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Economic Cooperation**

A Report on the APEC Region Labour Market:

Evidence of skills shortages and general trends in employment and the value of better labour market information systems

APEC Human Resources Development Working Group

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Acronyms

ABAC	APEC Business Advisory Council
ANZSCO	Australian and New Zealand Standard Classification of Occupations
APEC	Asia Pacific Economic Cooperation
AQFC	Australian Qualifications Framework Council
ASEAN	Association of South East Asian Nations
BID	Inter-American Development Bank
BLS	Bureau of Labour Statistics
CEPAL	Economic Conference for Latin America
CSCO	China Standard Classification of Occupations
ESDC	Employment and Social Development Canada
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GTS Survey	Global Talent Shortage Survey
ICT	Information and Communication Technologies
ILO	International Labour Office
ISCO	International Standard Classification of Occupations
ISIC	International Standard Industrial Classification
KEIS	Korean Employment Information Service
KSCO	Korean Standard Classification of occupations
LFS	Labour Force Survey
MASCO	Malaysia Standard Classification of Occupations
MQF	Malaysian Qualifications Framework
NAICS	North American Industry Classification System
NIE	Newly Industrialised Economies
NOC	National Occupation Classification
NQF	National Qualifications Framework
NZQF	New Zealand Qualifications Framework

OECD	Organisation for Economic Cooperation and Development
OEI	Organization of Iberian American States
OEM	Original Equipment Manufacture
PNG	Papua New Guinea
PSCO	Philippines Standard Occupational Classification
SOC	Standard Occupational Classification
SSOC	Singapore Standard Occupational Classification
STEM	Science, Technology Engineering and Mathematics
TSCO	Thailand Standard Classification of occupations
TVET	Technical Vocational Education and Training
VET	Vocational Education and Training
WTO	World Trade Organization

Executive Summary

Identifying and measuring labour market shortages and imbalances

Labour shortages or mismatches are a major factor inhibiting investment and economic development across APEC. In order to establish an appropriate regional response to the supply of skilled labour it is necessary to adopt a comprehensive strategy for monitoring labour force demand and supply across the APEC region. This report contributes towards that task and Chapter 1 outlines this reasoning.

Chapter 2 presents a review of the recent literature on labour market shortages and imbalances. It provides a definition of skill imbalance, an analysis of causes and a review of mechanisms for identifying and measuring skill imbalances. While methods and indicators for identifying skill imbalances all have practical uses they need to be applied with due recognition of their limitations, especially with respect to forecasting. Quantitative data and modelling are essential elements of effective monitoring, but need to be supplemented with qualitative assessments drawn from employers and other labour market participants in order to understand the complex economic and social forces that drive labour shortages and oversupply.

A major task for APEC is to develop a region-wide measure of skills imbalances that can be easily applied across all 21 member economies.

Assessing skill imbalances across APEC economies

Most APEC economies have occupation and industry classification systems that are generally aligned with the ILO's International Standard Classification of Occupations (ISCO) and International Standard Industrial Classification of all Economic Activities (ISIC). Data, however, are only partially comparable, as there is insufficient detail and infrequent periods of data collection. Notwithstanding these limitations and drawing on a range of sources, Chapter 3 provides a summary of skill imbalances for each APEC economy. The 21 APEC economies are discussed in Chapter 3 and they are clustered into five groups: (1) industrialised economies; (2) newly industrialised economies; (3) economies emerging from a largely agricultural base; (4) Spanish speaking economies; and (5) other APEC economies.

Most of the industrialised economies have clearly identified areas of skills shortages and seek to overcome the problem through a combination of training and migration programs. All have well developed technical and professional training systems but there is evidence of time-lags between identification of shortages and training institution and migration responses. Most have shortages of: specialised engineers in specific sectors; specialised health care occupations and skilled tradespersons in specific sub-sectors.

The newly industrialised economies have undergone rapid economic growth and industrial transition. They have promoted training institutions and firm-based industrial training programs through policies for high priority sectors. As a consequence this group of economies tends to have shortages among occupations in service sectors rather than in technical qualifications and skills.

The third group of economies are experiencing a transition from a predominantly agricultural base toward manufacturing. The large Chinese economy stands out among this group. However, for all economies in this group there tends to be a mismatch between the capacity and output of training institutions and the rapidly growing demands of their manufacturing sectors. There is considerable difference between the expectations of skills required by domestic firms and those of foreign transnationals and much evidence of shortages in the service sectors, particularly for senior management and finance executives.

The three Latin American APEC economies reflect a diverse range of skill demands. While agriculture is still an important sector in these economies, mining, manufacturing and services create growing demands for skills. There are important differences in the demand for skills across rural and urban areas in these economies, high informal labour market participation and high levels of geographic mobility.

The other three economies, Brunei Darussalam, Papua New Guinea and Russia, generally have not identified their skills imbalances statistically and tend to meet specific shortages by bringing in overseas workers.

It can be seen that economies with a history of permanent immigration have well developed mechanisms for monitoring 'skills in demand'. Many other economies, although not seeking permanent immigrants, tend to rely on employer demand for bringing in foreign workers that they need. They may maintain lists of occupations in demand that potential workers can consult in order to fulfil visa or work permit requirements. All economies rely on their training systems but these may or may not be meeting identified demands. Where training is not well aligned with employers' expectations and needs, a wasteful over-supply of certain skills may exist.

