5	1	3	1	1	1
Multiple subjects	20	3	1	1	1	12	10	2	5	1	1	2
Total non-science	**88**	**14**	**5**	**3**	**6**	**53**	**44**	**9**	**21**	**6**	**6**	**10**

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

Focusing on the educational requirements arising from the projected change in employment of the KS, Table 41 shows that an additional 33,300 workers with 3rd level qualifications will be required of which 13,700 will be 3rd level science graduates. The demand for Computing and IT; and Engineering and Architecture; is projected to be particularly strong and together account for 10,300 of the science total. The regional breakdown indicates that just under half the scientifically qualified will be required to meet projected increases in demand by KS in Dublin and the Mid East.

TABLE 41: BASELINE SCENARIO KEY SECTOR WORKERS: CHANGE EMPLOYMENT BY QUALIFICATIONS, 2004-2010

	CHANGE IN NUMBER OF PERSONS, 2004-2010 (000s)											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Total workers	60.3	9.1	2.6	1.5	5.0	29.2	23.9	5.3	22.1	2.0	6.5	13.6
Total without 3rd Level	27.0	4.4	1.1	0.9	2.4	11.2	8.8	2.4	11.5	0.5	3.7	7.2
Total with 3rd level	33.3	4.8	1.5	0.6	2.7	18.0	15.1	2.8	10.6	1.5	2.7	6.4
Computing and Information Technology	5.8	0.9	0.3	0.0	0.5	3.0	2.5	0.6	1.9	0.3	0.7	0.9
Engineering and Architecture	4.5	0.8	0.1	0.1	0.7	1.8	1.1	0.6	2.0	0.2	0.4	1.3
Life Sciences and Medical Laboratory Science	0.9	0.1	0.0	0.0	0.1	0.4	0.3	0.1	0.4	0.0	0.1	0.3
Mathematics and Statistics	0.5	0.1	0.0	0.0	0.0	0.3	0.3	0.0	0.1	0.0	0.0	0.1
Medical and related	0.4	0.1	0.0	0.0	0.0	0.2	0.2	0.0	0.2	0.0	0.0	0.1
Physical Sciences and Chemistry	1.6	0.2	0.0	0.0	0.1	0.6	0.5	0.2	0.8	0.0	0.2	0.5
Total science	**13.7**	**2.1**	**0.4**	**0.2**	**1.5**	**6.4**	**4.8**	**1.5**	**5.3**	**0.7**	**1.5**	**3.1**
Agriculture, Forestry, Fishery and Veterinary	0.4	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.2	0.0	0.1	0.1
Art	0.7	0.1	0.0	0.0	0.1	0.4	0.3	0.1	0.2	0.0	0.1	0.1
Education	0.3	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.1
Humanities	1.5	0.2	0.1	0.0	0.1	1.0	0.9	0.1	0.3	0.1	0.1	0.2
Social Sciences, Business and Law	8.3	1.0	0.5	0.2	0.3	5.4	5.1	0.4	1.8	0.3	0.4	1.2
Tourism and other	0.8	0.2	0.1	0.0	0.1	0.4	0.3	0.1	0.3	0.0	0.1	0.2
Other third level	2.9	0.5	0.2	0.1	0.2	1.5	1.3	0.2	0.9	0.1	0.2	0.6
Multiple subjects	4.8	0.7	0.2	0.1	0.4	2.7	2.3	0.4	1.4	0.2	0.4	0.8
Total non-science	**19.6**	**2.7**	**1.1**	**0.4**	**1.2**	**11.6**	**10.3**	**1.3**	**5.3**	**0.8**	**1.3**	**3.3**

Note: Totals may not add up due to rounding

Source: Census 2002, CSO, Forfás, ESRI, PACEC

Key Sector educational change: stronger regional policy scenario

The implications for the regional distribution of the workforce with 3rd level educational qualifications under the 'Stronger Regional Policy' scenario are shown in Table 42. The total workforce increase in the KS remains at an estimated 60,300. However as a result of the stronger regional policy the workforce in BMW increases by 5,400 to 14,500; by 4,400 to 26,500 in the Rest; and decreases to 19,400 in Dublin and Mid East. This regional redistribution changes the educational requirements of the workforce in each region compared with the 'Baseline' position in Table 41. For example the required workforce with scientific qualifications in BMW rises from 2,100 under the 'Baseline' to 3,500 under the 'Stronger Regional Policy' scenario. By contrast it falls in Dublin and the Mid East from 6,400 to 3,800.

