For discussion on 20 June 2000

Legislative Council Panel on Manpower
Consultancy on the Best Overseas Manpower Forecasting Practice

Purpose

This paper informs Members of the objective, scope, findings and recommendations of the Consultancy on Best Overseas Manpower Forecasting Practice.

Background

2. With its open economy, Hong Kong's labour market is affected by a variety of socio-economic factors, both internal and external. In order to maintain the competitiveness and vitality of Hong Kong's economy, the Administration needs to:

(a) ensure the availability of adequate manpower with appropriate quality and skills; and
(b) provide appropriate training, not only for those persons about to enter the labour market but also for those who are already in employment but wish to upgrade their skills and those who wish to take on jobs in new economic sectors, e.g. because of declining prospects in their own industries.

3. In view of these needs, the Education and Manpower Bureau (EMB) has commissioned a consultancy whose objective is to conduct a study on overseas manpower forecasting practices and their applicability to Hong Kong.

Scope of Study

4. In undertaking this study, the consultant was required to conduct in-depth qualitative analysis of the current manpower forecasting practices adopted by **nine** overseas economies at a similar or more advanced level of economic development. The purpose is to identify the potential learning points which can be used to improve Hong Kong's existing manpower forecasting model. These economies include Australia, Belgium, Japan, the Netherlands, Singapore, UK, USA, London and New York.

5. In addition, the consultant is required to carry out the following tasks:

- a review of existing manpower forecasting approaches in Hong Kong;
- an analysis of the requirements of potential end users of manpower forecasting in Hong Kong; and
- the development of options for introducing an updated manpower forecasting model in Hong Kong.

6. The study which was commissioned by the EMB in May 1999 has now been substantially completed. The consultant is now finalizing the report to take into account the feedback from relevant government bureaux and departments. It is expected that the final report will be ready before the end of June. For Members' reference, an advance copy of the report's Executive Summary is attached.

Existing Manpower Forecasting Approaches in Hong Kong

7. At present, the Administration adopts the projection approach for forecasting manpower requirements. This approach consists of a series of projections and is conducted once every 5 years, following the completion of the census or by-census which provide the latest information about our population. One of the main purposes of manpower forecasting is to assist the Administration in meeting future education and training needs for our community. The projections comprise several components, viz the population projections, labour force projections and employment projections by industry sector, occupation and qualification. Output from one component of the projections (e.g. population) form part of the input for another (e.g. labour force). Whilst supplementary information and expert views are also taken into consideration in finalising projection, the results are largely based on past behaviour and historical pattern of the component.

8. The Vocational Training Council (VTC) also carries out manpower forecasts for 22 specific industries based on manpower survey carried out once every two years. The projection approach is also adopted in the forecasts. However, views of employers as found out in the manpower survey and those of experts are incorporated to enhance the manpower forecasting results.

Manpower Forecasting Requirements

9. In the course of the study, the consultant undertook a series of consultation both within and outside the Administration to identify the requirements of potential end users of manpower forecasts in Hong Kong. At a result, 18 requirements have been drawn up as determining criteria for best practice. Some of the more important requirements include capability to respond to changing economic conditions and trends; to predict aggregate labour force, employment and unemployment; to forecast future skills needs and skill availability; to assist in planning of education and training, etc.

International Case Studies

10. The international research shows that manpower forecasting practices can broadly be grouped into four types. They are:

(a) those based upon an econometric approach, which produce GDP forecasts as well as breakdowns of employment and/ or output by sector and used in Australia, Netherlands, UK, US including London and New York;

(b) those based upon projections in which forecasts are based on past behaviour and used in Australia, Netherlands, UK and US;

(c) those based on surveys that focus on predicting short term employment vacancies and used in Belgium; and

(d) those based on expert opinions and used in Japan, UK and US.

A brief summary of the results of overseas case studies is presented at the Annex to the Executive Summary.

11. Based on the international case studies, the consultant has concluded that no one economy or city's approach can meet all the requirements for manpower forecasting referred to para. 9 above. Furthermore, there is no "off the shelf" model which can be purchased and then "filled" with Hong Kong data. While overseas approaches can be used as guides to improve forecasts for Hong Kong, manpower forecasting model for an economy must be tailored made to meet its requirements. Therefore no one model would suffice. Table 1 in the

Executive Summary presents an analysis of the capability of the various approaches adopted by case study economies in meeting the desirable manpower forecasting requirements.

Options for updating Hong Kong's Manpower Forecasting Model

12. The consultant has recommended a series of options for enhancing the manpower forecasting model in Hong Kong. They are summarised below:

Option 1 Refocus the various Vocational Training Council (VTC) manpower surveys to short term survey interpretation (one to two years) only and broaden the scope to cover the whole economy

Option 2 Develop a *detailed* econometric model of the Hong Kong economy to produce medium term (up to 5 years) manpower forecasts

Option 3 Develop a *simplified* econometric long term (ten years) model by incorporating structural factors reflecting key directions of economic development such as increasing labour productivity and the impact of technological change.

Option 4 Improve the existing techniques for forecasting occupations by incorporating data from various surveys

Option 5 Improve the current techniques for forecasting qualification required by revising the present link between labour demand and supply

Option 6 Improve the analysis of skill needs by incorporating questions on specific future skill needs into the VTC manpower surveys

Option 7 Incorporate expert review of forecasts

Option 8 Enhance the current statistical projection model by incorporating "soft data" to adjust present and future employment trends, improvement techniques to enhance forecasting of occupations, qualifications and skills and expert reviews as recommended in options 4 to 7

Option 9 Introduce data warehousing by collecting relevant labour market data to form a database

Option 10 Improve publicity and dissemination of results

13. Details of these options and estimated resources required for individual options are given in para 13 and Table 2 of the Executive Summary respectively.