Barriers to identifying and monitoring labour market imbalances

There are no on-going multilateral data collections (eg ILO or OECD) that are adequate for monitoring labour market imbalances across APEC. Non-official labour market studies are not reliable as they are set up for their own specific purposes. The Manpower Group, Michael Page and HAYS all provide information that is valuable but does not cover all sectors or economies and is intended mainly to be used for recruitment or training providers.

APEC member economies maintain labour market information systems but they are often not sufficient to meet the objectives of the *APEC Skills Mapping Project*. They may not collect appropriate information to identify skills shortages or surpluses. Moreover, there may be potential inaccuracies due to time-lag, quality of data or uneven sources of data. Despite their importance to employers, 'soft skills' are rarely covered in collections. At the moment, there is no facility for sharing data across APEC. Accordingly, APEC economy statistics are unlikely to provide region-wide data in the short-term.

The absence of a regional national qualifications framework (RQF) is a further impediment to the identification of skill imbalances and to the compilation of reliable data on the stocks and flows of qualifications. Without a consistent qualifications framework, enforced by the relevant regulatory authorities within each economy, educational and training institutions may be granting and thus comparing qualifications that vary greatly in terms of their scope and quality.

Such a framework is valuable for making comparisons between occupations that are described as being in shortage or surplus in one economy with those in other economies in the region. An alternative approach of ensuring transparency in qualifications' scope and quality is viable but involves the complexity of comparing qualifications across 21 economies and often many states or provinces within economies.

A strategy for better monitoring skills shortages and surpluses

Improving labour market monitoring systems

In order to establish a regional labour market monitoring system, data collected by each economy must be readily understood to be reliable and transparent across APEC. That is, there needs to be transparency in how data are collected and what they mean. A strategy for dealing with such a system is detailed in Chapter 5 and identifies both short and long-term actions.

Recommendation 1

It is recommended that economies assess their needs and priorities in relation to the development of labour market monitoring systems. Then short and long-term strategies can be implemented to improve their systems.

Developing short-term strategies

In order for data to be usefully shared across economies, alignment with the ILO's occupation and industry classification systems is essential. There is a need to develop a concordance between economies to enable the production of comparable datasets. Online publication of these data would be one way to ensure accessibility for all member economies and other stakeholders.

Recommendation 2

Each economy should work toward establishing and publishing a concordance between its occupation and industry classification systems and ILO's International Standard Classification of Occupations and International Standard Classification of Industries.

Recommendation 3

Each economy should take steps to publish their concordance online in internationally consistent formats, either individually or in cooperation with multilateral bodies, in a way that can best inform stakeholders.

Recommendation 4

The APEC Human Resource Development Working Group (HRDWG) should promote the value of knowing skills imbalances within their economies. Some of the major reasons are:

- **the value to the economy of having an adequate and appropriate supply of human skills;**
- **the ability to better target training programs, incentives, etc to develop the skills that suit current and emerging labour market needs;**
- **the importance of not just technical skills but also of many personal ('soft') skills to employers, especially multinational corporations;**
- **the better tailoring of migration programs—both immigration and emigration.**

The *APEC Skills Mapping Project* has put in place a *Skills Mapping Tool*. This could serve as a valuable tool for monitoring labour forces, and particularly regional skills shortages and surpluses. However, because in some cases the data are not currently collected, or there is

a shortage of labour market analysts and/or the cost of collecting the underlying data is prohibitive, it may be some time before the Mapping Tool is effectively 'populated'.

Recommendation 5

Economies be encouraged to populate the *APEC Skills Mapping Tool* based on their existing data.

The above recommendations are relatively short-term options though the amount of data requested to fully populate the *APEC Skills Mapping Tool* is extensive

Longer-term strategies

Not having an RQF is a significant barrier to monitoring skills shortages. For example an electrician's qualification in one economy may have a different set of competencies and standards compared to an 'identical' occupation in another economy. So it is important to know that when occupational imbalances are being monitored, like is being compared with like.

Nine APEC economies have so far developed either comprehensive or partial National Qualifications Frameworks (NQFs). Progress on the 2009 HRDWG report's recommendation for developing a voluntary Regional Qualifications Framework (RQF) needs to be reviewed, as this is a crucial step for enabling intra-APEC and international comparisons.

Recommendation 6

The APEC HRDWG (2009) recommendation for a voluntary regional qualifications framework should be revisited and promoted.

Given the short term data limitations in many economies, there is a need to collect quite specific and comparable data on skills imbalances across all economies from a representative cross-section of employers. The existence of data collected by the Manpower Group and other agencies, such as HAYS, illustrate how such data might be collected, though their data are not necessarily appropriate for APEC purposes.

One option is for APEC to promote a common online survey of employers (private and public) in order to collect information about current and projected skills shortage or over-supply in each economy. This could be undertaken in collaboration with local chambers of commerce.

Recommendation 7

APEC should promote a voluntary common survey of private and public sector employers seeking responses on:

- a. Hard-to-fill skilled occupational vacancies, equivalent of an ISIC 3-digit level classification – and the nature of those skills;**
- b. Occupations where there is a high ratio of applicants to jobs available;**
- c. Current mechanisms for filling occupations in shortage (i.e. on-the-job training, foreign recruitment, etc); and**
- d. Anticipated occupations in demand over next five years.**

An important theme to emerge from this study is that qualifications are not necessarily a clear indicator of skill acquisition, especially when international comparisons are made, and that skill acquisition occurs in many locations including on-the-job. There is also evidence that many employers are having difficulty filling jobs because of applicants' limited 'soft skills'.

