

WARWICK INSTITUTE *for*
EMPLOYMENT RESEARCH



Developing a National Skills Forecasting Tool for South Africa

Annex B: Labour Market Projections: A Review of International Best Practice

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1. INTRODUCTION

This document presents an up to date review of work on skill forecasting worldwide. It builds upon an earlier review of work in this area conducted on behalf of CEDEFOP, Wilson (2001). The latter surveyed what work had been completed across the developed world in this area. The present document extends this, highlighting the latest developments in a number of countries. It is part of a series of documents reviewing these issues for the South African Department of Labour. These include:

Main Report:

Wilson, R. A, I. Woolard and D. Lee (2004). *Developing a National Skills Forecasting Tool for South Africa*. IER/HSRC/Department of Labour.

Separate Annexes:

- A: The Rationale for Conducting National Occupational Projections and how they are Typically Undertaken.
- B: Labour Market Projections: A Review of International Best Practice (the present document)
- C: A Critical Review of Previous Work on Employment Projections in South Africa.
- D: Data Sources for National Skills Forecasting in South Africa: Strengths and Weaknesses - A Critical Assessment of Data Availability.

A web-based search of the key organisations has been undertaken, coupled with more conventional academic search tools. The results are presented as a series of notes on the main activities being undertaken, structured according to a rough standard template. This includes:

- 1) Coverage of the projections (geography, sectors, occupations (including replacement demands), qualifications, other aspects such as generic skills);
- 2) Methodological approach adopted (types of models used, emphasis on econometrics as opposed to other techniques);
- 3) Data sources and issues.

A general synthesis of the material covered is presented in a separate document (Annex A).

The review covers amongst others:

- USA (Bureau of Labour Statistics);
- Canada (COPS);
- Australia (including the MONASH general equilibrium model approach);
- Japan;
- European Union Countries, including:
 - France;
 - Germany;
 - Ireland;
 - Netherlands;
 - Spain;
 - Sweden;
 - UK;
 - Other Countries.

Section 2 sets out a few general issues regarding the rationale, problems and pitfalls in undertaking national level employment projections. Section 3 goes on to provide an overview of different approaches to anticipating future skill needs. Section 4 summarises the way the State has contributed to this by building a “statistical infrastructure”. The remainder of the document (Section 5) sets out the key points, country by country.

2. OVERVIEW OF EMPLOYMENT PROJECTIONS

It is important to recognise at the start that there are significant differences between countries in their approaches to these issues (especially anticipation of future skill requirements). These differences reflect both different cultural, historical and institutional backgrounds, (which influence the general approach to such problems), as well as more specific differences related to data availability (which can constrain what is technically feasible). Some knowledge of the institutional framework within which such work has taken place, is very important for a proper understanding of the

key issues. In most cases this has been attempted in only a most cursory fashion although a bit more is made of the UK case, purely as an example.

2.1 The rationale for employment projections: Mission Impossible?

Employment forecasts or projections have been undertaken in various countries across the world for over 50 years. Over this period there has been a continuous and ongoing debate about whether such work is necessary or even feasible. Despite such concerns, most countries continue to devote considerable resources to such activity on a regular basis. These “revealed preferences” suggest that such work has real value and should continue to be supported. However, there remains a lively debate about precisely what is needed and what can usefully be provided. This document is part of a more general report which aims to contribute to this ongoing dialogue, with specific reference to the situation in South Africa and what is the best way forward for anticipating future skills needs in that country.

2.2 Review of general approaches and issues in employment forecasting and projection

The review of such work across the world highlights a number of key issues:

- the many different audiences for employment projections and their different needs, aims and objectives;
- widespread misunderstandings about what is feasible and practicable in terms of projections, including confusions about what can be projected and what cannot;
- the general focus upon occupational employment levels and replacement demands as the main measure of skill needs and what this constraint implies;
- the lack of a rigid one to one link from demand for goods and services to the demand for specific skills and qualifications, and the need to recognise the importance of:
 - Substitution (switching between skills depending on their cost);
 - Screening (use of qualifications as a signal rather than as a measure of improved productivity).

- Misunderstandings about what is meant by the term skill: Occupation is not equal to skill and most occupational categories are NOT homogeneous with respect to skill or qualification (Stevens (2003); Wilson *et al.* (2003a and b));
- Various other issues with regard to measuring occupational structure, including the use of household versus employer surveys, and residence versus workplace issues;
- The other methods and approaches that have been adopted to anticipate changing skill needs, including the need to complement quantitative projections with other material such as :
 - Employer surveys;
 - Detailed case studies.
- The use of time series methods, recognising the limitations, of projection without behavioural content, especially for longer horizons;
- The constraints imposed by the statistical infrastructure (available data) in each country;
- Spatial aspects, including the importance of international trade and other influences upon locational decisions.

Each of these points is dealt with in greater detail in the discussion below.

3. APPROACHES TO ANTICIPATING FUTURE SKILL NEEDS

An enormous number of different methods and approaches have been used to anticipate education and training needs. No attempt is made here to provide a comprehensive review of all these studies; rather the emphasis is on providing some key insights, with detailed examples.¹ The discussion includes the use of both quantitative methods and qualitative approaches. It also highlights various improvements in modelling techniques that have been facilitated by the availability of better data as well as increased computing power. The discussion also considers the

¹ For further detailed discussion, see Wilson (2001 and 2002).

improvements in the technical means of support for anticipating skill needs offered by the State, and in particular its statistical agencies.

The main approaches can be characterised as follows:

Quantitative methods

- Mechanistic/extrapolative techniques
- More complex time series models
- Behavioural/econometric models
- Survey of employers' opinions
- Skills audits

Qualitative approaches

- Delphi techniques (consultation of expert opinion)
- Case studies
- Focus groups
- Holistic modelling approaches
- Scenario planning

Quantitative modelling

For many years the dominant technique has been quantitative modelling, typically using a combination of behavioural/econometric models and more basic extrapolative techniques (the latter where the data are inadequate to apply more sophisticated methods).

A detailed description of the general methodological approach is given in Wilson (1994). At the heart of the method is the use of a multi-sectoral, dynamic macroeconomic model (MDM). In most cases this has a Keynesian structure, incorporating Leontief input-output system and concentrates on the determination of changes in the real sector of the economy. The level of desegregation of commodities and industries is considerable. More recently the use of computerised general equilibrium (CGE) models has been popularised by advocates such as Monash University (Meagher *et al*, 2000). From an early stage such analyses have also included a spatial dimension, with detailed analysis of constituent regions.

The advantages of the detailed desegregation by industry and commodity in such models accrue not only from the greater accuracy achieved in the simulation of aggregate economic quantities, such as GDP and its main components, but also through the value of the additional detail itself. One of the great strengths of these disaggregated models is their ability to simulate interaction between different industries and between them and the rest of the economy. A further advantage concerns the potential that such detail provides for the development of sub-models concerned with other dimensions of employment such as occupation and region. These sub-models can exploit the link with developments in industrial structure, and are a key element in any attempt to anticipate changing skill needs.

There are of course disadvantages of desegregation. These relate not only to the increase in the amount of data preparation and estimation required, but also to the fact that this involves pushing disaggregated analysis to the limits of the reliability of the data. A second main practical disadvantage of desegregation is that it normally increases the number of exogenous inputs required to run the model. Not only are there difficulties in obtaining past estimates of these variables, but also a greater degree of judgement must be exercised in projecting their values into the future.

The approaches to generating national projections have gradually been refined and improved in parallel with the development of economic modelling more generally. These improvements have resulted from:

- Significant investments in methodological advances;
- Improvements in techniques and understanding;
- Huge increases in the ability to handle and process data;
- Improvements in the availability and accessibility of data.

Many of these elements are interconnected and related to the general effects of the IT revolution. Improvements in modelling techniques resulted from the investments made in many countries the 1970s-1990s, as well as from the more general advance in economic scientific methods over this period. The latter has been facilitated by the IT revolution's impact on the ability of analysts to handle increasingly complex statistical problems, with increasingly less effort. Statistical and econometric modelling techniques have been particular beneficiaries. In addition, the general

process of scientific advance (which has benefited from the massive expansion of investment in education and research and development world wide) has had a major impact. The availability and accessibility of labour market data has also steadily improved in most countries since the early 1970s, again linked to the IT revolution.

Improvements made to the main macroeconomic model and sectoral components of such models have been more substantial than those to the occupational sub-models, mainly because of the better quality of data available. A key problem has been the lack of reliable and detailed time series data on occupational structure within sectors. This has meant that in many countries analysis has focused on quite broad occupational categories. A notable exception is the case of the USA, where the Bureau of Labour Statistics produces much more detailed occupational forecasts. This is possible because of its regular and comprehensive survey of establishments, which collects data on occupational employment on an annual basis. In most other countries the costs of such surveys are regarded as prohibitive.

There have been considerable advances in the economic analysis of time series data in recent years. Two main new approaches may be identified. The first is the technique of co-integration that has been developed by a number of econometricians but is closely identified with the work of Engle and Granger (1987). The second is a methodology for developing parsimonious and robust time-series models in a comprehensive and efficient manner. This approach was initially developed by David Hendry (1985) and has been neatly summarised by Harrison (1995). Such approaches have been used in developing sectoral labour demand equations currently used in many macroeconomic models (see for example, Briscoe and Wilson (1991 and 1992). Such procedures are also beginning to be used in the analysis of occupational structure although such attempts to develop the analyses along these lines remain experimental due to data limitations (Briscoe and Wilson (2003)).

In theory it would be desirable to develop a complete model of supply and demand for different occupations in order to take into account the various behavioural relationships that will determine future changes in the labour market. In practice, severe limitations of the data available, as well as some conceptual problems (especially what the supply of labour for an occupation means), still preclude such an

ambitious approach and most forecasts are based on simplistic extrapolation of past trends, focussing primarily on the demand side (i.e. on employment).²

The approach developed adopted in most countries, involves two stages:

- First, projections of the likely changes in industrial employment are made using an MDM or CGE model.
- Second, projections of the occupational structure of employment within each industry are made using material from the Censuses of Population or similar surveys (usually fairly simple extrapolations of past trends).