TABLE 42: STRONGER REGIONAL POLICY SCENARIO KEY SECTOR WORKERS: CHANGE IN EMPLOYMENT BY QUALIFICATIONS, 2004-2010

	CHANGE IN NUMBER OF PERSONS, 2004-2010 (000s)											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	**STATE**	**BMW**	**BORD**	**MID**	**W**	**DME**	**DUB**	**ME**	**REST**	**MW**	**SE**	**SW**
Total workers	60.3	14.5	4.9	2.7	6.9	19.4	16.1	3.3	26.5	2.8	7.5	16.2
Total without 3rd Level	27.0	7.1	2.2	1.5	3.4	6.2	5.0	1.2	13.7	0.9	4.2	8.6
Total with 3rd level	33.3	7.4	2.7	1.2	3.6	13.1	11.1	2.1	12.8	1.9	3.2	7.7
Computing and Information Technology	5.8	1.5	0.6	0.2	0.7	1.9	1.4	0.5	2.4	0.4	0.8	1.2
Engineering and Architecture	4.5	1.3	0.3	0.2	0.8	0.8	0.4	0.4	2.4	0.3	0.5	1.5
Life Sciences and Medical Laboratory Science	0.9	0.2	0.0	0.0	0.1	0.3	0.2	0.1	0.4	0.0	0.1	0.3
Mathematics and Statistics	0.5	0.1	0.0	0.0	0.0	0.3	0.2	0.0	0.1	0.0	0.0	0.1
Medical and related	0.4	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.2	0.0	0.1	0.1
Physical Sciences and Chemistry	1.6	0.3	0.1	0.0	0.2	0.4	0.3	0.1	0.9	0.1	0.2	0.6
Total science	**13.7**	**3.5**	**1.0**	**0.5**	**2.0**	**3.8**	**2.7**	**1.1**	**6.4**	**0.9**	**1.8**	**3.8**
Agriculture, Forestry, Fishery and Veterinary	0.4	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.1	0.1
Art	0.7	0.2	0.1	0.0	0.1	0.3	0.2	0.0	0.3	0.0	0.1	0.1
Education	0.3	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.1
Humanities	1.5	0.3	0.1	0.0	0.1	0.8	0.7	0.1	0.4	0.1	0.1	0.3
Social Sciences, Business and Law	8.3	1.4	0.7	0.3	0.5	4.7	4.4	0.3	2.2	0.4	0.4	1.3
Tourism and other	0.8	0.2	0.1	0.0	0.1	0.3	0.2	0.0	0.3	0.0	0.1	0.2
Other third level	2.9	0.6	0.3	0.1	0.2	1.2	1.1	0.2	1.1	0.2	0.2	0.7
Multiple subjects	4.8	1.1	0.4	0.2	0.6	1.9	1.6	0.3	1.8	0.3	0.5	1.0
Total non-science	**19.6**	**3.9**	**1.6**	**0.7**	**1.6**	**9.3**	**8.4**	**1.0**	**6.3**	**1.0**	**1.5**	**3.9**

Source: Census 2002, CSO, Forfás, ESRI, PACEC

TABLE 43: STRONGER REGIONAL POLICY SCENARIO KEY SECTOR WORKERS: PERCENTAGE CHANGE IN EMPLOYMENT BY QUALIFICATIONS, 2004-2010