These include personal attributes such as creativity, flexibility, capacity to work in groups, or communication skills.

International standardised tests have been developed of 'foundation' skills of literacy, numeracy and problem-solving. These tests of critical foundation skills have been developed for both school students and adults. Such tests serve as important descriptive tools to enable economies to compare the level and distribution of foundation skills within their populations, but also as diagnostic tools to remedy fundamental problems that may be revealed. Without an adequate level and distribution of foundation skills in their population, economies are constrained in their development progress.

Recommendation 8

The APEC HRDWG should propose that all member economies participate in international standardised literacy and numeracy tests.

Finally, there is a need for collaborative action between economies to share information about their labour force monitoring systems and their analytical techniques for analysing labour force data. An important first step is to ensure labour force data are readily available across economies. A second step will be to share analyses of these data.

Recommendation 9

Each economy provides a brief English language labour market analysis for their economy and makes this accessible online for all APEC economies.

Skills Mapping Across APEC Economies

1. Introduction

Although APEC regional GDP growth moderated through 2011 and 2012 the region is still expected to outperform world growth through 2013 (APEC Policy Support Unit, 2012). There is a considerable body of evidence, from all points of the globe, showing that access to skilled human resources is, and will continue to be for some time, the major barrier to international competitiveness (Canadian Chamber of Commerce, 2013; Davies *et al*, 2012). The APEC economies present no exception to these observations. Recent reports from China have noted that the so called 'talent challenge' is likely to continue and even intensify (Xu, 2013) while in Canada, firms indicated that skill shortages were the number one barrier to competitiveness in 2013 (Canadian Chamber of Commerce, 2013). The economic and technological diversity across the region means that some economies will recover from the Global Financial Crisis (GFC) faster than others and that consequent demands for skilled human resources will vary. Over the next decade, in some economies, there is likely to be intensified demand for workers in some occupations in some industry sectors. In others there may be areas of oversupply.

The task of identifying and managing labour market imbalances across the APEC region as a whole is the focus of this APEC Project: the *APEC Skills Mapping Project*, steered by the HRDWG. The overall objectives of the project are to:

- develop a more coherent picture of employment projections, skills shortages and the supply of skills across the region; and
- provide better information for decision-making by businesses, governments, education and training providers on the availability and shortage of skills at a regional level (APEC, 2013).

The first part of this project has been to establish an initial collection of data from member economies concerning employment and unemployment by occupation and industry, education of the workforce, skills shortages or surpluses and employment projections by occupations and industry. The APEC Business Advisory Council (ABAC) has also identified a need to be able to collect and monitor data on skills supply and demand in order to better target vocational training and identify those areas where there is a need to import skilled labour (ABAC, 2012).

This report represents the second part of the *Skills Mapping Project*, which is essentially an analysis of the available evidence on skill shortages and labour market imbalances across the APEC region. Chapter 2 of the report provides some definitional clarity and presents a summary of the literature concerning the measurement of labour market shortages and imbalances and the causes and effects. This chapter also discusses the various analytical approaches and their strengths and weaknesses that have been used in order to provide labour market information concerning these issues.

Chapter 3 reviews the current and emerging labour market imbalances across all 21 of the APEC economies. This regional overview draws on individual economy data collections as well as some broader international analyses that include some of the APEC economies. The economies are grouped into five categories: (1) industrialised economies, (2) newly industrialised economies (NIEs), (3) economies emerging from a large agricultural base, (4) Spanish-speaking economies, and (5) others. APEC normally categorises economies under three headings, (1) industrialised and (2) emerging and developing (with various sub-

categories) (APEC Policy Support Unit, 2012). It was felt that these categories were too broad for this analysis.

Drawing on the initial chapters in this report, Chapter 4 discusses the factors that limit the ability to identify labour market imbalances across the region. Five major factors are identified. Finally, Chapter 5 presents a series of recommendations for developing a regional labour market monitoring system. Recommendations are directed toward both short and long-term strategic action.

2. Labour Market Shortages and Imbalances: Definitions, Causes and Effects

This chapter defines skills imbalances, which encompass both various types of skill shortage and over-supply, as well as providing a brief discussion of the causes of such imbalances. The differing types and causes of skills imbalance at different stages of national economic development are also briefly discussed.

2.1 Definition of Skill Imbalance

Skill imbalances are the effect of 'market disequilibrium' that result in either over or under supply of skills relative to a given level of demand (Mavromaras, 2013: vi). Skill imbalances impose large costs on individuals, firms and economies. For individuals, over or under investment in skills can reduce wages and limit career prospects. For firms, an inadequate supply of skills can constrain the level and quality of output, increase wage costs, reduce competitiveness and constrain investment. At an economy wide level, skill shortages reduce attractiveness to foreign direct investment (a crucial source of capital and technology) and constrain output and income growth. A large skill excess, especially in developing economies, is wasteful of scarce human talent and educational capital.