These occupational coefficients are then combined with the projected levels of industrial employment to obtain projected levels of employment by occupation.

The occupational employment projections are therefore based on a sub-model, which takes as input the industrial/sectoral employment projections produced by the macroeconomic model. It is a 'top-down' approach. The overall changes in aggregate occupational structure arise through a combination of shifting patterns of industrial employment structure and the changing occupational composition of employment within industries. The former can be regarded as primarily a reflection of the way in which the changing pattern of demands for commodities by consumers and companies impinges on occupational structure, while the latter is more a reflection of technological and organisational changes affecting the manner in which goods and services are provided. The level of employment in a particular occupation can, therefore, change for two main reasons; either because the industries in which it is concentrated grow or decline, or because of changes in occupational composition within industries. The former may be termed the *industrial* effect, the latter the *occupational* effect.

The main developments to this approach in recent years have been to add further elements to translate the projections of changing levels into implications for flows or *replacements demands*. These recognise that, in addition to dealing with any projected increase in occupational employment levels, there is also a need to replace

² Of course employment is the result of both demand and supply factors, but in most models the treatment of supply is rudimentary and generally very aggregate, focusing just upon economic activity rates by age and gender rather than the supply of suitable qualified and /or trained people into occupations

those leaving an occupation for because of retirement or other reasons. In some models an effort is also made to assess the need for particular types of qualifications. Again, these developments have been constrained due to limitations in the existing data sets.

Quantitative surveys

To many, the obvious way of assessing employers' future skill needs is to go out and ask them directly. This approach was quite popular in many countries, including the UK, in the late 1960s and early 1970s. It was subject to severe criticism as having no firm theoretical foundation, and for often being based on inconsistent and conflicting assumptions. It fell into disrepute when the projections produced based on this method turned out to be highly misleading. Lack of consistency in the underlying assumptions adopted by the respondents, and in particular conflicting views about future market share, resulted in very inaccurate projections. Since then, the general consensus has been that such surveys can only provide useful indications for a very short period ahead. There has been something of a revival of interest in this approach in recent years. However, these surveys are concerned with a range of issues and rarely attempt to obtain hard quantitative data on future skill demands.

An influential study to adopt this type of approach at national level was by Rajan and Pearson (1986). This was a major survey of companies at national level. It was as much concerned with reviewing current trends and their causes as making predictions for the future. It also took a more qualitative than quantitative emphasis than many of the previous survey studies, in many ways having more in common with "Delphi" type approaches as discussed below. This suggests that such approaches can provide some useful information but that they should not be used without considerable care.

The danger is that such surveys can be of a very *ad hoc* nature and produce data of dubious quality. When conducted in a very structured and thoughtful manner they can avoid the worst pitfalls of such approaches and provide valuable insights. A good example of the latter is the London TEC's *Employer Survey* (London TEC Council, 1998). This generated a range of information on current structure and performance and immediate future prospects. The results focus on size of firm as a key issue but also move well beyond simple issues of quantitative changes, attempting to discern

what is driving the observed changes. Issues of location of plant and inward investment were a key focus.

Most recently, a number of studies have begun to use quantitative *Skills Surveys* in combination with other methods to focus on questions related to generic skills. See for example Felstead *et al* (2002). These studies focus on skills such as numeracy, literacy, and social skills, that can be easily transferred across jobs, surveying both individuals and their employers. Employers have laid great stress on such issues in recent years. All such surveys are however quite expensive and require considerable technical expertise to execute successfully. Large-scale employer surveys have become increasingly popular as part of the attempt to assess current and future skill needs. This kind of instrument has been part of the armoury of the US Bureau of Labour Statistics for many years. It has also been adopted in the UK since 1999, following the recommendations of a National Skills Task Force set up by the incoming Government in 1997. The extensive 1999 survey of 27,000 establishments was repeated in 2001 (and on a much smaller scale in 2002, (just 4000 interviews)). They have spawned a number of detailed reports and analyses.³ The results of such research have made a major contribution to the evidence base on skill deficiencies, their causes and consequences in the UK. In 2003 the newly formed Learning and Skills Council (LSC) commissioned a further round of employer skills surveys at both national and local level, involving an overall sample of around 68,000 establishments in England. Such surveys are however extremely expensive and the jury remains out on how effective they are.

Skills Audits are another form of quantitative survey, which has also been widely used in recent years to establish the stock of skills available in a local area. These are surveys of households and are primarily concerned with the supply rather than the demand side of the labour market. However, such surveys can play a useful part in obtaining a complete overview of the supply demand balance (see for example the studies for Merseyside by Cambridge Econometrics, 1994)).

³ See Bosworth *et al* (2000 & 2001) and Hogarth and Wilson (2001a and b).

Qualitative methods

In many other countries, which are less well served in terms of statistical infrastructure, a variety of different types of more qualitative approaches to assessing changing skill needs have been adopted. They share in common the fact that they are not concerned with obtaining precise or comprehensive quantitative measures of employer's skill requirements but rather a broad-brush qualitative assessment of current trends and future possibilities. At the same time such studies often involve a very detailed analysis of the particular circumstances affecting the sectors or occupations under review. They also often involve explicit engagement with the key actors (including employers and education and training providers).

Delphi studies, focus groups, round tables

The so-called Delphi approach to forecasting involves pooling the opinions of a number of people (possibly experts of some kind) in order to try to identify the key issues. This can be done in a variety of different ways. The classic method is to bring the experts together in a suitable forum (focus group, workshop or conference) to exchange views and hopefully to develop some form of consensus.

A related method, which has become increasingly popular, is to arrange "focus groups" or "round tables" involving key stakeholders and interested parties. Discussion of the topic of interest is the arranged, possibly based around material submitted in advance and possibly involving some kind of facilitator to prompt and structure the discussion. This type of approach is a feature of the EMTA ADAPT project in the UK Engineering industry (EMTA, 2001) and also been used in many other studies including many with a local/regional focus, such as the Merseyside Economic Assessment (Cambridge Econometrics, 1994). This kind of approach has been very popular in many Southern European countries where the statistical infrastructure to do more quantitative modelling does not exist.

Another approach is to interview people (such as employers, education and training providers and other stakeholders) to discuss the issues in depth, possibly in a structured fashion. This can be used to develop "case studies", which can have some general messages. In this case the researcher/interviewer is the only one to hear all the views expressed. They have to make sense of all this, sometimes conflicting, information. The National Institute for Economic and Social Research in the UK has

established a long and distinguished track record of such work (see the various articles by Mason, Prais and Steedman in the bibliography). Such studies tend to focus primarily on the current situation. Anticipation of future change is generally very qualitative. Nevertheless this can add important insights that can complement and support the results of more quantitative projections.

Non Traditional Modelling

Some analysts have attempted to develop less quantitative, more holistic approaches for assessing long-term futures. Such work is often focused on the notion of sustainable development and social cohesion. The Henley Centre study of the Future of Work in London is a good example (Henley Centre, 2001).

Local Competitiveness is viewed as a function of social cultural and environmental factors as well as purely economic ones. Both long and short-term drivers of competitiveness, thus broadly defined, are distinguished. These are proxied by around 50 different indicators to operationalise the concept. The model does not deliver precise predictions of changes in levels of economic activity. Rather it represents a policy tool for exploring long range issues, developing various scenarios and strategies. Applying the model to London has enabled the different challenges facing each of its 33 boroughs to be identified and appropriate policy responses to be developed, including implications for skills.

Scenario planning

The scenarios methodology, as a form of modelling, is attracting increasing attention as policy makers seek to compensate for the limitations of forecasting in the longer term, and in situations of uncertainty as to how key drivers will shape the future (Leney *et al*, forthcoming).

Scenario planning is not a quantitative scientific method comparable to the statistical techniques used in forecasting. However, it is systematic in that it develops scenarios that are wholly based on evidence and analysis and goes on to test strategies rigorously, openly and consistently within these scenarios. Scenario's thinking is used as a practical tool to aid decision making in complex contexts and when future circumstances are uncertain - it complements quantitative scientific models rather than replaces them.

The scenarios methodology involves the development of plausible scenarios for 10 or 20 years hence, then the testing of strategies for achieving objectives in the context of these scenarios. The scenarios can be seen as a kind of lens or ‘wind tunnel’ through which to explore the potential and detail of different strategies. It is not a convergent tool that provides a best guess for a single, inevitable future, nor does it provide a ‘best possible strategic approach’, nor is it a derivative of forecasting. As a planning tool, scenarios are often considered alongside tools, such as more traditional forms of forecasting. The distinctiveness of the scenarios method lies in the way it tackles uncertainty, the richness of the data it generates for discussion and its capacity to facilitate ‘out of the box’ thinking.

Building scenarios helps to clarify relationships between elements of complex systems and encourages stakeholders in a planning process to think and discuss their work within a longer-term perspective. At best, the method generates a so-called “strategic conversation”.

Scenario planning may be optimally positioned in the medium/longer term where the number of uncertain outcomes are roughly the same in number as the number of predictable outcomes. For shorter planning periods, traditional forecast methods will be most effective.

4. TECHNICAL SUPPORT FROM THE STATE

In addition to investment in general economic modelling techniques, national governments have also provided technical support for anticipating skill needs in a number of ways. The key elements here have been:

- The development of standard systems of classification;
- The introduction of regular national surveys of households and employers;
- The development of means of access to these datasets electronically.

4.1 Classification of Occupations and Qualifications

A standard system of classifying occupations, both over time and across different data sources is essential to any systematic attempt to assess future skill needs. For a variety of reasons, until relatively recently, this has not been a top priority in most countries. However, things have improved, making more systematic approaches feasible. In most countries there is a gradual move towards harmonisation with the international standards set by the ILO.

Attempts have also been made to standardise the classification and treatment of qualifications. This has generally made less progress and in most countries there remain serious difficulties of comparison within their own borders over time, let alone between countries.