Implementation

14. The consultant has suggested two approaches for implementing the various options. One approach is to pursue Option 1 (refocusing VTC survey) and Option 2 (development of medium term econometric model) first and then to develop Option 3 (long term econometric model) gradually as part of the process. Another alternative and modest approach is to adopt Option 8 (enhancement of existing statistical projection model) in the place of Option 2 and 3. This second approach represents a package that could be implemented within a shorter time frame and the Administration already has the required skills to do this. Irrespective of the approach that would be adopted, the consultant advises that it should be implemented together with Option 7 (expert review) and Option 10 (publicity and dissemination) so that the forecasting model would benefit from them.

15. With regard to Option 4 (occupations), 5 (qualifications) and 6 (skill requirements), they can be implemented as and when appropriate since they are independent components of the forecasting process. However, for Option 6 (skill requirements), the consultant advises that it would probably be too ambitious to incorporate the improvement in the near future since such survey techniques are not yet fully developed.

16. With regard to Option 9 (data warehousing), although it is attractive, the process is expensive and time-consuming. The consultant therefore advises that it better be addressed after the manpower forecasting framework has been established.

17. The consultant further points out that if the econometric model (i.e. Options 2 and 3) is to be developed, it may be necessary for the Administration to resort to assistance from outside such as an organisation with previous experience of preparing econometric models for manpower forecasting and as soon as the Administration has acquired the necessary expertise, operation of the model can be carried out in-house.

The Way Forward

18. Following completion of the consultancy study, the next step will be for those concerned government bureaux and departments (such as EMB, Financial Services Bureau, Census & Statistics Department, Labour Department, Vocational Training Council) to study the recommendations of the consultancy carefully and to decide the best approach to update Hong Kong's manpower forecasting practice, having regard to the effectiveness and merits of the various options and the resources input requirements and financial implications. In the meantime, we will incorporate the enhancement such as collection of soft data through establishment surveys, special household surveys, expert review, etc. to improve our existing statistical projection model.

Education and Manpower Bureau
Government Secretariat
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EXECUTIVE SUMMARY

Introduction

1 This report summarises the findings of a consultancy study commissioned by the Education and Manpower Bureau (EMB) of the Hong Kong SAR Government entitled *"Consultancy on the Best Overseas Manpower Forecasting Practice."*

2 The study was commissioned in response to greater demands for information on labour market issues by businesses, career seekers and the Government in Hong Kong. In particular, EMB was keen to identify and review:

- existing manpower forecasting approaches in Hong Kong;
- the approach to manpower forecasting adopted in a selection of leading overseas economies;
- the perceived effectiveness of these approaches; and
- the scope for drawing from best practice overseas to improve the approach to manpower forecasting for Hong Kong.

3 Hong Kong has in fact prepared manpower forecasts for many years. These forecasts have been prepared by Government and the Vocational Training Council (VTC) to meet specific needs. EMB's forecasts, for example, have been tailored towards planning educational provision for the whole economy, whilst VTC have focused on short term forecasts of employment requirements for specified industries in order to plan and revise the provision of courses. In addition, sectoral forecasts have been prepared by Government. For example, Business and Services Promotion Unit sponsored research on the future manpower and training needs of the information technology sector.

4 The approach adopted by EMB, which also includes inputs from Census and Statistics Department (C&SD) is based on statistical projections. The basic approach is that labour force forecasts are produced using projections of population and labour force participation (based on extrapolation of past trends). Assumptions about future unemployment rates are then used to generate forecasts of employment, and these are broken down into occupations, again on the basis of past trends. From these, forecasts of future qualifications requirements are produced. The work that has been done to date has been diligent and thorough. However, there are some basic limitations to the approach - in particular the lack of modelling of underlying behavioural relationships in the economy (employment levels and inflation for example). This means that the approach is less responsive to external shocks, such as the 1997 Asian economic crisis, as models used in many overseas countries.

5 The VTC work focuses on 22 industry groups for which it provides training. The forecasts are produced on a rolling two year programme and are survey based. Employer reporting of current and anticipated employment and qualification levels forms the basis for projections a year ahead. In addition, time series methods are used to generate forecasts for up to four years ahead (i.e. a trend is identified and extrapolated forward).

The Need for Improved Labour Market Forecasts

6 This study has reviewed the past manpower forecasts and found them to be prepared in a thorough and diligent manner. However, a number of points have emerged from the review:

- Because the forecasts have been prepared with the specific objectives in mind, there is an understandable lack of integration between the forecasts, which tend to focus on a relatively narrow set of labour market features.
- The approaches adopted are often not best practice, partly because the systems were designed a number of years ago when the latest methodologies were not available and, in some cases, because certain data now collected were not available.
- The nature of Hong Kong's economy is changing. In particular there is an increasing focus on highly skilled occupations, where specific skills and qualifications are increasingly required. Such occupations clearly need more careful manpower planning than low skilled occupations, and this trend will be exacerbated by Government initiatives such as the proposed Cyberport.

7 Changing patterns of migration may also place new pressures on the labour market. It is therefore important that Government is able to assess the implications of immigration and emigration on unemployment, wage rates and the adequacy of the workforce in Hong Kong. The major migration patterns in Hong Kong, including migration from the Mainland of China and the outflow of Hong Kong residents to countries such as Canada and Australia, are often determined by factors that are not economic in nature (for example, Mainland and Hong Kong policies towards migration into the SAR by Mainland residents). A flexible approach that enables the Administration to assume differing migration scenarios, and then, model possible impacts of those scenarios, would therefore be useful(1).

8 There is therefore a need for an enhanced system of labour market forecasts which, by taking account of specific local circumstances and drawing on best overseas practice, can develop a customised model to suit the needs of potential end users of forecasts in Hong Kong.

(1) Overseas approaches may not be appropriate in the SAR. For example, migration between countries is often based on past trends. Similarly, methods of addressing internal migration flows, which examine factors such as job vacancies and house prices, are unlikely to be of direct relevance to the SAR given the small geographical size and good transport linkages of Hong Kong.