Two main types of skill undersupply or skill shortage are recognised in the literature. First, an inadequate number of persons in specified occupations and/or with specified qualifications. The distinction is made between occupations and qualifications since not all occupations require formal qualifications for entry and different levels of qualifications permit entry to identical or similar occupations. Second, there is an inadequate supply of specific skills or attributes within a given occupation. The latter are usually referred to as skill 'gaps'. A prominent type of skill gap detailed in Chapter 3 that is identified by employers within APEC economies is so called 'soft skills'.

Identifying skill under-supply or shortage requires specifying the particular demand conditions under which they occur, such as current wages and conditions and the geographic regions in which they arise. The following definition from the Australian Department of Education, Employment and Workplace Relations (2012a) neatly captures these conditions.

Skill shortages exist when employers are unable to fill or have considerable difficulty filling vacancies for an occupation, or significant specialised skill needs within that occupation, at current levels of remuneration and conditions of employment, and in reasonably accessible locations.

An oversupply of qualifications, specific skills and workers in given occupations also occurs. Of particular concern at an economy wide level, due to the inefficient allocation of scarce educational resources and human capital, is 'over-education', otherwise known as 'vertical job mismatch' (European Centre for the Development of Vocational Training (CEDEFOP), 2010: 11). This occurs when people invest in the acquisition of post-school qualifications at a level substantially above that required in the workplace. At the level of the individual, over-education 'has negative effects on the wages earned by individuals experiencing it and on their job satisfaction' (CEDEFOP, 2010: 11). Alternatively, there can be a surplus supply of certain types of qualifications, such as humanities degrees, in a labour market experiencing a shortage of science, technology, engineering and mathematics degrees or STEM (science, technology, engineering and mathematics) qualifications. This is referred to as horizontal job mismatch (CEDEFOP, 2010: 11).

2.2 Causes of Skill Imbalances

The causes of skill imbalance are complex. Ensuring a reasonable balance of skill supply and demand at a point of time and into the future, in the presence of great uncertainty arising from fluctuations in business cycles, structural change and new technologies, is a

major challenge for government and industry. It requires, for example, appropriate economic incentives and information for individuals to invest in relevant education and training, close co-ordination between the education and training system, employers, unions and government to ensure the skill formation system meets the needs of industry and measures to ensure industry maximises its use of existing workforce skills. The major causes are examined below in more detail.

2.2.1 Inadequate information and uncertainty

Adequate information is a critical pre-condition to assist individuals, firms and government make correct investment decisions to establish labour market balance. Good labour market information also acts as an 'early warning system' for emerging imbalances and is critical to evaluate the effectiveness of remedial measures used to redress imbalances. Without adequate information individuals may not be able to adequately assess, with a reasonable degree of certainty, the future demand for and value of investment in education and training. Such uncertainty can create risk aversion and lead to under-investment in training. Inadequate information can also lead individuals to train for occupations which are in over-supply.

It is critical that labour market information be readily available and in a format that is easily understood by individuals and firms. One example of such information is free web pages for prospective students, explaining in simple terms entry requirements for specific occupations; typical duration of training, wages and career prospects. For firms, information should be readily available, for example on regional training institutions and through government training or employment subsidies. Innovative projects are currently underway in many economies investigating information systems such as online maps showing regions with high and low demand for particular occupations (OECD, 2013).

However it is important to recognise that adequate information is a necessary but not sufficient condition for an efficient labour market. Many other economic, political and social factors must be addressed to ensure both reasonable skill balance and that imbalances are efficiently redressed.

2.2.2 Inappropriateness of firms' training investment

The inter-firm mobility of labour means that firms will not necessarily be able to recoup the cost of investing in employees before an employee leaves the firm. This applies in particular to general skills or skills for which there exists demand in the external labour market. The most well-known mechanism to correct this market failure is the apprenticeship system whereby a firm offers to invest in training an individual in skills that have value in the external labour market in return for the apprentice agreeing to remain with the employer for a time sufficient to recoup the firm's investment. Establishing apprenticeship systems entails co-ordination of employer and employee associations and government creating appropriate legal frameworks and training institutions (Toner, 2003).

2.2.3 Capital market imperfections

Commercial financial institutions are reluctant to lend to individuals to finance their education due to the absence of collateral and uncertainty regarding an individual's completion of training and future earnings capacity. This makes schemes that promote education funding on a pay later basis very attractive.

2.2.4 Mismatch between industry need and training system output

An important cause of skill imbalance is an education and training system failing to meet the skill needs of industry, resulting in either over-supply or under-supply of certain occupations or particular skills.

As explained above, even with good labour market information systems mismatches between what industry wants from training systems and what it delivers can occur. Indeed, as will be revealed in Chapter 3 of this report, this is a common cause of skill imbalance within APEC.

Mismatches are caused by factors such as inadequate co-ordination and communication between education and training institutions, unanticipated economic trends and under-investment by government or industry in training.

2.2.5 Rapid structural change

Rapid change in the industrial structure of an economy, due for example to changes in international trade, foreign investment, economy-specific industrial policies and technological developments, can result in marked skill imbalances. Historically, the most important of these broad changes in industrial structure are the shift in developing economies from a largely agricultural base to manufacturing and from manufacturing to services. The pace of change makes it difficult for individuals and institutions to adapt to the quickly changing demand for skills arising from either rapid growth in demand for skills required in say manufacturing or from over-supply of existing skills due to technological redundancy.