4.2 Development of Regular National Surveys of Employers: Censuses of Employment

Sectoral information lies at the heart of the multi-sectoral models used in employment projections. Good sectoral information (especially output and employment) is therefore essential. In many countries, such as the USA, UK and much of northern Europe, the State conducts good quality censuses or surveys of economic activity, which form the basis of such information. These form a key input into the National Accounts. In other countries such data are of much lower quality and reliability (if they exist at all on a regular basis). This constrains very significantly the ability of such countries (which include many southern European countries), to develop very sophisticated models.

Note that such information is different from that obtained in Employer Skills Surveys, which are concerned primarily with the pattern of skill needs and deficiencies rather than the scale of economic activity.

4.3 Surveys of Households (Censuses of Population, Labour Force Surveys)

Most countries conduct regular but infrequent Censuses of their Population. For many years this was the only source of detailed information on the occupational structure of the employed workforce. Such data sets remain a cornerstone for any analysis of changing occupational structure.

More recently Labour Force Surveys (LFS) have become much more commonplace. These are effectively mini-censuses although usually being completed voluntarily rather than as a legal obligation. The LFS has been a key survey in Europe- member states being obliged to carry one out on a regular basis and with a fairly standard set of questions. The gradual improvement in the LFS, and in particular its recent increase in sample size, mean that it is now the prime source of data on occupational employment in the UK. However, it is still limited in its ability to provide accurate data for small geographical areas. Compared to the huge survey of establishments conducted on a regular basis by the Bureau of Labour Statistics (BLS) for the USA, the LFS provides a very fuzzy and erratic picture of trends in occupational structure. However, as always considerations of cost are crucial and few other countries have been prepared to devote as much resource to such data collection as the USA.

4.4 Other Surveys and Databases

Most countries have a range of other surveys conducted on a fairly regular basis, which contain relevant data. These include surveys of earnings as well as various aspects of employment labour supply. This has improved the ability of researchers to monitor trends. However, with one or two exceptions (such as the Netherlands), these surveys still remain inadequate compared to the much larger surveys conducted by the BLS in the USA, which provide a much more accurate picture of skill mix within sectors.

The vast improvements in IT have also resulted in an explosion in the development of databases and primary data collection exercises at local level. Many of these are

intended to assess current positions but many also look forward into the future. These include major **Skills Audits** of local areas to supplement and update the information from official sources, as well as **Surveys of Employers**, intended to assess their skill needs. Often such work is subcontracted to specialist survey companies and labour market consultancies. Although this increase in availability of relevant LMI is to be applauded, there are many problems related to inconsistencies in methodology and definitions, which make it much less useful than it might otherwise be. There is a strong case for a more coordinated approach that would gain from economies of scale and benefit from synergy and cross-fertilization.

5. COUNTRY SECTIONS (ALPHABETICAL)

5.1 Australia

In Australia, employment projections have been carried out by the Centre of Policy Studies at Monash University (CoPS) for many years. CoPS forecasts are conducted within an economy-wide framework, which integrates a macro model (to determine aggregate employment), an applied dynamic general equilibrium model (MONASH, to determine employment by industry) and a labour market extension (to determine employment by occupation). The **MONASH** model evolved from an earlier model called *ORANI*. Meagher and Parmenter (1995) describe the model in some detail focusing on implications for occupations. This was updated in Meagher *et al* (2000).

Like *ORANI*, *MONASH* has a high level of microeconomic detail. Unlike *ORANI*, it has a strong forecasting capability. This is due to:

- a more detailed specification of intertemporal (i.e. dynamic) relationships;
- greater use of up-to-date data; and
- enhancements which allow the model to take on information from specialist forecasting organisations and from recent historic trends.

Thus while *ORANI* was limited to answering comparative static questions such as: *MONASH* can provide forecasts corresponding to alternative scenarios. *MONASH* can analyse issues such as labour market dislocation or adjustment costs, which other CGE models that do not produce a base case forecast, are unable to address.

Sectoral inputs to the *MONASH* forecasting system are:

- Macroeconomic forecasts from Syntec Economic Services;
- Forecasts for the agricultural and mining sectors from the Australian Bureau of Agricultural and Resource Economics;
- Forecasts for international tourism from the Bureau of Tourism Research; and

- Scenarios on technical change from extrapolations of recent historical experience.

MMRF is a full "bottom-up" multi-regional model with similar structure and notation to *MONASH*, used to model the Australian states and territories in more detail. Consistent forecasts are produced for 113 industries, 56 regions and up to 341 occupations.

The occupational forecasts project the demand for skills (i.e. occupational employment) that are likely to be required in the Australian workforce, with a horizon of 10 years. In the 1995 version of the model, this was based on a shift-share approach in which the occupational shares within detailed sectoral categories were assumed fixed. Subsequently this was extended to allow for variations in occupational shares within industries.

The CoPS team take the view that the key to generating believable forecasts is to use detailed information available from expert groups specializing in the analysis of different aspects of the economy. *MONASH* forecasts incorporate a wide variety of information including:

- Macro forecasts from the Treasury and other macro analysts;
- Export volume and price forecasts from the Australian Bureau of Agricultural and Resource Economics;
- Forecasts of tourist numbers from Bureau of Tourism Research;
- Forecasts of tariff rates from the Productivity Commission; and
- Forecasts of changes in technology and consumer tastes derived from trends calculated at CoPS.

The initial applications of *MONASH* were made for State and Commonwealth government departments requiring detailed employment forecasts. The model continues to be used for this purpose. However, more recently the main enhancements to the model have been directed at policy analysis. These include:

- The effects of changes in tariffs on different sectors;
- The effects of various sector specific changes on the economy more generally;
- The effects of external events on local industries.

Labour Market Forecasts

CoPS has a major ongoing research program on labour market forecasting. This is intended to provide a useful guide for the allocation of training resources. The employment forecasts are for detailed industries and occupations which, when the disaggregated forecasts are added together, are consistent with a plausible scenario for the macro economy.

So far the development of the system has focussed primarily on the demand for labour. A particular concern has been the effect in recent years of technological and social change on the structure of the economy and the implications for future labour demand. A complementary supply side forecasting system is in preparation.

The CoPS system has been used since 1994 to provide a bi-annual briefing service to various government agencies responsible for vocational education and training in Australia. These are subscribers to the service, which helps to fund CoPS activities.

CGE Models for Other Countries

ORANI-G is an applied general equilibrium model, which has been developed at Monash for use in other countries. It is descended from the ORANI GE model of the Australian economy, which has been used extensively for policy analysis in Australia for nearly two decades. ORANI-G (the 'G' stands for 'generic') is designed both for teaching purposes and to serve as a basis from which to construct new models. Adaptations exist for many countries, including South Africa. CoPS runs an annual GE training course, which is based around the ORANI-G model, and also offers consulting services to assist or accelerate development of similar models worldwide.

Internet sites

Australia: Monash University

Website: <http://www.monash.edu.au>

More technical details about the model are available at:

<http://www.monash.edu/policy/techdoc.htm>

5.2 Austria

Various labour market forecasting activities have been carried out in Austria for many years under the auspices of the former Ministry for Science and Research and the Austrian Labour Market Service (ALMS). The work has been primarily conducted by academic research institutes such as the Austrian Academy of Science (primarily focused upon the education system and labour supply), the Austrian Institute for Economic Research (WIFO) and the Institute for Advanced Studies (HIS), focusing more upon the economy and the demand side.

Macroeconomic projections are conducted at an aggregate level on a quarterly basis but these do not contain much sectoral detail. Medium term forecasts are conducted yearly which include greater detail. The work by WIFO incorporates expert views in a qualitative fashion into this process. The ALMS has also conducted a micro-prognosis of the labour market since the mid 1990s, focusing upon the behaviour of individuals and enterprises. It also produces annual projections of the apprenticeship market. These are all reviewed in Lassnig (2002).

Occupational and qualification projections have only been conducted infrequently usually linked to the availability of data from major data sources such as the Census of Population. Thus, the OECD undertook a major study in 1967 (see Steindl (1967)). This was in the manpower requirements tradition, applying US patterns of occupational structure rather mechanically to Austrian data. A second study in the 1970s by Clement *et al* (1980) adopted a methodology involving both supply and demand side elements. More recent approaches (Lassnig and Prenner (1997 and

Lassnig (1998) have adopted more conventional methods, applying a shift share analysis of changing occupational structure within sectors to a sectoral forecast based on a CGE approach (as adopted in Australia).

The procedures also take account of replacement demands and the implications for educational requirements.

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5.3 Canada

In Canada, employment projections are carried out by the **Human Resource Development Canada** (HRDC) (formerly known as Employment and Immigration Canada). This is done using the **Canadian Occupational Projection System** (COPS). The COPS Model has evolved from a demand-focused methodology, concentrating upon expected changes in labour demand, to a more general analysis of labour market conditions for different skill categories. The focus upon occupational requirements has also developed from a fixed coefficient approach to the use of a more sophisticated econometric method, allowing for some sensitivity to cyclical factors. The latest approach also formally includes elements of a more qualitative or Delphi approach, introducing qualitative judgments into forecasts. According to Hensen and Newton (1995), along with the Netherlands, Canada has one of the most sophisticated systems for projecting employment in the world. Archambault (1999) provides a more up to date assessment.

The COPS model is used to develop different scenarios and provide projections of demand for approximately 500 occupational categories and 67 industry categories. The projections are available at a national and provincial level. The base time series data for the model are national census data. In addition, Labour Force Survey industry time series data are used for inter-census periods.

The components of the Demand Model are various. First, estimates of industry employment are produced through simulation in a macro-economic model and checked through a consultative process with sectoral experts. The second step is the production of industry employment estimates, cross-classified by detailed occupational categories. This is done by estimating each occupation's share of a given industry's employment by using a coefficient matrix. Columns represent industry and rows occupations.

The Occupational Demand Model uses alternatively two matrix approaches. These are:

- A fixed coefficient matrix; and
- A variable or curvilinear coefficient matrix.