Requirements for Future Manpower Forecasting

9 Before embarking upon overseas research into manpower forecasting models, a detailed assessment was made of the requirements of potential end users of manpower forecasts in Hong Kong. This was undertaken through a series of consultation meetings with a range of organisations within and outside the Government. Analysis of the recommendations highlighted eighteen suggested requirements for future manpower forecasting. These suggestions related to both the scope and content of the forecasts, and the manner in which they were prepared and disseminated. The suggestions are summarised below.

SUGGESTED REQUIREMENTS FOR MANPOWER FORECASTING
1. Able to respond to changing economic conditions and trends
2. Predict aggregate labour force, employment and unemployment
3. Provide sectoral breakdown of employment
4. Forecast future skills needs
5. Forecast future skills availability
6. Assist in planning of education and training
7. Assist businesses and individuals to plan for the future
8. Provision of short, medium and long term forecasts
9. Assist with importation of skilled and unskilled labour
10. Predict vacancies
11. Able to take account of Mainland economy
Forecasting Process Issues
12. Provide assumptions and framework for other forecasts
13. Tap private sector expertise
14. Capable of providing frequent updates
15. Easier to manage data and undertake model runs
16. Innovative / proactive dissemination of results
17. Moderate demands on parties providing data
18. Ability to provide a range of forecasts

10 This is an ambitious set of requirements for any labour market forecasting system. In developing a system to meet these needs, no one model would suffice. Therefore, developing a manpower forecasting model should be viewed as designing and integrating a framework of activities (some of which are already undertaken to a high standard in Hong Kong). In addition, although overseas approaches can be used as guides to improve forecasts for Hong Kong, it is important to recognise that manpower forecasting models must be tailor-made for an economy. There is no "off the shelf" model which can be purchased and then "filled" with Hong Kong data.

International Case Studies

11 In order to investigate best practice overseas, a number of case studies were undertaken. The case studies were selected using a number of selection criteria, including:

- existing knowledge about the sophistication, uniqueness of approach or level of innovation in aspects of labour market forecasting;
- a desire to select a broad group of comparator economies, with a particular focus on developed countries; and
- a desire to select countries whose economic or demographic circumstances are similar (as far as is possible) to Hong Kong, such as being a city economy, being affected by the Asian economic crisis or experience of large migration flows.

12 Based on the above criteria, the following case studies were selected:

- Australia
- Belgium
- Japan
- the Netherlands
- Singapore
- The United Kingdom
- London
- The United States
- New York
- International Labour Organisation(1)

13 The types of manpower forecasting practices revealed by the international research can broadly be grouped into four types:

- Those based upon an econometric approach, which produce GDP forecasts as well as breakdowns of employment and/or output by sector . These approaches are used in Australia, the Netherlands and the UK, and some of the work done in London, the US and New York. Singapore is now working with an Australian company to develop a detailed econometric model.
- Those based upon projections, in which forecasts are based on past behaviour. This approach is also used in some of the work done in Australia, the Netherlands, the UK and the US. The Hong Kong Government's current practice and the Hong Kong VTC's forecasts are using this approach.
- Those based upon surveys, with a focus on predicting short term employment vacancies. Belgium is an exponent of this approach, but the focus is on vacancies rather than employment. The Hong Kong VTC's own forecasts of employment are similar in nature to this approach.
- Those based on expert opinions, in which economic forecasts and survey data are reviewed by a panel of specialists to predict future trends. This is the approach adopted in Japan, and also for some of the work undertaken in London. The US also uses this approach to interpret and revise the outputs of econometric forecasts, and the UK is moving in this direction too.

A brief summary of the results of the overseas case studies is presented as an *Annex* to this Executive Summary.

(1) ILO guidelines were found to concern coverage and process rather than techniques, and were very much aimed at developing countries.

14 No one country or city's approach meets all of the requirements for manpower forecasting that have been suggested for Hong Kong. However, all of the requirements are addressed to some extent by at least one of the case studies. A table that shows which overseas countries have practices that would meet the various suggested requirements for Hong Kong is presented as *Table 1* of this Executive Summary. However, it should be noted that many of the suggested requirements for Hong Kong are ambitious, and would draw upon the latest international approaches if adopted.

Options for Developing Hong Kong's Manpower Forecasting Framework

15 In order to highlight the possible components of an enhanced manpower forecasting model, a series of options have been developed. One of these options (Option 8 - enhancement of the existing statistical projection model) represents a package of measures that could be implemented in a reasonably short time frame and make maximum use of existing expertise within the Administration. The other options would each improve upon one or more aspects of current practice and, if implemented as a package, would function as a coherent whole. However, not all of the options need to be implemented at once - each option has merits when considered on its own. Indeed, a phased implementation approach would be more manageable. In recognition of this,

16 Ten options have been proposed. The options relate to both the methodology and scope of manpower forecasts, and also to process and management issues. They can be summarised as:

- *Option 1*. **Refocus VTC surveys onto short term survey interpretation (one to two years), but broaden the scope to cover the whole economy**. In addition to a more comprehensive coverage of the economy, it would also be advantageous to invest in the more rapid release of the results, and to present key findings in a summary format that would be easily accessible by end users, such as businesses and non-VTC education and training institutions. This option would mean that VTC no longer attempted to produce medium term forecasts through the use of time-series techniques, but instead highlighted trends in the near-future, based upon survey results. Data collected by VTC would, however, be of use in preparing the medium term forecasts described in Option 2, below.

- *Option 2*. **Develop a detailed econometric model of the Hong Kong economy, to produce medium term manpower forecasts**. Such a model establishes functional relationships between employment, productivity and other economic variables. It generates forecasts for output and productivity by sector which match total spending in the economy as measured by GDP. The forecasts for output and productivity are then used to generate forecasts of employment. This approach is adopted in the majority of the case studies. Econometric models offer the greatest

potential for the timely production of forecasts, and for the running of "what if" test scenarios, such as assessing the impacts of major development projects or migration flows on employment and economic output. Models also have the advantage of being based upon economic theory, which ensures that outputs are consistent with what is known about the fundamental workings of an economy.