2.2.6 Geographic immobility

Skill imbalances can arise from inadequate labour mobility across regions, given that economic growth and decline is typically not evenly distributed across geographic locations within and across nation states. Immobility arises from sources such as inadequate information regarding opportunities in other regions, potential realisation of capital losses if housing in depressed regions is sold, family commitments, transport costs and non-recognition of qualifications. Migration restrictions may also be a factor in limiting geographic mobility.

2.2.7 Differences in business and training cycles

Skilled occupations at a trade, para-professional and professional level will be subject to almost inevitable lags and leads in labour supply arising from domestic training because business and training cycles may not be synchronised. Entry into these occupations typically requires lengthy training which can lead to under-supply when there is a sharp spike in demand for skills and conversely, over-supply caused by recessions.

2.2.8 Low initial foundation skills

International standardised testing in developed and developing economies reveals that a surprisingly high proportion of workers do not reach even the lowest level of foundation literacy and numeracy considered necessary to succeed in today's societies and economies. This represents a major barrier to participation in skill acquisition (OECD, 2012: 13). It is well established that the higher the initial level of educational attainment the greater the propensity to participate in further education and training. Part of the reason for this is that learning is cumulative, as people with higher initial education attainment have developed learning skills and trainers can assume more basic knowledge and focus on imparting knowledge that is new to learners.

2.2.9 Skill under-utilisation

Skill under-utilisation applies where the qualifications held by a worker are higher than those required to do the job in which they are employed. The prime foci of research on this topic has been first, on under-utilisation of the skills of migrants, particularly those skills acquired abroad and second, over-education when people acquire qualifications at a level substantially above that required in the labour market.

The OECD (2012: 13) reports that on average 30 per cent of workers in European countries state 'they have the skills to cope with more complex tasks at work'. Elsewhere 'some 30 per cent of Australian tertiary education graduates work in jobs classified at a lower skill level than their qualification' (Skills Australia 2009: 10). Another indicator is that 'a substantial proportion of employers—over 40 per cent in recent years—report that their workforces have in general more skills than the organisation requires' (Skills Australia, 2009: 10).

Solutions to skill under-utilisation include improved recognition of overseas qualifications and job redesign to make better use of workers' skills. The latter entails broadening job content and increased delegation of responsibility and authority to workers (OECD, 2012; Department of Education, Employment and Workplace Relations, 2012b).

2.2.10 Cultural and social barriers

Strong cultural barriers can prevent people entering certain jobs, despite these jobs being in shortage with good wages and career prospects. In some economies there has been a diminution in the quality and quantity of applicants for important trade and technical jobs due to preference by parents for their children to receive an academic and not vocational education (Hoeckel and Schwartz, 2010; Ashton *et al.*, 2002). Other occupations that are male-dominated may not be attractive to many women (eg. engineering).

2.2.11 Migration

When skilled workers migrate, acquire higher level skills and experience and return, in a process known as 'brain circulation', migration can be an important means of solving skill imbalances in both receiving and source economies. Conversely, a large permanent net loss of skilled labour through migration, or 'brain drain', can lead to shortages. This is especially problematic when migrating skilled labour from less developed economies have received extensive taxpayer supported training. Remittances sent by such migrants to their country of origin do not solve this problem of wasted scarce educational resources as the beneficiaries of remittances are families of migrants and not the broader taxpayer base (Connell, 2010). On the other hand Hanson suggests remittances can be associated with higher educational expenditure by receiving families which can offset, to some degree, the loss of skilled labour.¹ Because of these opposing effects determining 'the effect of brain drain on an economy is ultimately an empirical question' (Hanson, 2010: 4389-90).

2.2.12 Other causes

In addition to all of the causes of imbalance identified above, developing economy labour markets are subject to an additional set of factors leading to skill over and under-supply and mismatch (Lall, 2003). Some of these include the following issues.

¹ Although there is no broad consensus on the benefits of mobility, there is evidence that international mobility of skilled professionals can potentially benefit both sending and receiving economies (see Turpin *et al.* 2008).

- The absorptive capacity of poorly educated workers is low and limited initial educational attainment is a barrier to participation in formal education and on-the-job training (Lall, 2003).
- The often poor quality of government provided vocational training and higher education means the skills developed are not adequate.
- Rising productivity in agriculture creates large levels of hidden unemployment as surplus labour in family farms is retained despite adding little to output (Rosenzweig, 1988).
- Rapid population increase results in rapid labour force growth which cannot be absorbed by the economy and leads to unemployment (Behrman 1999).

In the present study, a number of developing APEC economies (such as Peru and Papua New Guinea) are especially subject to these constraints.

2.3 Establishing Skill Imbalance Priorities

Given scarce government resources for monitoring and intervening in labour markets, all economies need to establish priorities for the identification and resolution of skill imbalances. According to the literature the major characteristics of occupations/skills that should determine whether they are subject to labour market monitoring for possible action, should imbalances arise, are summarised below.