The second one has been developed using more sophisticated econometric methods in recent years. This is described in more detail in COPS (2002). The sum of all the occupations by industry coefficients for each column equals one, regardless of the matrix used. While assuring model consistency, the resulting matrices are subject to 'bottom up' amendments through a consultative process that reviews the detailed occupational projections. This enables more qualitative insights about key trends to be built into the econometric and mechanical forecasts and projections.

Once the "expansion demand" level for each occupation has been determined, the estimates for attrition by occupation are needed. Attrition (or replacement demand) is the number of openings that arise due to people leaving the labour force for reasons such as retirement, changing occupations, or mortality. The estimates of attrition are obtained from an occupation and age distribution model. This is similar to that developed by ROA for the Netherlands.

The HRDC staff responsible for the COPS models consult with industry, provincial governments as well as HRDC's own regional offices. The first round of consultations ensures that input numbers reflect a broad consensus on the economic outlook. Once the macroeconomic scenario is set, participants comment on occupational projections and adjustments may be made to the coefficient matrices.

COPS have also developed a supply side component to their modeling, which allows them to say something more general about the supply demand balances for different skills (Boothby, 1995).

There has been a debate in Canada about the most appropriate level of disaggregation to undertake occupational projections. There is a trade-off to be assessed between the demand from users for greater detail and the reliability and robustness of data for surveys such as the Canadian LFS with limited sample size. The review by Archambault (1999) suggests that statistical noise can bias projections unless an appropriately high enough level of aggregation is chosen.

Internet site

Canada: Human Resources Development Canada

Website: <http://www.hrdc-drhc.gc.ca>

5.4 Cyprus

Cyprus is another country that has conducted employment forecasts for the first time in the last few years. The organization responsible for this work is the **Human Resource Development Authority** of Cyprus. The forecasting methodology developed in Cyprus is based on approaches that have been developed and used in European countries and the United States. However, the two methodologies that have been mainly adopted are those developed in the UK by the Warwick Institute for Employment Research and in Ireland by FAS/ESRI.

The employment forecasts in Cyprus refer to 27 sectors of economic activity and 36 occupational groups. The data for the projections are taken from the Census of the Cyprus Statistical Service (conducted every five years and covers all sectors except Agriculture and Fishing) and the Labour Force Survey. Further details can be found in: *Employment Forecasts in Cyprus 2000-2010*.

Internet site

Cyprus: Human Resource Development Authority of Cyprus

Website: <http://www.hrdauth.org.cy/>

5.5 Czech Republic, Poland and Slovenia

Forecasting activities in three 'pre-accession'- countries

A two-year survey and analysis project was recently funded by the European Commission (under the Leonardo da Vinci programme) in order to develop labour market forecasting tools for pre-accession countries, about to join the European

Union. The project aimed at the investigation of labour market information systems and methods used by four EU members states, France, Germany, Ireland and the Netherlands, as well as some other countries, for forecasting education and training needs and compared them to the data and the methods available in three pre-accession countries (Czech Republic, Poland and Slovenia).

Czech Republic: Occupational forecasting models used in the Netherlands (ROA) and Ireland (ESRI) were adapted to the needs of the Czech Republic. Limited time series for the period 1993-1999 were used in order to provide forecasts for the period 2000-2004 for 50 occupation groups and 59 educational categories for expansion demand, replacement demand and job openings.

For more details see *Regular forecasting and training needs: Quantitative methods for the Czech Republic in Forecasting Skill Needs: Methodology, Elaboration and Testing*, NO-NTF, Prague 2001

Poland: Different databases were brought together in order to provide projections for the demand of labour one year ahead, five years ahead and ten years ahead. The approaches used by the Polish were closer in spirit to those used by the United States and Australia. The forecasts were made at national and regional level.

For more details see the *Polish report in Forecasting Skill Needs: Methodology Elaboration and Testing*, NO-NTF, Prague 2001

Finally, teams from the Czech Republic, Slovenia and France worked in parallel on the elaboration and testing of qualitative research tools for anticipation of labour market needs at regional and sectoral level. This built on French experience of regional and sectoral prospective studies. The approach was also enriched by attempting to combine semi- qualitative and 'soft' qualitative methods.

For more information see *The Cross Country Summary of Results in Forecasting Skill Needs: Methodology Elaboration and Testing*, NO-NTF, Prague 2001.

Internet site

Czech Republic: National Observatory of Employment and Training

Website: http://www.nvf.cz/observatory/gb/info_gb.htm

5.6 France

France has a long history of employment forecasting stretching back to the indicative manpower planning carried out in the 1950s and 1960s. More recently, this has been replaced by more broad brush and less mechanistic techniques, although the Statistical and Economic Research Department of the French Ministry of Employment and Solidarity continues to produce quantitative employment projections. These include a general outlook for the French economy as part of the Commissariat General au Plan under the Occupation and Qualification Projection Group (PMQ).

It is not now believed in France that educational provision can be planned in precise detail using such methods. However, the monitoring of the changing skill needs of the labour market, and the provision of useful information to all labour market participants about these developments to aid them to make rational choices, is still regarded as useful.

Employment forecasts in France are currently carried out at national, sectoral and local level, with different bodies being responsible for the forecasting activity in each case. Both quantitative and qualitative methods of analysis are used. At the national level, the Institute of Economic Forecasting (**BIPE**) carries out forecasts of occupational employment for the Ministry of Education.

At the sectoral level, the results are based on a multi-sectoral macroeconomic model that is used to generate projections for some 75 sectors and for some 22 occupations or professional branches. This was originally developed from the Hermes model that was built for the European Commission as a tool for making macro forecasts across all member states. It is a Keynesian model with an input-output structure at its heart.

BIPE now also uses a range of other models.⁴ The main macroeconomic model (DIVA) focuses upon employment levels for each sector branch. The CALIFE model analyses employment level for each professional category. Finally, GESPER is a geographic and professional mobility model of working population that estimates the hiring needs for each professional category.

BIPE makes forecasts for 22 broad occupational groups (aggregated from some 455 more detailed occupational categories). This uses a model called FLIP-FAP⁵ for calculating recruitment needs according to professional categories. At its most detailed level the model now distinguishes 75 occupations or professions in its final projections. The projections use econometric techniques to analyse trends in LFS and other data on occupational employment within sectors. However, data limitations restrict the sophistication of what can be done, so effectively the results are not much more than trend extrapolations. Different methods are also used in the public sector, including use of expert views on changing occupational structures within areas such as education and health.

Implications for replacement demands are regarded as essential (Topiol 2001b). The procedures also work out implications for qualifications/educational requirements.

In addition to Censuses and Labour Force Surveys, the data used, are taken from regular surveys such as:

- Employment Surveys and the Vocational Training Qualification Survey carried out by the National Institute of Statistics and Economic Studies (INSEE);
- The Centre for Research on Training, Employment and Qualifications (CEREQ) on young people starting their working life (irregular surveys); and
- Continuing vocational training in companies (annual and compulsory surveys);
- Irregular surveys of companies and qualitative data, such as assessment of existing studies from professional organizations, research centers, experts or firms.

⁴ For more details about these models see www.bipe.fr/us_frameset_base.html

⁵ Inter-professional flows by families of professional activities.

At sectoral level, forecasts are also carried out by using existing data and combining them with more qualitative information. Knowledge of each sector, professional category and the working population are combined and each profession is analysed using qualitative as well as quantitative analysis.

At a local level the responsibility for projections falls to the Regional Employment and Training Observatories (**OREF**). At local level, OREF first links the jobs, the sectors and the qualifications. Then regular surveys on trainee integration are used in order to provide a diagnosis that is followed by an analysis of the explanation factors of the change, the identification of development factors and their probability of continuation or cessation, and the provision of recommendations. OREF uses data concerning employment, demography, training, unemployment, integration. These include population censuses (every 8 years), and regular surveys of employment structure and staff turnover, trainee population statistics, statistics on job seeking and new entrants statistics.

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Internet sites

France:

Website: http://www.bipe.fr/frameset_base.html

www.bipe.fr

5.7 Germany

Germany also has a long tradition of undertaking employment projections. These have generally been provided for policy analysts rather than trying to provide useful information for those making career choices. Although the role of such work has been hotly debated, the government continues to support such activity.

In Germany, there are three main research institutions involved in forecasting activity. These are: the **Institute for Labour Market and Vocational Research (IAB)**, the **Federal Institute of Employment**, which provides quantitative forecasting and the **Federal Institute for Vocational Training (BiBB)** which conducts more qualitative research.

The main organization providing forecasts for the labour market in Germany is the IAB. It has used a number of different approaches to anticipating changing skill needs. These have been mainly concerned with the demand side of the labour market. They include:

- Educational Accounting System (BGR).
- Comprehensive Forecasts of Employment to 2010.
- Early Recognition System of Qualification and Training Needs in the German Economy.

- IAB Establishment Panel.
- Training as a dominant Active Labour Market Policy in the Eastern German Transformation Process.

Only the second will be discussed in detail here.

The statistical data used for forecasting are used mainly provided by the Federal Statistical Office. These data are complement by a number of individual surveys.

The most important databases used are:

- Microcensus (destatis.de)
- Socio-economic panel (diw.de)
- Employment statistics
- IAB Company-related Survey Panel (www.infratest-sofo.de, www.iab.de)
- Labour Landscape 2010 and the IAB/INFORGE Model
- Labour Market Monitor for the new Lander (www.infratest-sofo.de)
- BiBB/IAB surveys
- Total Education Accounting
- Reporting Trends and Structures
- Report on Qualification Structures (www.wz-berlin.de)
- Report on vocational education and training (www.bmbf.de)
- Reporting System on CVET (www.bmbf.de)
- Atlas of Occupations (www.pallas.iab.de)

Educational Accounting System: this system follows the stocks and flows of people in the education and training system, in employment, in unemployment, the number of people outside the labour force as well as the transitions between these

areas. This is done by using a method called ENTOR. An outcome of this approach is the ability to follow the skill level unemployment rate using time series.

Early Recognition System for Qualification and Training Needs: this method uses job advertisements in dominant newspapers and fills a databank with the relevant information. This method is thought to provide useful indicators of demand.