	CHANGE IN NUMBER OF PERSONS, 2004-2010 (%)											
SUBJECT AREA OF 3RD LEVEL QUALIFICATION	STATE	BMW	BORD	MID	W	DME	DUB	ME	REST	MW	SE	SW
Total workers	32	24	20	22	26	34	35	30	35	10	41	50
Total without 3rd Level	23	16	11	17	18	24	25	21	26	3	31	41
Total with 3rd level	48	44	47	36	44	46	46	45	57	27	74	68
Computing and Information Technology	47	50	55	16	57	39	37	54	67	37	118	66
Engineering and Architecture	36	32	10	22	46	32	29	38	45	18	51	61
Life Sciences and Medical Laboratory Science	51	30	14	34	36	51	50	53	63	15	68	75
Mathematics and Statistics	53	59	82	55	48	50	50	45	63	36	85	72
Medical and related	49	38	45	42	35	47	47	48	59	21	71	72
Physical Sciences and Chemistry	49	32	19	19	38	45	44	48	61	16	70	72
Total science	**44**	**38**	**29**	**21**	**47**	**38**	**36**	**45**	**56**	**24**	**76**	**66**
Agriculture, Forestry, Fishery and Veterinary	46	34	35	37	32	47	48	45	53	15	62	66
Art	48	43	46	28	45	44	43	48	61	31	89	66
Education	51	46	60	43	40	49	50	42	57	30	70	71
Humanities	52	50	69	47	42	49	50	46	61	33	81	72
Social Sciences, Business and Law	58	58	80	74	37	57	58	43	61	32	70	75
Tourism and other	48	43	55	43	37	47	49	40	54	26	60	67
Other third level	50	45	55	53	35	50	52	40	53	24	61	69
Multiple subjects	48	45	48	30	48	44	44	48	59	29	81	68
Total non-science	**52**	**49**	**62**	**51**	**40**	**51**	**52**	**44**	**58**	**29**	**71**	**71**

Source: Census 2002, CSO, Forfás, ESRI, PACEC

4.6 Qualitative assessment

This section presents the findings on skill gaps from interviews with public and private sector stakeholders in each region. The interviews took place in 2003-4 when the demand for labour had eased somewhat by comparison with the period in the mid to late 1990s. Although the focus of the discussions that took place was the period to 2010 inevitably it was influenced by the prevailing situation. It is also important to note that in general regional skill shortages specific to a particular KS, typically reflected skill shortages confronting that sector nationally. There was also a widely held view in regions outside Dublin and the Mid East, that skills pools are limited because sectors requiring those skills are under-represented. Should future requirements for specific skills by KS in a region increase, the view of many respondents was that in many cases (particularly for skills where national shortages were not severe) such demands would be met through a combination of the usual labour market adjustments e.g. commuting/in-migration. It was often the case that regional respondents perceived the central issue as one of whether Ireland has the skills rather than one of whether people with the skills reside within their region.

It was recognised across all regions that the future growth of the Engineering sector hinged very much on its capacity to compete successfully in export markets and that this required not only increased cost competitiveness but also R&D to support the development of new products and services. In this context the skills and capability gaps were perceived to be those related to specific professional engineering skills required of advanced manufacturing processes (e.g. automation, robotics, quality systems, Statistical Process Control), 3rd level R&D and business skills required to enter and sell in international markets (language skills) and manage R&D (business strategy, procurement/outsourcing, entrepreneurship, design and new product development and marketing). These gaps are to be found across all regions fairly evenly. However, it was the view (particularly of respondents in the South East), that those workers able to combine their scientific and engineering skills with the appropriate business skills are to be largely found in Dublin. The companies which had acquired such skills and capabilities were able to compete well. Most others appear to be losing ground or making only limited headway in international markets.

In Medical Devices the regional skill shortages were identified in those regions where this sector was most concentrated such as the West. The skills most in demand in would seem to be biomedical engineers and CNC[5] machinists. Skill shortages in the latter were seen as particularly important but also skill constraints were identified in R&D (other than technicians) and production operators. The requirement for production operators, while large in absolute terms, it is small in relation to the size of the overall workforce.