- Long duration of training—entry into the occupations require several years of vocational preparation in terms of formal study and/or work experience. Resolving imbalances for occupations that have extensive preparatory lead times is more difficult compared to other occupations that require short courses or limited work experience. The latter require no significant government intervention to redress imbalances.
- Strategic occupations—occupations are strategic in that there is high risk arising from imbalance. Shortages of the occupations, for example, may curtail production or investment and lead to significant wage inflation, increase consumer prices or adversely affect public health. However, it is important to note that an oversupply of workers in these occupations is also wasteful of economic resources at an individual and economy wide level.
- Large numbers involved—occupations are typically large in terms of numbers employed and in-training. Size is important for several reasons. First, it reinforces the strategic nature of imbalances. Second, when sampling techniques are employed to collect data, information gathering is more statistically efficient if employment in the occupation is above a minimum size. Larger occupations are also likely to have well-resourced industry/employee and employer associations that can be a valuable source of quantitative and qualitative information. Adequate occupation-specific information is essential to determine the nature, cause and extent of imbalance.
- Long term imbalance—skill imbalances are not due to relatively short-term, temporary market fluctuations, for example over-supply as a result of recession, where demand for the occupation can be expected to recover in the medium term.
- Poor substitutability with migrants—skilled migrants may not be ready substitutes with local skilled labour experiencing shortages or skill gaps. The lack of easy substitution can arise from local qualification/registration or particular work experience requirements. The degree of substitution between migrants and local labour differs across skilled occupations. It is high for ICT professionals but lower for medical, dental, engineering, teaching professions and some licensed trades. A high elasticity of substitution reduces the significance of local skill shortages as migrants can easily be used to supplement

local skilled labour. On the other hand, local skilled shortages may well reflect general strong labour demand for these same occupations regionally or globally. Many STEM and medical occupations fall into this category.

Some idea of the scale of occupations that meet these criteria can be gauged by the fact that in Australia around 120 occupations are subject to regular, comprehensive evaluation. This constitutes only around 12 per cent of the 998 total occupations recognised in the Australian and New Zealand Standard Classification of Occupations (Australian Bureau of Statistics, 2006). More pragmatically, the high cost of these labour market assessments is another factor limiting the number of occupations monitored.

2.4 Identifying Skill Imbalances

This section briefly describes the various methods used to detect the presence, scale and to some extent, the causes of skill imbalance in some occupations.²

2.4.1 Partial indicators

These methods use a mixture of partial quantitative indicators of skill imbalance combined with complementary qualitative intelligence as to the nature and type of skill imbalance. The following are some of the partial indicators of skill imbalance that are widely employed.

Graduate outcome surveys

Surveys of recent graduates from higher education and VET institutions, conducted 12 to 18 months after graduating, provide a very useful guide as to the short-run state of the labour market for skilled occupations. Data can be collected, for example on graduate unemployment rates and for those in a job, how closely their occupation matches their prior field of study and wage rates. Trends over time in the data can provide a useful guide to prospective students as to which courses offer good job prospects and for educational planners which courses may need additional monitoring to ensure educational supply meets labour market demand.

Vacancies and vacancy rates

The most direct measure of balance between labour supply and demand is movement over time in the number of job vacancies. Given that overall labour markets and individual occupations are subject to growth and decline in absolute numbers over time a preferable measure is the 'vacancy rate' or ratio of vacancies to employment.

An increase in the vacancy rate may indicate an increase in relative demand for labour, which in turn may reflect factors such as shortages due to high demand, a decline in supply, technological redundancy of skills and occupations or decline in quality of labour supply. Caution needs to be exercised in the interpretation of high or rising vacancy rates as they 'may not necessarily be indicative of a skill shortage in the occupation' (DEEWR, 2012a). Some employers have requirements for specialist skills which are not generally used in the occupation; some firms offer pay or conditions below market standards or the geographic location and other terms of employment such as hours of work or shift-work may be unattractive. On the other hand, very low vacancy rates for some occupations, especially compared to occupations that have much higher rates, may be indicative of actual or approaching excess supply.

² These are derived from multiple sources including Mavromaras *et al.* (2013); DEEWR (2012); CEDEFOP (2010) and OECD (2012).

Recruitment difficulty

Whilst simple vacancy rates are a critical indicator they must be supplemented with additional information to clarify the type and cause of imbalance. Especially informative is data on 'recruitment difficulty' as the degree of effort by employers in sourcing skilled workers can be indicative of over or under-supply in a particular occupation or skill. Measures of recruitment difficulty include the duration between advertising and filling a vacancy and the number of suitable and unsuitable applicants per vacancy. Additional information such as the reasons applicants were deemed unsuitable and whether higher wages or other inducements were necessary to attract suitable applicants are also very useful.

In considering employer perceptions of labour market balance, governments need to consider employers' self-interest in maintaining an ample supply, or even a degree of oversupply, of labour. The converse, of course, applies to union perceptions of labour market balance.

Labour turnover

Another application of vacancy data is the rate with which people leave and enter work. Generally, a faster rate of job churn is usually associated with a rising demand for labour. Rising turnover reflects a faster rate of job creation but also greater preparedness of some workers to experience involuntary unemployment because they are confident of finding work. Conversely, a reduction in job turnover is indicative of declining labour demand and potential labour over-supply.

Employment growth

Employment growth, on its own, is not indicative of skill shortages but changes in rates of growth over time clearly indicate changes in labour demand and supply. Paired with knowledge of flows into the occupation from sources such as graduations and net migration, rates of employment growth can be an important pointer to shifts in labour balance. Long-term change in the characteristics of employed persons is an important sign of fundamental changes in the demand for and supply of occupations, qualifications and other labour characteristics. Two obvious and far reaching trends are the growth in female labour market participation over the last five decades and increased demand for and supply of higher level qualifications.