IAB Establishment Panel: this is a reporting system that monitors the structures and developments of the demand side of the labour market on the basis of surveys of employers. The IAB Establishment Panel includes questions concerning future needs for personal capacity and motives for rejecting candidates.

Long Term Labour Force Projections: this approach focuses upon measures of the labour supply. It tracks the number of employed persons plus the number of (registered) unemployment in Germany.

Comprehensive Forecasts of Employment to 2010:

The forecasts of occupational employment date back to 1975 when the IAB made its first projections in collaboration with the Battelle Institute. Projections are made for 17 economic sectors and 34 occupational tasks. Three variations are calculated, based around a low trend, a medium trend and a high trend in employment change.

The demand for skill levels also distinguishes 11 skill levels. An ex-post analysis investigates a range of influencing factors (technological, economic, social and other) and their impact on occupational tasks. Qualitative issues are described and their impact is classified as positive (increase of employment in this occupation) or negative (decrease of employment in this occupation). These impacts are a result of empirical analysis of the past and are estimated for the future. They are standardized and transformed from cardinal to ordinal status. For each occupational task more or less qualitative impacts are selected. The transformation from cardinal to ordinal status is then made, leading to a variation around the quantitative trend extrapolation.

In 2002, a new long-term employment forecast model, the IAB/INFORGE Model was used for the first time. This is a part of the international GLODYM network and operates with a bottom up construction of some 600 variables for each of 59 economic sectors. The IAB/INFORGE Model is a quantitative tool with qualitative backups, which take into consideration employment and occupational shifts between sectors and between individual occupations. The approach covers analysis of the development of the economy and the labour market as well as on the development of the structure of jobs.

The IAB/PROGNOS long-term assessment procedure is based on an **open econometric model** that includes a **modified trend extrapolation** of some aspects of employment structure supported by qualitative expert ratings and quantitative scenario techniques. The results are evaluated in three alternative scenarios, each of which is developed under the different framework conditions, documented and portrayed as orientation aids.

The main data sources used are again:

- National census;
- Microcensus;
- Additional data by the Federal Office of Statistics;
- Data on national accounting;
- Expert interviews.

Reference

Franz, H. (2003). *A.Th.E.Net Anticipation of Training Needs for a European Network, Leonardo II Programme, Final Report on Germany*

Internet sites

Website: <http://iab.de/iab/default.htm>

www.iab.de

www.bibb.de

5.8 Ireland

The Irish occupational forecasting model has been developed by the Economic and Social Research Institute (ESRI) on behalf of Foras Aiseanna Saothar (FAS, – the Training and Employment Authority). Employment forecasting activity was initiated in Ireland in 1989 when the Minister of Labour requested the Training and Employment Authority to make available information upon which its plans for future vocational education and training could be based.

The projections are based on the use of a multi-sectoral macroeconomic model run and maintained by ESRI. This model, which is part of the Hermes family developed for forecasting in the member states of the European Commission, covers all sectors of production- primary, secondary and tertiary. Its industrial classification consists of 13 major groups and 29 sub-groups. The industrial classification provides more details for the service sector than agriculture or manufacturing, since the service sector has been the main source of employment growth during the past decades.

The occupational data used for the ESRI forecasting models are taken from the Census of Population that is conducted in every five years, and the Labour Force Survey (LFS, Now referred to as the Quarterly National Household Survey). Some 45 occupations are distinguished (aggregated from more detailed categories to obtain more statistically robust data).

The FAS/ESRI occupational forecasting model produces forecasts of employment by occupation based upon the forecasts of employment by sector taken from the ESRI medium- term macroeconomic model. The forecasting procedure has two main parts. In the first stage, the ESRI medium-term model's employment forecasts for 11 sectors are desegregated into 29 sub-sectors by projecting the trend of each sub-sector's share of employment within each sector. In the second stage, the trends in the share of each occupation in each sub-sector (based primarily on LFS data) are examined and projected to a target year. The latter is done using linear, logarithmic and semi-logarithmic equations (as well as some judgment to select the projection

which appears more reasonable in the light of what is expected about labour market developments during the projection period).

The results of the forecasts of the number expected to be employed in each sub-sector in the target year and of each occupational sub-group's share in each sub-sector in the target year are multiplied together and summed to provide forecasts of the number expected to be employed in the target year in each occupational sub group. In addition, a gender sub model is used to project the female share of employment in each occupational sub group. Implications for replacement demands are also assessed using flow data from the LFS.

An overview of the work conducted can be found in Sexton (2002). The latest work of ESRI is *Occupational Employment Forecasts by region for 2010: FAS/ESRI Manpower Forecasting Studies Report no. 11*, which is part of a long running series.

The quantitative work on changing skill needs in Ireland has also been complemented by more Qualitative approaches, including the setting up of an Expert Group on Skills Needs.

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Internet site

Ireland: Economic and Social Research Institute

Website: <http://www.esri.ie>

5.9 Japan

Labour market projections are undertaken by various organisations in Japan. The most representative and authoritative are those produced by the Ministry of Labour (MOL).⁶ This serves as a corner stone of the government's *Basic Employment Measures Plan* that has been undertaken every 5 years since 1967.

The projections are based around forecast from a multi-sectoral macro model, including both supply and demand blocks. The demand block is essentially Keynesian, with a Leontief input output structure. Quite sophisticated econometric techniques are used and here is a quite detailed sectoral desegregation.

The supply side focuses upon aggregate labour supply by age and gender. A supply –demand adjustment block incorporates aggregate wage/ unemployment feedback mechanisms.

The occupational implications are developed using information on occupational employment structures within sectors. Results can be found in MOL (1999) and in an overview by Suzuki (2002).

In the MOL model this is only quite aggregate. For more detailed implications the Japan Institute of Labour (JIL) produces a breakdown to some 283 occupations (Watanabe, 2001). JIL is affiliated with the MOL.

The projections are widely used by government and in tripartite situations, involving social partners. They are institutionalized, which has the advantage of meaning that they become a common background for discussion. There are however disadvantages in that political considerations can sometimes cloud scientific judgments about the results.

⁶ From 2001 the MOL was integrated with the Ministry of Health and Welfare (MHW) into the Ministry of Health, Labour and Welfare (MHLW).

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Internet site

<http://www.jil.go.jp/buletin/year/2001/vol40-01/>

5.10 Netherlands

The Dutch Government has a legal responsibility to provide adequate education for all labour market participants. This implies a need to anticipate changing skill needs.

Early projections by the Central Planning Bureau were based on a manpower requirement type approach. In the mid 1980s the Research Centre for Education and the Labour Market in Maastricht University (ROA) was commissioned to develop a more comprehensive system, aimed primarily at helping to guide career choices.

The forecasting model for the Dutch labour market developed by ROA is used to produce projections every two years. These are limited to the medium term, which is a period of about five years. ROA provides forecasts not only for occupational groups but also forecasts by type of education. Particularly, 104 types of education, 127 occupational groups and 34 economic sectors are examined.

The forecasts are provided by matching labour demand and labour supply. Labour demand consists of expansion and replacement demand. The forecasts of expansion demand are based on the employment level forecasts for economic sectors that are produced by the Dutch CPB Netherlands Bureau for Economics. On the other hand, supply consists of the future flow of school-leavers entering the labour market and the outflow from training courses after and outside the regular education system plus the supply of short-term unemployed persons waiting to enter the market at the start of the period. It is assumed that long-term unemployed do not constitute serious competition for school leavers. The flow of school leavers that enter the labour market correspond to the Reference Forecasts that are compiled by the Ministry of Education, Culture and Science for regular education courses in the educational system. These forecasts are desegregated by ROA and supplementary data are used to estimate the flows from non-regular education.

The matching of labour demand and supply provides various indicators. The first and most important is a general indicator of the future labour market. Other indicators are: future risks of labour recruitment problems; a risk indicator that shows the opportunities for school leavers to switch occupations; a risk indicator which reflects the opportunities for school leavers to switch economic sectors; and a risk indicator which measures the sensitivity of employment to cyclical fluctuations. All these indicators are translated into a qualitative characterization of the expected labour market prospects on a 5-point scale: very good, good, reasonable, moderate and poor prospects.

ROA uses quantitative databases but qualitative judgments are made on the reliability of extreme and/or intuitively unexpected developments. The major data source is the Dutch Labour Force Survey (EBB) collected by Statistics Netherlands.

Other data sources apart from the external forecasts outlined above are data from Statistics Netherlands (which are used to estimate the effects of continuing vocational education on the educational backgrounds of the labour force) and follow-up surveys of school leavers conducted by ROA (which are used for desegregated data on the extent to which graduates of the various types of educational flow onto the labour market). For the supply side, the numbers of short-term unemployed by educational background (from registered data or surveys on unemployment that include information on the educational qualifications of the unemployed) are also used.

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Boston, Dordrecht and London: Kluwer Academic Publishers.

Internet sites

**The Netherlands: ROA (Research Centre for Education and the Labour Market),
Maastricht University**

<http://www.fdewb.unimaas.nl/roa/>

5.11 Spain

In Spain, there is a wide range of agents involved in the anticipation of training needs, acting at national, regional and local level. With a few exceptions, as noted below, these have been largely of a qualitative nature, reflecting the lack of good quality data ideally required for quantitative projections.

At the level of central government there are currently two main initiatives. These are: the National's Institute of Employment (INEM) Occupational Observatory and the National Institute of Qualifications Observatory.

As far as the first is concerned, its main aims are:

- To obtain information on the labour market and specifically on its evolution, as well as the factors determining this behaviour;
- To provide information on changes arising in the content of occupations and anticipate their likely impact on job offers; and
- To perform regular analyses of the training and employment needs arising out of social changes, technological innovation and the development of new forms of work and business organization and management.

The data for the above actions include:

- Institutional INEM data in the areas of employment supply and demand, placement, unemployment benefits, administration of active employment policies, occupational training, etc;
- Studies carried out on its own behalf involving press advertisements, consultation with employment intermediaries and companies, consultation with specialists and the examination of data concerning the economic situation and investment projects;

Studies prepared by other government agents and research centres.