- ***Option 3*. Develop a long term model and incorporate structural factors.** The model would consider factors such as increasing labour productivity and the impact of technological change, in generating long term (ten year plus) projections. This option would require the development of a simplified version of the type of econometric model described above in Option 2. Having a separate, simplified model would allow relationships that are known to hold true over the long term (such as increasing labour productivity) to be specified, and the implications for the future demand of labour to be explored. This overcomes a weakness with short term models, which are dominated by demand side factors (relating to the demand for goods and services) in the short to medium term. These demand side factors can be volatile in the short term, and they also become less important in the long term, when it is the economy's structural development which influences its performance.

- ***Option 4*. Improvements to the forecasting techniques for occupations**. This option entails making use of existing, regularly updated survey data to enhance the understanding of changes in employment by occupation. This approach would supplement data derived from the census and by-census with data from the Business Establishment Survey and the General Household Survey. VTC survey data may also be of use. The present approach in Hong Kong for generating projections of employment by occupation is only to use occupations data from the census and by-census. That practice means that very few observations are available, and some of these are outdated and potentially misleading. The problems with the more up to date information sources are that they do not provide the wealth of occupational detail contained in the census and by-census data, and that they are derived from samples which inevitably limits their accuracy. However, there are techniques available for taking account of systematic differences between differing data sets. These include adjusting the coarser data to fit with detailed census and by-census data before introducing it to the model by comparing results in years when both surveys are conducted (1), the use of expert judgement or the use of moving averages rather than simple raw data.

- ***Option 5*. Improvements to the forecasting techniques for qualifications**. Qualifications forecasts are primarily of value for providing indications of any mismatches between employers' demand for people with differing levels of qualifications and the number who are

(1) For example if the General Household Survey results for a particular data series are 10 percent lower than the census results in a given year, General Household Survey reulsts are uprated accordingly in that year and each subsequent year.

likely to be available. The existence of mismatches then signify possible needs to alter educational, training or retraining plans, migration policies or policies for the alleviation of unemployment. It is important that the demand and supply parts of the methodologies be kept distinct, so that mismatches can be seen clearly. The current Hong Kong practice takes the projected supply of labour (based on net migration, demographics and a participation rate assumption), assumes a projection for unemployment, and thus derives an employment forecast as the difference between the two figures. This is treated as a forecast for the demand for labour, and may give misleading messages.

- ***Option 6*. Improvements to the analysis of skills needs**. This would entail amendments to VTC's survey design with questions on specific future skills needs. Both generic (team work, numeracy, language skills) and specific skills would need to be covered by the surveys. This area of work is relatively new, even amongst countries that are recognised as leaders in the field of manpower forecasting, so a certain amount of experimentation might be required. It is therefore recommended that it be considered once the major elements of a new forecasting system are in place.

- ***Option 7*. Expert review of forecasts**. This would apply the VTC's approach of employing sector experts to comment on forecasts, to the medium term economy-wide forecasts. The aim would be to provide opinion on trends, and early warning of major shifts in business or economic conditions. Genuine, senior experts from business and academia would be required for this to be effective.

- ***Option 8*. Enhancement of existing statistical projection model**. This option would be less ambitious than developing a new econometric model of the Hong Kong economy, but could still offer many improvements on current practice. The option would comprise collecting "soft data" on present and future trends through interviews with senior Government, business and academic specialists, making greater use of the results of the VTC's surveys, more frequent revision of manpower forecasts (perhaps biannually) and incorporating the results of forecasts produced by Options 4 (improvements to the forecasting techniques for occupations), 5 (improvements to the forecasting of qualifications), 6 (improvements to the analysis of skills needs) and 7 (expert review of forecasts).

- ***Option 9*. Improved data warehousing**. Under this option, forecast data and other labour market data would be collected together to form a database that would provide a comprehensive picture of the Hong Kong economy. This is resource intensive and therefore may not be a priority at present.

- ***Option 10*. Improved publicity and dissemination of results**. Past forecasts have generally been produced for internal Government

consumption. To enable businesses, school leavers and other job seekers to take advantage of the work rapidly released, user friendly bulletins should be prepared for different target groups, making use of the print media, the internet and existing business and careers newsletters.

The resource implications presented by each of these options are summarised in *Table 2* of this Executive Summary.

Recommendations

17 Whilst a range of options have been identified, it is not recommended that all be implemented at once. This would be difficult in resource terms, and would probably detract from the ability to introduce the most important revisions in the short term.

18 In order to prioritise the most important and effective improvements it is recommended that Option 1 (refocus VTC surveys) and 2 (detailed econometric model) are pursued first. We would suggest that the development of the model (Option 2) should also incorporate structural factors into the long-term projections (Option 3) as part of the process. This would provide a variety of end users in Hong Kong with improved short term occupations data and a macro-economic model for better medium and long term forecasts. Publicity and dissemination should also be improved to coincide with the release of the first medium term projections produced under the new framework (Option 10). Furthermore, all options would benefit from an expert review of the forecasts (Option 7).

19 An alternative, and more modest approach, would be to adopt the course outlined in Option 8 (enhancement of the existing statistical projection model). Option 8 would mean that, in the short term at least, a macro-economic model (Option 2) would not be developed. This would limit the potential outputs of the forecasts, but could be up and running in a shorter time frame.

20 As a part of improved forecasting, maximum use should be made of the most up to date data, and not just census and by-census results which are only available on a five yearly cycle. This would enable forecasts to provide substantially improved data for occupations. VTC should also include questions on skills (as opposed to qualifications) in future VTC surveys (Option 6), although it would probably be over-ambitious to incorporate this in the near future, particularly as such survey techniques are in their infancy elsewhere. Finally, data warehousing (Option 9) is an attractive option, but is an expensive and time consuming process and is therefore better addressed after the revised manpower forecasting framework has been developed and tested over the course of a year or two.