Skill gaps were also pointed to in the devising/designing of products required in export markets and one particular problem related to limited market feedback. The latter problem is closely associated with the difficulty, identified by the Irish Medical Devices Association, of many clinicians lacking the time, the linkages, the liaison mechanisms and the up-to-date technology that would enable them to produce the required feedback[6]. The feedback from people marketing products in Europe is also limited because the quality of the information and the capability to absorb and utilise it effectively is limited. To some extent this problem comes back to difficulties with technical marketing and these are not confined to the medical devices and diagnostics sector[7].

For ICT software the scale of workforce skills requirements and problems of meeting these requirements in different regions very much reflected the geographical concentration of the sector. The sector is heavily concentrated in Dublin with the rest of the sector located in the urban centres of Cork, Limerick and Galway. With respect to future skills requirements in ICT software areas pointed to were the business-related ones of technical marketing and sales, patenting, Intellectual Property Rights management, asset valuation, customer relationships and strategic planning. Indigenous companies seeking to extend export markets were also seen as facing potential problems of securing skills to do this. Technical skills increasingly needed to be integrated with business skills such as developing e-business strategies, integrating websites with existing value chains, designing multimedia systems that handle high volumes, managing short-lived teams, understanding user needs, using converging technologies and managing content.

Producing and maintaining mass-market e-commerce and information systems requires such non-technical skills as business, graphics design, and language / cultural skills. A high proportion of software services requirements are therefore for academic courses other than computer science. The need for non-technical skills mean that there is no simple relationship between the supply of IT graduates and skill needs. The premium is on adaptability and ensuring that skills are kept up to date.

There is less need for product- and technology-specific skills and a greater need for the fundamental skills of structured programming, systems analysis, network engineering and design. An over-reliance on product- and technology-specific skills can lead to problems with response, reliability and fitness-for-purpose of products. It is easy to make the mistake of neglecting systems analysis, network engineering and testing and to rely too heavily on increased processing power and bandwidth to solve the problems resulting from such neglect.
Ireland's ICT manufacturing future probably lies in supply chain and customer relationship management, sales and marketing and shared services, as well as higher value-added production. In the regions with a high share of this

5. Computerised Numerical Control.
6 The IMDA has recently put forward proposals for rectifying this problem in their strategy document, "2020 Vision".
7. These difficulties were identified in the "Innovate Market Sell" report produced by the Expert Group on Future Skills needs in 2004.

sector, such as Dublin/Mid East and Mid West/South East, there will still be a strong requirement for design and other engineers and technical skills in testing, quality control and technical design people. These skills will need to be integrated with the services skills just listed and the skill issues will be concerned with specialist, changing and hybrid sets of skills and generic skills such as problem solving in practical environments.

The main skills required in the Pharmaceuticals sector for the vital process optimisation and development functions are Ph.D. level validation skills and pharmaceutical, synthetic, organic and analytical chemists (to develop analytical methods) and graduate chemical, process and mechanical engineers. Recruitment of these scientists and engineers is becoming more difficult.

The recently launched National Institute for Bioprocessing Research and Training (NIBRT) will significantly boost the supply of vital pharmaceuticals skills and capabilities by supporting collaborative research; creating an interface between academic research and industry; and training graduates in manufacturing techniques and processes. It will enhance technology transfer, which is moderate in Ireland compared with best practice. It will also supply facilities that are currently in short supply, such as wet lab space.

The problems in the supply pipeline for the pharmaceuticals industry include (a) the fall off in enrolments for Science, Engineering and Technology courses, (b) competition for skills and competencies from the growing medical devices and diagnostics industry and from the development of large bio-pharmaceutical production facilities in Ireland (c) support for postgraduate chemistry researchers is insufficient compared with the support for biotechnology and ICT researchers, who receive SFI funding (d) significant numbers of chemistry graduates going to the UK to do postgraduate degrees and not returning and, conversely, significant proportions of foreign students doing Ph.Ds in Ireland and not remaining in the country.