Another complexity in the interpretation of job growth is that change in the number of persons employed is a 'lagging' indicator of economic activity. Employers are reluctant to take-on or a lay-off a worker until change in demand for their firms' output becomes a clear trend. This reluctance is in part due to the expense and management effort incurred in recruiting new labour and, conversely, labour 'hoarding' occurs due to the cost and adverse effect on worker morale of job lay-offs. In addition, occupations experiencing a significant decline in employment, due say to technical change, shifts in consumer demand or import competition can be, paradoxically, subject to quite intense shortages as people leave an occupation viewed as having both diminishing job prospects and high rates of redundancy. Such occupations will also likely experience low employer investment in training and be unattractive to higher quality trainees.

Hours worked

Changes in hours worked is a useful early indicator of changes in labour balance. A closely related measure is change in the share of full-time or part-time employment, with increased demand for labour associated with a rise in the share of full-time employment and overtime.

Conversely, a form of labour hoarding may occur when firms and employees distribute a decline in demand by reducing average hours worked rather than making a number of workers redundant.

Wage movements

An upward movement of wages may indicate growing shortage as demand growth outstrips supply. On the other hand, above trend wage movements may be due to factors unrelated to labour supply and demand such as high rates of unionisation or high industry profitability in some industries. Similarly, in some highly regulated occupations, such as teaching and medicine, excess labour supply will not translate readily into below trend wage increases. More generally, it is well established that the level of nominal wages, if not real wages, are 'sticky downwards'. That is, they will not fall much even in the presence of general labour over-supply, as in prolonged recessions.

Unemployment

At first appearance labour unemployment, either in terms of change in levels or rates, would seem to be a clear sign of labour market imbalance, but again, as an indicator its interpretation, and especially its implication for policy, requires complementary information and careful analysis. This ambiguity arises from the different causes of unemployment, several of which can be in effect at any point in time. The main types of unemployment recognised in the literature are summarised below.

1. Frictional unemployment exists at all times and arises mostly from job turnover and delays between leaving and beginning jobs. The scale of frictional unemployment is dependent on the efficiency of job search, recruitment and labour mobility.
2. Demand-deficiency which is temporary and cyclical. This is Keynesian involuntary unemployment where all people who want to work can't get a job at the prevailing nominal wage rate.
3. Structural unemployment arises, for example, from changes in technology; consumer tastes or import competition, and results in a permanent decline in the demand for the output of particular industries and/or specific occupations. Structural unemployment is longer term than demand-deficiency unemployment.
4. Labour supply mismatch where the qualifications, skills, experience or other attributes of workers do not fit employer requirements. High rates of unemployment can co-exist with persistent shortages: 'having a large pool of unemployed people provides no guarantee that employers can find appropriately skilled individuals to fill their vacancies' (OECD, 2012: 23). This applies to both developing and developed economies. As the OECD (2012: 1) observes 'at the height of the economic crisis in 2009, more than 40 per cent of employers in Australia, Japan and Mexico reported difficulties in finding people with the appropriate skills'.

The apparent paradox of high unemployment and skill shortage is easily resolved when it is considered that the lack of appropriate skills can be a cause of unemployment and sustained unemployment can exacerbate existing skill shortages as workers' skills atrophy if not used. Skills are both an input to production and an output from the production process: they are 'used up' but also created in production. In recessions employers also reduce investment in training. Unemployment and skill shortages or imbalances can thus create a negative feedback loop in the supply of skilled labour. This is one reason governments institute both anti-cyclical training policies as well as anti-cyclical macro-economic policies.

Unemployment is also an ambiguous indicator as low unemployment rates can also hide oversupply in an occupation, particularly for highly skilled occupations, where people who can't get a job in their chosen occupation will take up other jobs.

Unemployment rates for specific occupations should also be treated with caution as labour market surveys typically ask an unemployed person to state the occupation of their last paid job, which may or may not indicate the preference of their future employment or indeed, the job they are best qualified to do. This can lead to an overestimate of unemployment rates within an occupation.

Labour or population ratios

For some, mostly professional occupations labour imbalance is easily identified as government and/or industry associations have established arbitrary supply ratios. For example, government sets doctor-patient ratios in hospitals. Similar metrics exist for other jobs such as teacher-student ratios and even police/firemen to population ratios. These ratios are usually justified in terms of ensuring a minimum level of service quality. Employment to various population ratios are used to inform labour supply into these occupations, such as adjusting the numbers of doctors in training to achieve a desired doctor-patient ratio.

A particularly important type of labour ratio in some economies applies to apprenticeships. As the entry point into trade occupations, apprenticeships are a critical source of skilled production and maintenance labour in advanced economies. For apprenticeships, the key ratio is the training-rate or number of apprentices in-training at a given point as a proportion of employed tradespersons in a given trade occupation. Apprenticeships are different from the other occupations discussed in the previous paragraph as employment and training occur simultaneously and because most apprentices are employed by the private sector, labour imbalances are more difficult to correct than simply adjusting the annual intake of students (such as in medicine, dentistry, teaching or employment of police cadets). Deviations in annual training rates over several years from long-run averages are a key measure of labour imbalance (Toner, 2003).

2.4.2 Quantitative labour market projections

Traditional 'Manpower planning' and more recent large scale econometric modelling rely on identifying occupational balances by forecasting future labour market supply and demand conditions. Typically, demand for labour is derived from projections of industry output assuming relatively stable output-employment coefficients, adjusted for labour productivity. Detailed occupational supply estimates are derived based on stocks adjusted for flows arising for example from deaths, retirements, net migration, permanent movement out of the occupation into other occupations, graduates from training and informal upgrading in to the occupation where this occurs³.