21 Finally, there are alternative ways of implementing the recommended options. The key issue concerns the development of a macro-economic model (Option 2). Should Government wish to adopt Option 2 and the related recommendations, it is realistic to assume that outside assistance

will be required. This should be provided by an organisation with previous experience of preparing econometric models for the purposes of manpower forecasting. As the overseas Government departments reviewed in this report all contract out model development and operation to consultancies or specialist university research centres, this would be in line with practice elsewhere. In time, however, it would be possible for the Administration to train an individual to operate the model, and retain the operation in-house. However, many of the other options such as Option 1(refocus VTC surveys) and Option 8 (enhancement of the existing statistical projection model) would be able to be developed by the Administration itself, as staff already have the required skills to do this.

Table 1 Summary of Desirable Requirements of Manpower Forecasting

Scope and Content Issues								
1. Able to respond to changing economic conditions & trends	◆	✓	◆	◆	◆	◆	◆	◆
2. Predict aggregate labour force, employment & unemployment	✓	✘	◆	✓	✓	✓	✓	✓
3. Provide sectoral breakdown of employment	✓	✘	◆	✓	✓	✓	✓	✓
4. Forecast future skills needs	◆	✘	✘	◆	◆	◆	◆	✘
5. Forecast future skills availability	◆	◆	✘	◆	◆	✘	✘	✘
6. Assist in planning of education and training	✓	✓	✘	✓	✓	✓	✓	◆
7. Assist businesses and individuals to plan for future	✓	◆	✘	✓	✓	◆	✓	◆
8. Provision of short, medium and long term forecasts	✓	✘	◆	◆	✓	✓	✓	✓
9. Assist with importation of skilled and unskilled labour	◆	◆	◆	◆	✓	✓	◆	◆
10. Predict vacancies	✘	✓	◆	✓	✓	✓	✓	✘
11. Able to take account of Mainland economy	◆	✘	◆	✓	✓	✓	◆	◆
Forecasting Process Issues								
12. Provide assumptions and framework for other forecasts	✓	✘	✘	✓	✓	✓	✓	✘
13. Tap private sector expertise	✓	✘	✘	◆	✘	✓	✓	◆
14. Capable of providing frequent updates	◆	✓	✘	✓	✓	✓	✓	✓
15. Easier to manage data and undertake model runs	✘	✘	✘	✓	✓	◆	✓	✓
16. Innovative/proactive dissemination of results	✓	✘	✘	◆	✘	✘	✓	✘
17. Moderate demands on parties proving data	✓	◆	✓	✓	✓	✓	✓	✓
18. Ability to provide a range of forecasts	✓	✘	✘	✓	◆	◆	◆	◆

Source: ERM analysis of research interviews

Key: "✓" = yes, "✘" = no, "◆" = partial

Aus = Australia, Bel = Belgium, JPN = Japan, NL = Netherlands, UK = United Kingdom, Lon = London, USA = United States, NY = New York

Table 2 Summary of Resourcing Issues(in Days)

Option Number		Lead Forecaster	Senior Economist	Junior Economist	Total
Years of relevant experience required		(15 +)	(5 - 10)	(0 - 5)	
1	*Refocus VTC surveys*	2 - 4	1 - 2	1 - 2	4 - 8
2	*Develop medium term econometric model*				
	- data cleaning and input	2.5 - 5	2.5 - 5	25 - 50	30 - 60
	- model development	25 - 50	5 - 10	5 - 10	35 - 70
	- model operation	7.5 - 15	5 - 10	60 - 120	70 - 140
3	*Incorporate structural factors into long term projections*				
		Included in Option 2 above.			
4	*Improve forecasting of occupations*				
	- model development	5 - 10	1 - 2	5 - 10	11 - 22
	- model operation	5 - 10	1 - 2	5 - 10	11 - 22
5	*Improve forecasting of qualifications*				
		Included in Option 2 above.			
6	*Improve analysis of skills needs*				
	- survey development	2 - 4	4 - 8	2 - 4	8 - 16
	- survey analysis	2 - 4	2 - 4	2 - 4	6 - 12
7	*Expert review of forecasts*				
		Not costed at this stage.			
8	*Enhancement of existing statistical projection model*				
		Not costed at this stage.			
9	*Improved data warehousing*				
		Not costed at this stage.			
10	*Publicity and dissemination*				
	- set-up	5 - 10	5 - 10	-	10 - 20
	- ongoing	2.5 - 5	5 - 10	5 - 10	12.5 - 25
Project management		5 - 10	10 - 20	5 - 10	20 - 40
Total for all options		59 - 118	42 - 84	115 - 230	217.5 - 435

Notes :

Estimates are based on contracting Options 2, 3 4, 5 and 10 to a non-government organisation, whilst providing strategic advice to organisations such as VTC for other aspects of the work.

Lower-bound time estimate assumes required expertise, extensive experience of preparing manpower forecasting models and basic familiarity with data sources and the nature of Hong Kong's economy.

Upper-bound estimate assumes adequate skills for manpower forecasting but limited or no practical experience. Also assumes basic familiarity with data sources and the nature of Hong Kong's economy.

Annex

Summary of Overseas Case Studies of Manpower Forecasting

1 SUMMARY OF OVERSEAS CASE STUDIES OF MANPOWER FORECASTING

1.1 INTRODUCTION

In order to review the best overseas manpower forecasting practice, a number of case studies were undertaken in a broad range of countries plus the guidelines issued by the International Labour Organisation (ILO). These were:

• Australia	• The United Kingdom
• Belgium	• London
• Japan	• The United States
• the Netherlands	• New York
• Singapore	• ILO guidelines

The case studies were selected to provide a representative sample covering comparable economies, comparable cities and relevant regional competitors. A considerable amount of information was collected in the course of the case studies and detailed reports for each country have been presented in *Annex B* of the main report. However, a very brief summary of the results for each country case study are presented below. The aim of the summary is to briefly explain the approach adopted in each case study. The guidelines produced by the ILO have not been reported on as it transpired that they have been designed with developing countries in mind. They are therefore much less sophisticated than current practice in Hong Kong, and hence are of little use when attempting to improve upon existing forecasts in the SAR.