It is important to note that skill sets are emerging which cut across these sectors at a number of occupational levels. There are process skills such as handling regulatory affairs, quality control, design, data management etc. In the bio-pharma sector there are many such skills which do not tie in easily with NACE occupational codes. These include devising and implementing a business strategy, R&D and associated skills (R&D programme management, managing IP) regulation compliance, validation, information management, procurement and professional-level sales and marketing.

The important skills that are most difficult to acquire will be generated by a combination of education/training (with a strong reference to industry) and from experience in the sector. The latter is very important. Industry experience is what hones the skills and makes them valuable. A science graduate can move to several different jobs depending on industry experience. Thus product registration staff in bio-pharma will have a science degree and experience in research, quality control, production technology, clinical research or sales and marketing. Companies and industry associations are generally more concerned about the numbers of skilled and qualified people than about precise roles.

In selected locations such as Galway, Cork and Dublin a critical mass of capabilities and skills has been generated. Moreover as major business processes cut across several sectors (procurement, supply chain management, shared services) so do the supporting skills and capabilities. This would suggest that an industrial strategy in the regions based on the cultivation of horizontal business functions would be more appropriate than the targeting of specific sectors.

5 Conclusions

The analysis in Section 4 estimates that the KS will increase their total employment by just over 60,000 to just under a quarter of a million in the period 2004 to 2010. Within this total increase it is estimated that there will be a requirement for 33,300 additional workers with 3rd level education.

In view of the small geographical size of Ireland it is likely that labour market adjustments across regions will, in time, partially or fully correct any imbalances. Nevertheless, the interview programme identified for a number of regions outside Dublin and the Mid East, skills shortfalls for more narrowly defined skill categories within the broad SET educational categories used in this report. In general these skill shortfalls were sector specific and their regional severity depended on the scale and growth of the sector in the region. For example, in ICT software future skill requirements were the business related ones of technical marketing and sales, IPR management, customer relationships, asset management and strategic planning. Skill shortfalls in these areas were felt most acutely by firms in Dublin and the other main urban centres in which this sector is located. In ICT Hardware a strong requirement was identified for design and technical skills in testing and quality and located in Dublin, the Mid East and the South West. In the Medical Devices sector skills in demand included biomedical engineers, CNC machinists and production operators.

Integrating regional skills development and regional specialisation

One of the important findings from the evidence on the regional pattern of KS employment growth was the tendency for regional specialisation to emerge. The growth and development of these different regional clusters requires the development of a regional capacity to meet their skill requirements, particularly for high level cluster specific skills. Regional concentrations of KS can be used to establish priorities for training programmes and University/IoT course development to meet demand in those regions where demand exists. It is important to recognise as well that many occupations are interchangeable between clusters such as computer support specialists and prospective 3rd level qualifiers require career planning support and career ladders to advance within a chosen field or within a specific industry cluster. Industry/employer-led regional skills collaborations involving higher education institutes and other stakeholders are arguably best prepared to identify current and emerging skill constraints.

Efficient labour market adjustment mechanisms and public infrastructure shortfalls

Regional skill requirements will only be met and any emerging imbalances removed through the efficient operation of regional labour market adjustment processes: net inward migration, net inward commuting, increased activity rates and in-house retraining of the existing workforce and flexible sources of skills supply. Past evidence from both the desk research and the fieldwork, suggests in many cases these adjustment mechanisms have been working such that regional deficits and surpluses do not persist in the long run. For example, historically many 3rd level graduates seek employment in Dublin and the Mid East but have been trained in Universities and IOTs in other regions and there is also evidence of significant inter-regional and international migration of the skilled workforce. However the economy has experienced unbalanced regional development and there are increasing problems of congestion in the Greater Dublin area. At the same time there have emerged significant infrastructure deficits in Dublin and other regions that potentially constrain the efficiency of labour market adjustment. In these circumstances there is a case for public policy intervention and adjustment, particularly where there is significant market failure or government failure impacting adversely on the processes of regional labour market adjustments.