INEM prepares basically three types of reports. These are:

- Regular labour market studies in different areas;
- Specific monograph studies concerning different occupations, economic activities and groups of interest in employment terms; and
- Monitoring studies of Occupational Training and Training Workshops and Craft Centres.

The second initiative is the National Institute of Qualifications Observatory (OBINCUAL). This observatory aims to provide information concerning the evolution of supply and demand for professions, occupations and profiles in the labour market.

OBINCUAL 's main activities are;

- The construction of an overarching network of existing observatories.
- The design and implementation of cooperation principles for the construction of an observatory network.
- Analysis of supply and demand for qualifications; this mainly involves research into the social and employment evolution of the required qualifications in collaboration with employer's associations and trade unions organizations on the basis of the supply and demand for professions, occupations and profiles in the labour and vocational training markets.
- Research into the relationship between the need for qualifications and training provision/ demand.
- Preparation of information on the supply/demand for and evolution of qualifications.

In addition to the national level, the autonomous communities of Spain have created labour market observation and monitoring systems. Namely;

- The Basque Vocational Training System Observatory;
- The Canary Islands Employment and Vocational Training Observatory;
- Qualifications Institute of Galicia Occupational Observatory.

Some attempts have been made to undertake quantitative projection, although in the absence of good data for building macroeconomic models these efforts have been less advanced than in many other countries. Garrido (1991), Garrido and Toharia (1991), Fina *et al* (2000), and Mane and Oliver-Alonso (2002) present increasingly sophisticated attempts to build up such a capability.

Garrido published some of the earliest projections, using essentially a manpower requirements type approach, although this was complemented by some more sophisticated analysis, especially of the supply side. Garrido and Toharia (1991) extended this to consider alternative scenarios. Fina *et al.*(2000), presented the most comprehensive set of projections in Spain to date. Mane and Oliver-Alonso (2002) emulate Fina *et al's* approach, building up a macroeconomic and then sectoral picture from various sources, before then drawing out implications for occupations. Their approach also includes extensions to cover replacement demands and implications for qualifications. They recognise that the lack of a full multi-sectoral model to provide the main economic scenario for the projections is a major weakness

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- Mane, F. and J. Oliver-Alonso (2002). *Projecting labour market developments in Spain through 2010: From massive unemployment to skill gaps and labour shortages?*

5.12 South Africa

Previous work in South Africa is covered in Annex D.

Internet site

South Africa: Human Sciences Research Council (HSRC)

Website: <http://www.hsrc.ac.za/about/mission/index.html>

5.13 Sweden

In Sweden, there are various different actors involved in labour market forecasting activity, including two major institutes, namely Statistics Sweden (SCB) and the National Labour Market Administration (AMV).

Starting with the first, Statistics Sweden, has carried out forecasts of supply and demand of qualification, by type of education, since the 1960s. For that purpose two models of forecasting are used. These are the Trends and Forecasts model and the Education and Demand for labour model. The former provides information about the demand for labour within different industry sectors whereas the latter calculates labour market flows, with the objective of comparing new supply with estimated recruitment need.

On the other hand, the National Labour Market Administration conducts both short-term and long-term forecasts. The Country Labour Boards and the local employment services carry out the short-term forecasts regularly. These are developed on the basis of data collected from questionnaires whereas the findings are published in a report series called 'where is the jobs'. The long-term forecasts, which are not regularly conducted, concern the demand for labour and especially the expected leavers into retirement.

Finally, forecasts are also conducted by a number of other actors such as the Swedish Business Development Agency, the Confederation of Swedish Enterprise and the National Agency for Education.

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Internet sites

<http://www.wz-berlin.de/ars/ab/qb/publikationen/publikationen.en.htm>

www.ams.se

www.hsv.se

www.scb.se

5.14 United Kingdom

The UK Context: Institutional and Legal Background

As noted in the introduction, the context within which work on anticipating skill needs takes place is of crucial import in shaping the form it takes. The situation in the UK is described here in some detail, not because this is regarded as “best practice” but more to illustrate such factors that may constrain what is done. There are a number of parallels with the situation in South Africa.

The 1980s saw significant changes in the UK’s approach to VET, marked by an emphasis on developing a national system for defining and certifying occupational

competencies, and based upon the use of qualifications policy and funding mechanisms as the main drivers for change. These changes were presented as a demand-led approach, driven by the needs of employers.

In recent years the UK has been moving towards a more decentralised system of government, with the establishment of devolved administrations in Scotland, Wales and Northern Ireland. The systems described in detail are mainly those of England.

The rationale for the recent changes was based upon the need for:

- Greater international competitiveness;
- Improved workforce performance through an emphasis on world-class standards;
- A rationalised, simplified and transparent system of qualifications to raise the esteem of vocational education;
- An emphasis on breaking down unnecessary barriers to transfer; and
- Progression, to support greater workforce flexibility and mobility.

It is important to recognise that there are significant differences between countries in the approaches to these issues (especially anticipation of future skill requirements). These differences reflect both different cultural, historical and institutional backgrounds, (which influence the general approach to such problems), as well as more specific differences related to data availability (which can constrain what is technically feasible). Generally speaking, the UK is relatively well served in the terms of the quality of local labour market data, although specialists will always be arguing the case for further improvements. However, some knowledge of the institutional framework within which such work has taken place is, very important for a proper understanding of the key issues. Further discussion about the role of the various actors is provided below.

Until the mid-1990s, responsibility for education and training in England was divided between two government departments: the Department for Education (formerly the Department of Education and Science); and the Employment Department (which absorbed the Training Agency, formerly the Manpower Services Commission in the

early 1990s). The two departments were merged in 1995 to create the Department for Education and Employment (DfEE), but most employment functions were transferred in 2001 to a new Department of Work and Pensions (DWP), leaving responsibility for education and training with a re-named Department for Education and Skills (DfES). Although the DfES is the lead department for education and training policy in England, Wales and Northern Ireland, responsibility for education in Wales and for education and training in Scotland and Northern Ireland are devolved, with both countries having their own education ministers and administrations.

In the late 1990s, the issue of anticipating skill needs in the UK was put under the spotlight by the National Skills Task Force (NSTF). This was a national body set up by the Secretary of State for Employment in 1998 to assess the UK's future skill needs. It had members from a broad range of companies and other bodies although it was not intended to be representative.

The DfES is the national government department responsible for labour market and related issues. It is responsible for collecting and analysing labour market data as well as carrying out various other evaluations of specific training programmes and policy initiatives.⁷ The DfES itself carries out some of this analysis itself but it has a long history of commissioning research on the labour market from external bodies such as IER. This includes, in particular, formal assessments of future skills needs.

With the introduction of the 70 (or so) Training and Enterprise Councils (TECs) in England and Wales and the 22 Local Enterprise Councils (LECs) in Scotland, after 1988 the responsibility for delivering government training programmes for young people and the unemployed passed to the local level. These organisations often conducted their own surveys of employer's labour and training needs in order to get a local perspective. Many also commissioned forecasts from organisations like the IER, Cambridge Econometrics, or Business Strategies Ltd. These organisations estimated local labour market trends on the basis of analysis of the Labour Force Survey and other national data sets. Various software packages were developed to exploit the data collected by DfEE.

⁷ The LFS, in common with other official surveys, is organised by the Office for National Statistics (ONS). The DfES also commissions its own surveys which are conducted by commercial survey companies.

In April 2001, the TECs in England were replaced by 47 Local Learning and Skills Councils (LLSCs). These are local arms of a national body set up to overview education and training provision post 16 (excluding University). This is the national Learning and Skills Council (LSC). Other arrangements apply in the newly devolved Wales, Scotland and Northern Ireland.

Originally, TECs and LECs were set up to pursue the interests of employers as far as education, training and skill provision was concerned. This had already begun to change in the late 1990s, with many TECs and LECs engaging in partnerships with other local organisations, including Chambers of Commerce as well as broadening their membership, scope and objectives.

The new LLSCs are arms of a national quasi-governmental body (Quango), with strong representation from employers but also from social partners and education and training providers. The national LSC is primarily focussed on England. The newly devolved administrations in Scotland, Wales and Northern Ireland are each developing their own institutions and structures for dealing with these matters. These include national bodies such as Future Skills Scotland.

Careers guidance companies have also recently been privatised (previously they were part of local government). They are now taking an active interest in anticipating future labour market conditions on behalf of the clients they advise. They also operate at a local level. Moreover, education and learning suppliers (colleges, universities, etc.) have been charged with the responsibility of ensuring that the courses they provide are relevant to future labour market needs.

There has also been change in the institutions charged with taking a responsibility for sectoral interests. Between 1964-1988 the UK had a system of sector-based industrial training boards (ITBs). These had statutory powers to raise a training levy on the companies defined as being 'in scope' to them, which was based on the number of employees in each company. The ITBs collected data on the occupational structure and the volume of training undertaken, since this was linked to the analysis of their administrative returns. One of their duties was to forecast future training needs and to ensure that sufficient training was available to meet these needs. ITBs

were set up for a wide range of sectors. Probably the most important of these were the Construction Industry Training Board (CITB) and the Engineering Industry Training Board (EITB). The ITBs were largely disbanded by the Conservative Government when the TECs were established in the late 1980s. However, a few of the larger ones such as the Construction Industry Training Board and SEMTA (which is responsible for Engineering) have survived (EITB was succeeded by the Engineering and Marine Training Authority (EMTA) and subsequently by SEMTA which has an additional remit to cover Science and Technology across all sectors). As a result, with these few exceptions, these valuable sources of data no longer exist. Both CITB and EITB (and, more recently, SEMTA) have actively pursued the development of tools to enable them to anticipate future skill needs. These are discussed in more detail below.

Numerous other sectoral bodies primarily set up to reflect employers' views, continue in existence. In the late 1990s, a new series of National Training Organisations (NTOs) were set up, operating at national level under the auspices of a National Council (NC). These included CITB, which was the NTO for construction and EMTA, which was responsible for engineering. Others covered areas such as Agriculture, Distribution, Rail Transport and Security Services. In total, there were well over 100 such bodies, most of which had a very specific sectoral remit.