1.2 SUMMARY OF COUNTRY CASE STUDIES

1.2.1 Australia

Rationale for Selection

Australia was selected as a case study due to its open economy, high standards of governance and relatively high levels of migration. In addition, the Australian economy is service dominated, and heavily reliant upon the Asia Pacific region for exports.

Approach to Manpower Forecasting

Australia has a sophisticated approach to manpower forecasting. The models used in Australia are based on an econometric approach with two, the MONASH model and the MURPHY model, being the principal sources of manpower forecasts.

The MONASH model is funded by the Department of Employment, Education, Training and Youth Affairs (DEETYA) and produced by the Centre of Policy Studies at Monash University. The MONASH model itself is a detailed macro-economic model of the Australian economy that is used as the basis of the manpower forecasting process. A set of occupational and industry projections are produced every four years for DEETYA by the modelling team and cover employment (120 categories) and industry (112 categories).

The MURPHY model is the other leading macro-economic model in use in Australia. The model is developed and operated by a private sector consultancy (Econtech) and outputs are sold through subscription to private companies and federal and state governments. The MURPHY model produces employment forecast on a much more regular basis. For example, as part of its macro-economic forecasting service, Econtech produces employment estimates by industry (18 categories) and by state / territory (8) on a quarterly basis, and national forecast 8 times a year. In addition, twice a year Econtech produces national employment forecasts by detailed industry groups (158).

The Australian Bureau of Statistics also produces labour market forecasts detailing the size of the workforce broken down by gender and eight age groups. These are produced on a five yearly basis in order to take advantage of up to date census data. Other activities that are of relevance to manpower forecasting in Australia include:

- The TRYM model, used exclusively by commonwealth and state / territory treasury departments. TRYM is a macro-economic model of the Australian economy, and produces some high level outputs relating to the labour market, most notably total labour supply.

- The Department of Workplace Relations and Small Business Leading Indicator of employment. This indicator tracks six data series which, historically, have provided good indications of future (cyclical) employment patterns. The indicator tracks vehicle registrations, dwelling approvals, job advertisements, skilled vacancies, ABS reported vacancies and GDP.

Evaluation of Past Performance

Formal evaluations of past performance are not undertaken for either the MURPHY or MONASH models. However, past results have been found to be a good indicator of labour market trends. In addition, it is worth noting that:

- DEETYA has commissioned Monash University to provide manpower forecasts three times now, so is presumably satisfied with performance; and

- Econtech is a commercial organisation, and the continuing demand for its services would suggest satisfaction with model outputs by clients.

1.2.2 Belgium

Rationale for Selection

Belgium has a highly developed, free enterprise economy, with substantial cross border movements of goods and people. The country, with few raw materials on its own, requires substantial export revenues and is unusually reliant on trade performance for its economic well-being. Belgium is also dominated to an unusual extent by larger neighbouring economies (principally France and Germany).

Approach to Manpower Forecasting

Belgium is an interesting case study as the local approach to manpower forecasting focuses on short term vacancies, rather than medium to long term projections based on econometric models. The principal objective is to survey vacancies in order to highlight skills shortages and adjust training and educational provision accordingly. The surveys identify 20 "bottleneck" occupations and this data is then used to refocus training.

Longer term projections, such as those found for the majority of the case studies, do not seem to be produced at all on any regular basis. There is an econometric model of the Belgium economy that is operated by central Government. However, there appears to be very little use of this made for manpower forecasting. The only labour market data that are published relate to employment and unemployment, which are broken down by industry but not occupation.

Although this approach can certainly provide useful short-term data, one problem is that the majority of employment vacancies are not reported to state employment services (this is true across the industrialised world). There is therefore a question mark over whether the range of vacancies recorded, and the subsequent policy responses that are developed, are adequate. Additionally, and from a broader perspective, the approach offers no insights into important longer term issues such as future occupational profiles and skills needs.

Evaluation of Past Performance

There appears to have been no evaluation of past forecasting performance in Belgium.

1.2.3 Japan

Rationale for Selection

Japan has the leading economy within the Asia Pacific region, with highly developed finance, technology and manufacturing sectors. Although often

considered to have a stable population structure, Japan actually experiences high levels of out-migration. In terms of Government, Japan has a history of economic planning and intervention, although the ownership of business and industry has always been very much with private sector.

Approach to Manpower Forecasting

Government manpower forecasts in Japan are the responsibility of the Ministry of Labour (MoL). Manpower forecasting activity actually appears to be quite limited. However, the MoL does undertake two types of forecasts:

- short-term forecasts, produced annually and for Government consumption only; and
- long-term forecasts, typically produced every five to six years.

Short-term forecasts are based primarily on survey results but also include views from the MoL's expert "think tank" group. Their principal purpose is to help the Economic Planning Agency prepare annual economic forecasts for the economy as a whole.

The longer term forecasts are based primarily on expert opinion, with account taken of short-term survey results and statistical forecasts based on past trends. The current forecasts cover the period 1999 to 2010

In addition, an annual summary of the state of the labour market is prepared by the MoL and, whilst this has no explicit forecasting element, current trends are highlighted and discussed. There is also a monthly survey of labour market demand but, once again, there is no forecasting element to this.

Evaluation of past Performance

No evaluations of the past performance of manpower forecasting have been undertaken in Japan. However, if the MoL considers that longer term forecast have failed to adequately anticipate changes in the labour market it can prepare new forecasts before the scheduled time. The current plan (1999 to 2010) actually superceded the 1995 to 2001 plan, indicating that problems were found with the 1995 to 2001 forecasts.

1.2.4 The Netherlands

Rationale for Selection

The Netherlands has a highly developed, affluent economy. Like Hong Kong, services dominate the economy, but port and other transport functions are also important and the Netherlands is something of a hub in northern Europe, particularly for shipping, but also for air and land transport. Economic relations with larger neighbours, and in particular Germany, are also crucial to economic prospects. With regard to

Government, the Netherlands has a strong reputation for well run and innovative public services, including in the field of manpower planning.