Restructuring regional economies towards the knowledge-based manufacturing and service sectors requires not only an appropriate upgrading of the skills base through increased output of 3rd level graduates and retraining of the existing workforce, but also the provision of a range of complementary public and private facilities and infrastructure. Appropriate planning policies to release land for housing and improve transport infrastructure and also the upgrading of essential amenities/utilities and public services such as education and health facilities will be required to facilitate adjustment mechanisms such as commuting and migration. The interviewing programme in the eight regions revealed persistent and significant infrastructure deficits in a number of areas which could potentially thwart efficient labour market adjustment. For a number of regions, improved transport communications are required to facilitate increased and less costly commuting and to extend the geographical reach of the travel to work area; an upgraded and improved housing stock is necessary to accommodate in-migration to a region; an urban centre with high quality leisure amenities and local public services is required if a region is to attract a high quality workforce; sites and premises appropriate for modern commercial and industrial firms are an imperative. In summary we are suggesting that to be effective, regional labour market policies designed to meet the SET skill requirements of the KS (and other sectors) must be embedded and configured within the wider spectrum of regional economic development policies.

Address both supply and demand side of regional labour market

The upgrading of the skills and capabilities of a region's workforce, to one suitable for an advanced knowledge-based economy, cannot be supported by policy measures operating solely on the demand side of the labour market. The phenomena of a **Low Skill Equilibrium**[8] regional economy is well known. Increased production of high value-added goods and services is closely correlated with increased demand for more highly skilled labour and this is very much the case for the KS. If Ireland's regions are to increase their share of the KS, to make their contribution to the restructuring of the national economy and to fulfil their potential for increased productivity, supportive policies on both the demand and supply side of the labour market will be required.

Strengthen partnerships between HEIs and industry at the regional level

A potential shortage of 3rd level SET graduates in the regions may in part be met through recruitment from outside the region and one advantage of this option is that it offers the potential for technology transfer and an upgrading and refreshing of the local skill base with capabilities developed elsewhere. However, exploiting the skills and qualifications emerging from the local education providers has the advantage that their output of graduates can be more closely tailored to the needs of the KS in the region. This may be best achieved with the development of appropriate partnerships between providers and users of important skills operating at the regional level. The evidence presented in this report also indicates that the Key Sectors (with the possible exception of Engineering) have a tendency to favour certain regions. This suggests that there should be a focus on the skill requirements of the sector that is dominant in the region, with the qualification that many skills are not sector specific. At the same education and training providers should seek to strengthen existing initiatives designed to provide 3rd level SET graduates with business training and experience.

Companies do not always appreciate the role that they can play in shaping the education base that ultimately supplies them with a highly qualified and skilled workforce. There is generally considerable scope for them to articulate their requirements to the HEI sector and to co-operate with it to fulfil those requirements. Initiatives which promote this interaction in the UK include the Knowledge Transfer Partnerships (formerly the Teaching Company Scheme), student placement arrangements, and the provision of external input into university courses.

Many large companies employ scientists to work in cross-disciplinary teams with a view to training them

8. Finegold, D. and Soskice, D. (1988). The failure of British training: analysis and prescription, Oxford Review of Economic Policy, 4, 3, 21-53.

further on the job or through Continuous Professional Development (CPD). It is difficult for SMEs, which usually have great cash and time pressures on them, to take this approach. One suggestion is that generic and transferable skills be embedded in graduate and post-graduate training programmes. These programmes need to be tailored to fit the different requirements of large companies, which can often provide additional training, and SMEs, which often cannot.

A related issue to be addressed is the scarcity of practical research experience among graduates. There are shortages of people with research methodology skills and of practically-based technicians. The former problem has led to the growing relevance of the Masters in Research (MRes) qualification, which enables graduates to acquire additional practical skills before embarking on a research career.