From April 2002, these bodies were replaced by a series of new Sector Skills Councils (SSCs), operating under the auspices of a national Sector Skills Development Agency (SSDA). This new body is charged with providing a voice for employers about their skill and training needs at national level. The SSDA is responsible for organising the work of the SSCs. So far 5 "Trailblazer" SSCs have been set up and more are planned but nowhere near as many as the 100 plus NTOs that the NC had to cope with. Many of these new SSCs cut across traditional industry boundaries, reflecting the interests of their members, which often run along "supply chain" lines rather than within SIC boundaries.

Many employers' organisations, including the Confederation of British Industry (CBI) and also many of the sectoral organisations just described, conduct their own surveys of members, particularly of their perceptions of skill shortages. It is important to note, however, that there is often an element of social construction in claimed

levels of skill shortages. It is often the case that there are qualified workers who could be recruited but the employer is not willing to pay the appropriate wage. Some also conduct detailed assessments involving the use of quite sophisticated tools and methods. However, these remain the exceptions.

From 1986-97, the national accreditation agency specifically responsible for overseeing the development, implementation and quality assurance of NVQs throughout the labour market was the National Council for Vocational Qualifications (NCVQ). NCVQ was established in October 1986 following a government white paper in July 1986⁸. Although a public body, its legal basis was as a (non-profit making) “company limited by guarantee”, with a board appointed by the Secretary of State for Employment in consultation with those for Wales and Northern Ireland. In October 1997, under arrangements set out in the Education Act 1997⁹, NCVQ was wound up and its responsibilities were merged with those of the School Curriculum and Assessment Authority (SCAA)¹⁰ within a new statutory agency, the Qualifications and Curriculum Authority (QCA).

QCA’s statutory functions span both general and vocational education and include policy advice to the Secretary of State for Education and Employment and regulation of: 0-5 early years education; the 5-16 National Curriculum, statutory tests and publicly funded qualifications; all 16+ general and vocational qualifications (with the exception of university qualifications). QCA regulates external qualifications – those qualifications that are awarded by a body other than the institution in which they are offered. Accreditation by QCA indicates that a qualification has been approved for inclusion in the National Framework of Qualifications and, as such, has met exacting criteria. Statutory regulation is used to safeguard the public interest where other mechanisms – including awarding bodies’ own quality assurance arrangements – would not be sufficient to ensure proper maintenance of consistent standards across awarding bodies and over time. Although NCVQ’s role was confined initially to providing a national system of accreditation and facilitating the development of qualifications by industry, the establishment of QCA consolidated a trend (evident

⁸ *Working Together – Education and Training*. White Paper presented to Parliament by the Secretary of State for Employment and the Secretary of State for Education and Science, supported by the Secretaries of State for Scotland, Wales and Trade and Industry and the Paymaster General, HMSO July 1986

⁹ *Education Act 1997*: <http://www.hmso.gov.uk/acts/acts1997/1997044.htm>

¹⁰ SCAA was responsible for the school curriculum and national assessment within the general education system.

since the early 1990s) towards greater regulation of all aspects of qualifications design, quality assurance and also, to an increasing extent, delivery.

The Secretary of State for Education and Skills, acting on the advice of QCA, has responsibility for approving qualifications that may be offered within the public education system of England (under the provisions of the Education Act 1997 as amended by the Learning and Skills Act 2000¹¹). Similar provisions apply for Wales and Northern Ireland. These provisions apply to any qualification provision supported through public funds. All approved qualifications must be accredited by QCA within the NQF, and the DfES publishes the list of approved qualifications.

It should be noted that, at higher education level, the NQF overlaps with the framework of university qualifications regulated by the Quality Assurance Agency (QAA).

In 1999, following recommendations from the NSTF, a new series of projections were produced. These were carried out by the IER and published in a series of documents called *Projections of Occupations and Qualifications*. These results were made available via the Internet as well as more conventional means.¹²

The most recent UK national projections were commissioned by the Sector Skills Development Agency (SSDA) in partnership with the LSC. They are representing the broader interests of UK national government, as well as regional bodies. These latest projections include an unprecedented amount of detail, with consistent results for almost 70 industries down to the geographical level of 47 LLSC areas. These new projections were published in autumn of 2003 (Wilson *et al.* (2004).

As outlined below, there is therefore a variety of well-established mechanisms within the UK that have been used for analysing, identifying and forecasting labour market trends and skill needs. However, the reliability of estimates based on some of the national surveys (often adjusted to reflect regional conditions) may be questioned. Moreover, the fragmentation of the TEC/LEC system meant that the quality of

¹¹ *Learning and Skills Act 2000*: <http://www.hmsso.gov.uk/acts/acts2000/20000021.htm>

information often varied from one locality to another. With the setting up of the LSC and SSDA things have again become somewhat more centralised, with the aim of benefiting from economies of scale and use of common approaches.

However, a key question in the UK context is the extent to which this information is used effectively to plan training provision. The way in which funding has been distributed recently is on the basis of trainees achieving National Vocational Qualifications. The incentive has been for the TECs/LECs and now LSCs to support those that are cheapest in terms of unit costs. Although they have some scope for allocating their funding as they see fit, the dominant rationale is that of achieving completed National Vocational Qualifications (NVQs). Therefore the issue here is less the quality of data and analysis, but the fact that the system is very fragmented and that decision-making processes are not transparent.

Various actors have an interest in and play a crucial role in the anticipation of education and training needs. These include the following:

- The State/Government (at national and local level);
- Quasi governmental bodies (including regulatory & awarding institutions);
- Employers;
- Unions;
- Education & training providers;
- Individuals (who actually receive the education and training) & households.

Approaches to Anticipating Changing Skill Requirements in the UK

The Department for Education and Skills (DfES) (and its predecessor DfEE) is the UK government department responsible for labour market and related issues. It has for many years collected and analysed labour market data, based on a range of different sources (unemployment statistics, estimates of employment vacancies, pay and other key labour market indicators. These are collated and published in *Labour Market Trends* (formerly *The Employment Gazette*) and related publications. In

¹² See the DfES Skillsbase site at : <http://skillsbase.dfee.gov.uk/>

addition, the DfES is responsible for commissioning the Labour Force Survey (LFS) as well as various other evaluations of specific training programmes and policy initiatives.¹³

The DfES has carried out some of the analysis of such data, but it also commissions research on the labour market by other organisations. This work includes forecasts of future labour demand. Academics and commercial consultants have usually undertaken such work.

During the 1970s and 1980s the UK Government invested heavily in macroeconomic model development. This included major programme grants (via the Economic and Social Research Council and its predecessors) to various organisations for the development of general macroeconomic models, as well as the DfEE's own support for work specifically concerned with the labour market. This was substantially reduced in the 1980s and the 1990s due to cut backs in public expenditure.

Pioneering work in the labour market area was conducted for the Engineering Industry training Board (EITB). This was published in Wabe *et al* 1975). Building upon this foundation, the Institute for Employment Research (IER) has received support for developing and running a sophisticated econometric forecasting model of the national economy over many years. This resulted in the production by the IER of an annual *Review of the Economy and Employment*, which looked at future trends in the labour market.¹⁴ This was followed by the development of national models covering all sectors (Lindley, 1978 & 1980).

The National Employment Projections for the UK produced by the Institute for Employment Research (IER) were for many years the only source of detailed skill forecasts available in the UK. The Institute has been at the forefront of developments in this area since the late 1970s. These projections have been widely used and quoted, not just within the government department that sponsored the original work,

¹³ The LFS, in common with other official surveys, is organised by the Office for National Statistics (ONS). The DfES also commissions its own surveys which are conducted by commercial survey companies.

¹⁴ For a short period in the late 1990s this work was undertaken by a commercial consultancy, Business Strategies Ltd. (BSL).

but across a broad range of different users including TECs, Local Authorities and other bodies. They have therefore had considerable influence on opinion.

There are many different approaches to the anticipation of future skill needs in the UK. The main approaches have included both quantitative and qualitative methods. For many years the dominant approach has been quantitative modelling, based around the use of a multi-sectoral macroeconomic model. The prime focus was on projecting occupational employment levels. The most recent studies have laid increased emphasis on modelling replacement demands, and the need for qualifications and generic skills (see Wilson 2000 & 2001 and Wilson *et al* 2004).

The macroeconomic model used in most of the work carried out in the UK is described in detail in Barker and Peterson (1987) and Barker (1989). It has a Keynesian structure incorporating Leontieff input-output system and concentrates on the determination of changes in the real sector of the economy. The level of desegregation of commodities and industries is considerable, some 50 sectors being distinguished.

From an early stage the UK analyses also included a spatial dimension, with detailed analysis of the Standard Regions of the UK (which include Wales, Scotland and Northern Ireland as well as the 9 regions of England. However, the regional projections only covered sector and not occupation until the early 1990s. The introduction of occupational projections at regional level reflected the shift in emphasis towards local provision of education and training programmes. More recently this has led to the further narrowing of the geographical scope to a focus on the areas covered by local bodies responsible for training.

Improvements made to the main macroeconomic model (MDM) have been more substantial than those to the occupational sub-model in recent years, mainly because of the better quality of data available. A key problem has been the lack of detailed data on occupational structure within sectors. This has meant that most analysis has focused on quite broad occupational categories. This is in marked contrast to the USA, where the Bureau of Labour Statistics produces much more detailed forecasts.

This is possible because of its regular and comprehensive survey of establishments, which collects data on occupational employment on an annual basis.

The approach used in developing the set of sectoral labour demand equations currently used in the macroeconomic model implements the principles of co-integration. The procedures are also used in most of the other behavioural equations, but not in the analysis of occupational structure although some initial attempts to develop the analyses along these lines have now been conducted (Briscoe and Wilson (2003)).

The occupational employment projections conducted as part of the IER's assessment exercise are therefore based on a sub-model which takes as input the industrial projections produced by the macroeconomic model. It is a 'top-down' approach, the industrial employment projections being disaggregated into the 25 occupational categories for each industry.