Approach to Manpower Forecasting

As noted above, the Dutch are widely recognised as being at the leading edge of manpower forecasting practice, and the government devotes considerable resources to its forecasts. The Dutch approach is based on an econometric model which is supported by short-term survey research. The manpower forecasting is undertaken by a specialist group at the University of Limburg, although this centre uses central government macro-economic and employment level forecasts as inputs.

Particular strengths of the Dutch approach include a strong focus on flows of workers into and out of the work force by skills, as opposed to just forecasting the total numbers of workers by skill. This can be very important as it takes account of not just overall growth, but also turnover and replacements needs as workers leave the workforce. Forecasts are made for 93 occupational classes and 79 types of education, covering the full spectrum of the labour market (earlier forecasts covered 49 types of education but it was perceived that significant differences between the technical, commercial and administrative types of education and so these are now desegregated).

The Dutch approach also takes account of mismatches between the labour market and educational provision and qualifications. The unemployed represent "visible" discrepancies, but work is also undertaken to identify the extent to which workers are over-educated, leading to calculations of under-utilisation by type of education. This is obviously of great benefit when seeking to plan for training and educational needs.

The Dutch also undertake well regarded surveys of vacancies on a quarterly basis, in order to provide information on short-term skills needs, and also have a good system for disseminating results to business and other end-users.

The outcome is that the Dutch approach is thorough and takes account of every influence on the structure of the labour market. This is in a part a reflection of the desire of Government to have forecasts that are of use to all participants in the labour market, including employers and job seekers.

Evaluation of Past Performance

The consultants have identified no formal evaluation of past performance. However, as reported above, the Dutch approach is highly regarded internationally. It should be noted that resources are deployed to constantly improve upon current practice. For example, work to improve the monitoring of school leavers is currently being planned, as is work on matching the supply of and demand for university graduates.

1.2.5 *Singapore*

Rationale for Selection

Singapore was selected due to its obvious similarities to Hong Kong in terms of economic structure, regional role and territorial extent. Like Hong Kong, Singapore also has a reputation as a well administered, free market economy.

Manpower Forecasting in Singapore

Manpower forecasts in Singapore are the responsibility of the Ministry of Manpower and the Council on Professional and Technical Education. However, these organisations elected not to participate in this study and reported that both the methodologies used and outputs are kept confidential and not distributed outside Government.

However, we have learnt that the Singapore government has recently commissioned a MURPHY style econometric model from Econtech, developers and operators of the MURPHY model in Australia. The purpose of this model is to replace the existing approach to forecasting which, as far as we were able to ascertain, does not use macro models. The old practice in Singapore appears to have some similarities with current practice in Hong Kong, in that it makes use of survey data rather than macro models, is aimed at the short- to medium-term and is intended primarily for planning for educational and training provision.

Evaluation of Past Performance

Based on the fact that Singapore is investing in a new approach to manpower forecasting, it can safely be assumed that it was no longer satisfied with the outputs of the old approach. Clearly, no data are available on the performance of the new approach at this stage, although reference to the Australian case study (and also the Dutch, UK and US ones which are also based on an econometric model) should provide a general indication of future reliability.

1.2.6 *United Kingdom (National Forecasts)*

Rationale for Selection

The UK has a well developed economy, with an unusually high reliance on service industries, and in particular financial and business services. There is currently a great deal of interest in skills forecasting and the knowledge economy in the UK, and this has led to some interesting and innovative work which is likely to be of interest in Hong Kong.

Approach to Manpower Forecasting

The UK has a well developed approach to manpower forecasting, with work being undertaken by consultancies and academic research groups on behalf

of Government, which sponsors the research. The approach is based on detailed macro-economic models of the UK economy, supplemented by a range of census and survey data.

Forecasts are produced on a regional basis, although the Department for Education and Employment only sponsors the national forecasts. Forecasts are produced annually and cover a ten year time frame, although they could be extended further. The econometric model is dominated by demand factors in the short term, but long forecasts that take account of long term economic factors such as productivity growth are also used to influence shorter term projections.

The forecasts cover employment by occupation and industry for men and women, employees and the self employed, and part time and full time. As a part of the same project, the occupational forecasts are also used to generate forecasts for the demand for highly qualified people, divided up into sub-degree level qualifications, first degrees and higher degrees, and into subject groups. The supply of qualified people is also forecast so that mismatches can be identified and addressed.

Annual surveys of skills needs are also undertaken by the Department for Education and Employment (DfEE). Although there is no central forecasting of skills needs in the central government work, regional governments have commissioned their own research in this area. For example, in 1998 the Welsh Office funded forecasts of future skills needs in Wales. These forecasts used data on the relative importance of skills by occupation and on the expected changes in the importance of these skills, and then used sector output forecasts to generate forecasts of skills demand by sector.

New work that is now being undertaken includes a greatly enhanced annual survey of skills. One focus of this work is to gain more insights into how skills requirements are likely to change as companies increasingly focus on higher value added activities. The objective is to understand how differing development paths for the UK economy might affect skills requirements.

In addition to cross-sectoral work, the UK also has a number of industry specific training organisations who have done interesting work on skills surveys and forecasts. One of the most advance is the Land Based Training Organisation (Lantra), which covers activities such as agriculture, forestry, fisheries, horticulture, landscaping and machinery production, operation and maintenance. Lantra has undertaken a major data warehousing exercise, and the type of model it has developed could be of interest to Hong Kong should data warehousing be pursued in the future.