Deepen and widen job opportunities in the KS in the regions

Closer working between providers (Universities, Institutes of Technology and other colleges) in the regions and firms will raise awareness of opportunities in the region but the 'brain drain' of scientists and other graduates to Dublin and abroad is likely to persist without a significant deepening and widening of regional labour markets. The regions must seek to provide a wider variety of career structures and job opportunities to limit the drain to the more developed labour markets located in major cities such as Dublin and elsewhere. The solution goes beyond raising awareness of the varied career structures open to those who enter technology-based companies in the specific KS in the region. It includes also ensuring that a wider range of business functions are performed in the regions outside Dublin and to a lesser extent the other major city/regions, especially by the Irish facilities of inward investors. This would increase the range of functions, job responsibilities, skills and salaries of scientists and engineers working in the relevant sectors in the regions.

Monitor regional skill requirements of KS and raise flexibility of skill providers

In the short run there is an obvious need to ensure that HEIs are provided with timely, regular and accurate information on the recruitment needs of local firms and that employability issues inform curriculum design. However, as the pace of technological change accelerates, as different technologies converge and new products embody an increasing variety of technologies, the overall workforce is likely to need a deeper multidisciplinary education and training to enable effective teams and specialist participation. This will require the development of longer term strategies to equip the workforce with the necessary capabilities and skills. With the rapid and sometimes tumultuous change occurring in some parts of the KS (and elsewhere in the economy) it is difficult however to predict what workforce skills will be required. Flexibility of response on the part of educational institutions and firms and the establishment of institutions for ongoing updating of skills and competences are therefore imperative for such high skill turnover industries.

There is a need to define relevant labour market travel to work areas for different occupational/skill groups when addressing issues of regional skill imbalances. These TTWAs are likely to change significantly in the next decade as the planned improvements in the national and regional transport infrastructure unfolds. Thus, there is critically important need to strengthen regional labour market knowledge and to build the capacity for capturing and disseminating knowledge of labour market processes at the appropriate spatial level. The NSS provides a starting point for delineating labour market areas in the context of designated growth points and proposed improvements in communications and accessibility.

Appendix A: Methodology

Total employment (10 sectors)

- All of the historic and forecast data is constrained to be consistent with the data provided in "Occupational Employment Forecasts by Region for 2010", ESRI, January 2004. In the first place this generated a dataset of 10 sectors by 3 super-regions by 3 years (1991, 2001, 2010).
- Growth rates from 2001-2002 and 2001-2004 in each of ten sectors from the Labour Force Survey were used to extend the above dataset to 10 sectors by 3 super-regions by 5 years (1991, 2001, 2002, 2004 and 2010).
- The 1991, 1996 and 2002 Census of Population were used to estimate the regional and sectoral breakdown of the above dataset, giving rise to 20 sectors by 8 regions by 5 years (1991, 2001, 2002, 2004 and 2010).
- The growth rate from 1991-1996: The Census of population was used to estimate the 1996 position, giving rise to 20 sectors by 8 regions by 6 years (1991, 1996, 2001, 2002, 2004 and 2010).

Key Sector employment

- Forfás supplied Key Sector employment data comprising 14 KS sub-sectors by 8 regions for 1972-2004.
- PACEC produced growth rates for 2004-2010 based on analysis of past trends and primary research for each of 14 KS sub-sectors. In addition, PACEC produced regional estimates for 2010 for each of the 14 KS sub-sectors, using a projection forward of differential regional performance in the period 1996-2004 for 14 sub-sectors, giving rise to 6 Key Sectors by 8 regions for 1972-2010.
- The 6 Key Sector dataset (above) was combined with the Total Employment dataset (from the end of the last section) to produce a Total Employment dataset comprising employment for 18 sectors (6 key and 12 others) for 8 regions for 5 years (1991, 1996, 2002, 2004 and 2010).