Following the recommendations of the NSTF, a new programme of regular projections was set up. This delivered detailed analyses and data, which have been made widely available using conventional publications and the Internet (see Wilson 2000 & 2001).

Most recently the SSDA, acting as a representative of more general government interests (including in particular the LSC), commissioned a new round of projections from IER. These were published in the autumn of 2003 (Wilson *et al.* (2004)).

Local focus

As noted above, during the late 1980s and early 1990s, emphasis switched to a more local focus. In part this was supply driven. Improved access to local data, combined with ever increasing computing power, made development of local projections, linked to a national macroeconomic forecast, both easier to conduct and cheap. At the same time reforms in the system of education and training provision, with the introduction of TECs, led to a much greater interest in such projections.

Initially, such local projections were fairly rudimentary but rapid advances in computer technology and software, including the adoption of Microsoft Windows as a virtual standard, facilitated the development of a much more sophisticated approach. In a joint operation with Cambridge Econometrics (CE), the IER developed the first version of the Local Economy Forecasting Model in 1993 (for a detailed description see Wilson *et al* (1995)). LEFM provides a detailed desegregated database, covering all of the usual economic and labour market indicators for the locality. These are all linked by the same kinds of technical and behavioural linkages which one would expect to find in a national model, including a full input output matrix. Corresponding data are also provided within the package for the region within which the local area sits and for the whole of the UK. Links between the local area and the rest of the world are dealt with by modelling the flow of goods and services and of people across the local boundary.

LEFMs have been set up for over a hundred local areas since the model was first developed. The main clientele has been TECs. However, the package has also been supplied to Local Authorities, Careers Guidance Companies and a variety of other clients. It has been used to produce the economic and labour market forecasts, which lie at the heart of very many “Local Labour Market Assessments” and related reports. A version of LEFM has also been set up for countries outside the UK. Similar models have been developed in the USA by Treyz and Treyz (2001).

Use of Surveys and other instruments

In 1998 the Secretary of State for Employment set up a National Skills Task Force (NSTF) to advise him and the UK Government about the changing pattern of skill needs in the UK economy. The remit of the NSTF required it to “provide advice on the nature, extent and pattern” of skill needs and problems and “how these are likely to change in the future and what can be done to ease such problems”. DfEE commissioned a programme of research intended to examine “The Extent, Causes and Implications of Skill Deficiencies” (ECISD). The primary stimulus for the ECISD research was the requirement of the NSTF for reliable and comprehensive information on skill needs and skill deficiencies. An additional stimulus for the ECISD project was the need to provide information on the geographical pattern of skill needs and problems for the newly established Regional Development Agencies (RDAs).

Previously, DfEE's main historical source of skills information was the Skill Needs in Britain (SNIB) survey. A major limitation of SNIB was that this survey relied on relatively simple measures of employer perceptions and responses to questions asking if they have recruitment difficulties and skills problems. This presupposes that employers can fully assess and articulate their skill needs, but it is known from other research that this is not always the case. Also, SNIB's limited sample size meant it could only provide simple analyses of skills problems by region. It was not able, for example, to give a breakdown by industry in each region.

The ECISD research programme comprised four major elements: a series of case studies, intensive (face to face) and extensive (telephone) employer surveys and a detailed econometric analysis of the results from the two surveys.

The extensive survey was repeated in 2001 and on a much smaller scale in 2002 (just 4000 interviews). These surveys have been renamed as the Employers Skills Surveys (ESS). They have spawned a number of detailed reports and analyses. The results of the ECISD and ESS research have made a major contribution to the evidence base on skill deficiencies, their causes and consequences in the UK. In 2003 the LSC commissioned a further round of employer skills surveys at both national and local level, involving an overall sample of around 68,000 establishments in England.

Skills Dialogues, forums that brought together government, academics and researchers, education and training providers and representatives from both sides of industry were also introduced. These focused on skill needs in different sectors. They were based around the data collected and created from the quantitative projections, the large national skills surveys and many others sources. These events were used as a means of dissemination for this labour market information and intelligence as well as a mechanism for drawing in opinions and views of a more qualitative nature from interested parties.

Internet sites

<http://skillsbase.dfes.gov.uk/>

<http://www2.warwick.ac.uk/fac/soc/ier/>

<http://www.ssda.org.uk/>

<http://www.ssda.org.uk/pdfs/wf-national.pdf>(Working Futures)

5.15 USA

The organization responsible for labour market projections in the USA is the **Bureau of Labour Statistics** (BLS). The BLS has been examining the future job prospects for over 50 years. Initially, the aim was to help World War 2 veterans return to the world of work. It is now used by a wide variety of organisations and individuals interested in changing employment structure and the implications for skill needs.

Since its beginnings, the methodology used has steadily evolved. In particular, the simple descriptive material about numbers employed by occupation has grown to a model based approach, which develops projections of the macro economy, the labour force, industry output and employment, and occupational employment growth.

The BLS also produces projections of labour supply Fullerton (2003). These focus upon aggregate labour market participation rates by gender, age and ethnic group but they do not have an occupational dimension. The projections are based on the Census Bureau of Population numbers (based on historical trends). Labour force numbers and labour market participation rates are projected for 136 age, sex and race or ethnicity groups.

Regarding labour demand, the long-term view of the US economy, on which the occupational projections are founded, is based on a scenario of a full-employment economy, in which labour markets clear. The growth in the macro economy is translated into the levels of final demand for the output of each industry, including levels of intermediate inputs that are purchased by each industry to produce the output. A detailed multi-sectoral macroeconomic model is used to project indicators of economic activity and growth including the annual rate of growth of productivity as well as general labour market indicators such as the unemployment rate. The model develops projections of four different categories of expenditures, namely, personal consumption, investment, government and foreign trade. These projections provide the key input to the industry output and employment projections, which in turn form the basis for the occupational projections. Occupational structure within industries is analysed using trend extrapolative methods. The above detailed data are coupled with expert assessment of likely trends to produce employment projections.

Based upon this the number of jobs needed to support the level of economic growth in each sector are estimated. In addition, job openings (replacement demands) are calculated by projecting both net employment growth and net employment needs.

The projections concern the primary, secondary and tertiary sectors of production and are broken down in 11 main occupational groups and 725 detailed occupations.

The projections of the industry flows of inputs and outputs make use of the 2002 North American Industrial Classification System (NAICS). The occupational staffing patterns needed are projected by using data from the Occupational Employment Survey (OES). Detailed occupational employment information is available from the OES for each of the NAICS-based industries.

The latest work of the BLS is reported in *Employment outlook 2002-12*, in the *Monthly Labor Review*, (Horrigan (2004) and Hecker (2004)).

Considerable efforts have been placed on measuring generic skills in the USA in recent years, including the development of the O*NET system. This is probably the most sophisticated (and complicated) system for measuring and assessing such developments anywhere in the world. Barnow (2002) provides a useful summary. At present this system does not include any forward-looking element.

There are a large number of more localized projects involved in labour market projections in the USA. For example: the ***Occupational Forecasting Conference: State of Louisiana US***. The occupational Forecasting Conference was created by statute to develop official information on long term job growth and demand. The aim of the conference is to develop and approve occupational forecasts, discuss and approve methodology and examine issues relevant to occupational forecasting in the State of Louisiana.

For more information go to: <http://www.laworkforce.net/ofc/index.htm>

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Internet site

USA: Bureau of Labor Statistics

<http://stats.bls.gov/>

<http://www.onetcenter.org/data> Structure.htm

<http://www.laworkforce.net/ofc/index.htm>

6. OTHER GENERAL STUDIES

6.1 Anticipation of skill needs (ATheNet)

The AThENet Project

AThENet (Anticipation of Training Needs for a European Network) was a project organised within the context of the European Union's Leonardo da Vinci programme and involving a partnership of organisations from Italy, France, Germany, Spain and the United Kingdom. The project's aim was to build a network for the permanent exchange of information. The aim was to provide the participating countries with a comprehensive comparative understanding and common conceptual overview of:

- Labour market demand;
- The identification of future skill needs;
- Their utilisation in active labour market policies; and
- The identification of training and qualification needs at a European level.

The UK was represented in the project by the Institute for Employment Research (IER), University of Warwick, and the Qualifications and Curriculum Authority (QCA).

6.2 Early identification of skill needs in Europe:

6.2.1 European Conference, Berlin, 30/31 May 2002:

The German Ministry of Education and Research, and Cedefop organized the conference. The aim of the conference was to explore the question of how future oriented skills and competencies can be identified early and how education and training should be shaped to meet future trends. Particularly, were discussed a wide range of activities and approaches on how to identify new skills emerging at national, sectoral and regional level.

Spanish contribution: Jordi Planas addressed the development of forecasting tools and the development of a 'skills observatory' that will collect and evaluate skill needs.

Italian contribution: Mario Gatti presented an Italian survey network for new skills.

6.2.2 European Conference, Thessaloniki, Greece, 22/23 May 2003.

This was the second expert meeting for identification of skills in Europe. The conference took place in Thessalonica in the occasion of the Greek Presidency.

Note: The proceedings of the conferences have been published by CEDEFOP (English version) and BMBF (German version). For more info go to:

http://www.cedefop.eu.int/mt_conference/mt_conf4en.html

6.3 Other Country Websites

Denmark: Danish Institute of Border region Studies (?)

Website: http://www.ifg.dk/en/about_us.html

New Zealand: Institute of Economic Research

Website: <http://www.nzier.org.nz>

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Separate annexes and reports connected to the present document

Main Report:

Wilson, R. A., I. Woolard and D. Lee (2004). *Developing a National Skills Forecasting Tool for South Africa*. IER/HSRC/Department of Labour.

Separate Annexes:

- A: The Rationale for Conducting National Occupational Projections and how they are Typically Undertaken.
- B: Labour Market Projections: A Review of International Best Practice
- C: A Critical Review of Previous Work on Employment Projections in South Africa.
- D: Data Sources for National Skills Forecasting in South Africa: Strengths and Weaknesses - A Critical Assessment of Data Availability.