Evaluation of Past Performance

A review of the accuracy of employment forecasts has been undertaken by the University of Warwick (who used to carry out the forecasts under contract to the DfEE prior to the contract being awarded to a consultancy,

Business Strategies). The findings were that the forecasts proved accurate at predicting the nature of key changes in the labour market, even if the magnitude of those changes was not always predicted precisely. In particular, the Warwick team pointed out that sometimes it is beneficial for forecasts to be wrong in the sense that undesirable outcomes can, with adequate warning, sometimes be averted through effective intervention by Government. The Warwick team concluded that occupational forecasts do provide useful information. The identification of broad trends does allow policy makers to formulate responses, which in themselves tend to be rather broad (for example, to promote information technology rather than a particular sector within IT), but which never the less can prove effective if well designed.

1.2.7 London

Rationale for Selection

London was selected as a case study due to obvious similarities with Hong Kong in terms of economic structure and role, namely high reliance on financial and business services, with a leading role in its region.

Approach to Manpower Forecasting

Until very recently, London's government has been fragmented and poorly co-ordinated, with responsibility for a range of functions (including manpower forecasting) divided between central government, local boroughs, quangoes and publicly sponsored research groups. However, interesting work of relevance to Hong Kong has been undertaken in the field of skills forecasting, much of which has been sponsored by the Corporation of the City of London (the local authority for the financial district) and Training and Enterprise Councils (TECs, which are focused on specific districts within in the capital). TECs are also supporters of the London Skills Forecasting Unit (LFSU), which sponsors a range of work of interest to groups across the capital. The Unit has also proved successful at packaging existing information into more accessible sources.

Skills forecasts by the LSFU have focused on requirements for eight sectors, namely the financial services, business services, the public sector, hotels and catering, retail, transport, manufacturing and construction (which is having to respond to rapid changes in the skills that are required for modern office developments). Other organisations have examined sectors such as the creative industries (which are typically high value added). On-going research is looking at the impact of new technology, and on organisational restructuring (such as management "delayering"). The approach adopted is therefore quite sector specific, and is very much focused upon the needs of employers.

A final group undertaking labour market research is the London Labour Market Forecasting Consortium, which is headed by a consultancy, Business Strategies. This work is seeking to understand patterns of commuting and

migration into London. Factors that are being examined include house prices, the impact of competition from Frankfurt, the capacity of transport networks and the impact of major development projects such as the Channel Tunnel.

Evaluation of Past Performance

Many of the initiatives in London have been established relatively recently in response to a growing need for London specific data. Some of the work is also innovative, and it is too early to comment on the performance at this stage.

1.2.8 United States (National Forecasts)

Rationale for Selection

The US was selected for two main reasons. Firstly, the US has the most advanced economy in the world, and has to address issues such as skills development for leading industries at an earlier stage than other countries. Secondly, the US devotes considerable resources to manpower forecasting and is recognised as a leader in the filed of disseminating results.

Approach to Manpower Forecasting

The USA has a well developed approach to manpower forecasting. A specialist agency, the Bureau of Labor Market Statistics (BLS), produces employment forecast by industry, occupation and state which are all prepared using a detailed macro-economic model of the US economy. The BLS projections for employment are based upon a productivity calculations and a matrix showing occupational employment patterns. This matrix includes 260 detailed industries and 513 detailed occupations.

These forecasts are used by a wide range of local government, research and consultancy organisations, who adapt and tailor the results in order to produce more detailed sector, occupational or state level analyses. Also, BLS forecasts are widely used by private businesses, careers services and consultancies, as well as federal and state governments. The US is particularly well known for very active dissemination of forecasts and, for example, publishes extensive data on its web site.

Evaluation of Past Performance

The BLS is rare in that is has undertaken a detailed evaluation of past forecasts and reports that, overall, their projections provided a good indication of future labour market trends. Although fully accurate predictions are, in practice, impossible due to the inherent uncertainties surrounding many of the key variables, BLS reported that they were able to predict key trends in the majority of cases. Where projections turned out to be inaccurate by a wide margin, it was generally due to unforeseen circumstances such as the rapid advance in information technologies, or the drastic cut back in US defence spending (which accounts for a major

proportion of research and development activity and manufacturing output).

1.2.9 *New York*

Rationale for Selection

New York was selected as a case study for much the same reason as London, namely that it is a major financial and business services centre, and is pre-eminent in its region in these activities.

Approach to Manpower Forecasting

The New York State Department of Labor (DoL) is primarily concerned with generating projections by occupational groups for New York. The DoL interacts with a number of other organisations when preparing its forecasts, including the Department of Budget (DoB, which forecasts employment and output by sector for tax revenue estimation purposes) and the joint state / Federal Occupational Employment Survey.

DoB forecasts make use of sectoral employment and output forecast from a private consulting firm, DRI McGraw Hill. The DRI model is an econometric model of the economy of the US as a whole (run under a contract from the Federal government), and is regarded as highly complex. It is the model on which the BLS national forecasts are based. Upon receiving the DRI model outputs, adjustments are made by the DoB to increase the level of detail for key factors in New York, such as migration and age structure (which in New York are obviously very different to the national averages), and to remove irrelevant factors (such as agricultural production or industries not represented in the city). The result is that the 1,000 or so equations of the national model are simplified to just 150 for the local New York model.

Evaluation of Past Performance

Because the New York economy is much less diverse than that of the US as a whole, there have been problems associated with failing to predict economic shocks, such as booms and busts in the financial industry. However, this is more of a problem with the underlying macro-model than the manpower forecasting element, and is an issue with every macro-economic model. Because of this, expert opinion or actual knowledge of future changes (such as the run down of major manufacturing facilities) are used to interpret results.

1.3 *SUMMARY OF SCOPE OF OVERSEAS MANPOWER FORECASTS*

A simple summary of the coverage of manpower forecasts overseas has been presented earlier as *Table 1* of the Executive Summary. The table

summarised a checklist of requirements suggested for Hong Kong against overseas practice.

With regard to the Singapore case study, as noted above the consultants have been unable to undertake a detailed examination of current or future practices. This is because the responsible organisations in Singapore chose not to participate in the study. However, as Singapore is reportedly developing a MURPHY style macro-economic model, the match of capabilities against suggested requirements for Hong Kong can be assumed to be reasonably similar to the match for the Australian case study.