Employment by occupation

- Occupation-Industry matrices for each region in 1991, 1996 and 2002 from the Census of Population were used in combination with the above dataset to obtain a first estimate of 2 sector (key and another) 8 region, 227 occupation employment for 5 years (1991, 1996, 2002, 2004, 2010). The 2002 matrix was used for 2004 and 2010 in this exercise.
- Employment by 42 occupations for 3 years (1991, 2001 and 2010) were taken from the "Occupational Employment Forecasts by Region for 2010", ESRI, January 2004. Shares of employment by 42 occupations for 1991, 1996, 2002, 2004 and 2010 were obtained by interpolating this ESRI data.
- The previous two datasets (constraining the first to have the characteristics of the second) were used to generate final estimates of 2 sector (key and another) 8 region, 227 occupation employment for 5 years (1991, 1996, 2002, 2004, 2010).

Employment by qualification

- Qualification-Occupation matrices for each region in 1991, 1996 and 2002 from the Census of Population were used in combination with the "Employment by Occupation" dataset (above) to generate first estimate of 2-sector (key and another) 8-region, 15-qualification, employment for 5 years (1991, 1996, 2002, 2004, 2010). The 2002 matrix was used for the 2004 and 2010 in this exercise.
- Employment by 2-qualification (3rd level, not 3rd level) for 3 super-regions for 3 years (1991, 2001 and 2010) were taken from the "Occupational Employment Forecasts by Region for 2010". Shares of employment by 2-qualifications by 3 super regions for 1991, 1996, 2002, 2004 and 2010 were obtained by interpolating this ESRI data.
- The previous two datasets (constraining the first to have the characteristics of the second) were used to generate final estimates of 2-sector (key and another) 8-region, 15-qualification, employment for 5 years (1991, 1996, 2002, 2004, 2010).

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Appendix C:

Membership of the Expert Group on Future Skills Needs

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Jack Golden	Cement Roadstone Holdings PLC/IEI	Member
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Andrew McDowell	Forfás	Advisor
Anne Nolan	Dept. of Finance	Advisor
Martin Shanahan	Forfás	Head of Secretariat

Appendix D:

Publications by the Expert Group on Future Skills Needs

Report	Date of Publication
Data Analysis of In-Employment Education and Training in Ireland	December 2005
National Skills Bulletin 2005	October 2005
Skills Needs in the Irish Economy: The Role of Migration	October 2005
Languages and Enterprise	May 2005
Skills Requirements of the Digital Content Industry in Ireland Phase I	February 2005
Innovate Market Sell	November 2004
The Supply and Demand for Researchers and Research Personnel	September 2004
Literature Review on Aspects of Training of those at Work in Ireland	June 2004
Financial Skills Monitoring Report	November 2003
Responding to Ireland's Growing Skills Needs - The Fourth Report of the Expert Group on Future Skills Needs	October 2003
The Demand and Supply of Skills in the Biotechnology Sector	September 2003
Skills Monitoring Report - Construction Industry 2003/10	July 2003
Benchmarking Education and Training for Economic Development in Ireland	July 2003
The Demand and Supply of Engineers and Engineering Technicians	June 2003
The Demand and Supply of Skills in the Food Processing Sector	April 2003
National Survey of Vacancies in the Private Non-Agricultural Sector 2001/2002	March 2003
National Survey of Vacancies in the Public Sector 2001/2002	March 2003
The Irish Labour Market: Prospects for 2002 and Beyond	January 2002
Labour Participation Rates of the over 55s in Ireland	December 2001
The Third Report of the Expert Group on Future Skills Needs - Responding to Ireland's Growing Skills Needs	August 2001
Benchmarking Mechanisms and Strategies to Attract Researchers to Ireland	July 2001
Report on E-Business Skills	August 2000
Report on In-Company Training	August 2000
The Second Report of the Expert Group on Future Skills Needs - Responding to Ireland's Growing Skills Needs	March 2000
Business Education and Training Partnership 2nd Forum, Dublin	March 2000
Business Education and Training Partnership	
Report on the Inaugural Forum, Royal Hospital Kilmainham	March 1999
The First Report of the Expert Group on Future Skills Needs - Responding to Ireland's Growing Skills Needs	December 1998