Aside from these large scale econometric forecasting models, projections of labour demand can be made using qualitative assessments such as 'horizon scanning and scenario development' in which experts can identify key changes in employment and skills over the long term. The obvious trends in the more industrialised economies include: (a) employment among low-skilled workers will continue to decline; (b) employment among highly skilled workers will increase; and (c) a persistent shift to more service-based economies will prevail (OECD, 2012: 22). Unfortunately, whilst projections of broad trends are relatively robust they become much less accurate when made at a finer level of disaggregation of individual occupations and over longer time periods.

³ Informal upgrading is where persons without normal entry qualifications are able to work in the occupation. This is common in the construction industry for instance.

2.4.3 Beveridge curve analysis

This is a simple but useful technique for determining the relative state of labour market balance applicable to either individual occupations or economy wide labour markets. It examines the relationship between unemployment rates and the job vacancy rate (the ratio of advertised or unfilled jobs to employment). Vacancies are typically plotted on the y-vertical axis and the unemployment rate on the x-horizontal axis. The curve is hyperbola shaped as a higher rate of unemployment is normally associated with a lower vacancy rate and conversely a lower unemployment rate with a higher vacancy rate. Beveridge curves can be fitted to gauge the state of the overall labour market or individual occupations over time.

If the curve moves outward from the origin over time, then a given vacancy rate is associated with higher rates of unemployment, implying an increased mismatch between employer demand and occupational supply. This could indicate, for example, a decline in the quality of unemployed labour, geographic mismatch between jobs and labour or technical change making certain skills redundant. Conversely, a better matching of labour demand and supply will shift the curve inward over time as vacancies are filled faster.

2.5 Conclusions on Methods for Identifying and Measuring Skill Imbalances

It is clear from the above that all methods and indicators for identifying skill imbalances have uses, but also limitations. A further short discussion is warranted to provide a balanced assessment of these issues.

First, all of the indicators presume the existence of a large and sophisticated data collection infrastructure with skilled and experienced labour market specialists, interviewers and statisticians. If these pre-conditions do not hold, then the quality of data will be diminished.

Second, projections extending beyond say 7-10 years into the future are subject to profound uncertainty due to technological change, shifting geographic location of production and economic fluctuations. Other methods, such as Beveridge curves and partial indicators, are not subject to these uncertainties since they mostly capture aspects of current labour balance.

Third, none of the methods or indicators offers a clear theoretical base for determining how much of a deviation from trend levels or rates of growth constitute an 'imbalance', and especially whether an imbalance necessitates state intervention. In other words, the indicators provide no benchmark as to the margin above or below a median, mean, standard deviation or some other measure of central tendency or distribution when a shortage or oversupply occurs. Establishing these benchmarks relies on the qualitative judgement of experienced labour market analysts. In addition, when multiple indicators are used they may send contradictory signals to labour market analysts, as indicators can move in opposite directions. In the presence of such uncertainty, analysts will be required to qualitatively weight indicators, giving more priority to some than others.

Fourth, the value of indicators as a marker of labour balance differs across occupations. For example, movements in the wages of occupations involved in aged care in the private sector in Australia do not fully reflect the difficulty of recruiting and retaining suitable staff (Community Services and Health Industry Skill Council, 2013). This is due in large part to the role of government in the sector, funding arrangements and budget decisions.

Fifth, it is increasingly recognised that, with the exception of those professional and some trade occupations that mandate possession of a specific qualification for entry, the supply of and demand for qualifications provides only a general approximation of labour balance in many occupations. There are a number of reasons for these limitations.

- The stock of qualifications in an economy does ‘not account for skills that were acquired after formal education or training or for the loss of skills’ (OECD, 2012: 12).
- There is considerable variation in the quality of similar qualifications within and across nations. This variability applies with particular force to school and even some post-school qualifications in terms of signaling a holder’s actual level of literacy and numeracy skills. The OECD (2012: 12) argues ‘that formal qualifications and diplomas cannot be equated with foundation skills. This also suggests that direct measures of skills are a much more reliable basis for policy development than indirect proxies such as qualifications attained’. Accordingly, the OECD recommends the use of international standardised tests to measure the level and distribution of these skills within the population of member economies. The principal test is the *Adult Literacy and Life Skills Survey (ALLS)* of literacy, numeracy and problem solving to measure the distribution of literacy skills within and across economies (Australian Bureau of Statistics, 2007). Many OECD members and other economies have participated in these surveys. There are of course other standardised tests applied to school children such as the *Programme for International Student Assessment (PISA)* which evaluates education systems worldwide by testing the skills and knowledge of 15-year-old students.
- There is rarely a neat correspondence between a specific field of study and employment in a specific occupation. This holds especially for non-STEM university qualified occupations and vocationally qualified jobs.⁴ The low correspondence between qualifications and occupations is problematic not just for determining labour market balance it also makes it difficult to establish a valid and reliable metric of the extent to which the education and training system matches labour market needs.
- Even for some licensed trade occupations which mandate possession of a specific qualification for entry, there can be a surprising proportion of unqualified or under-qualified employed persons.⁵ Unqualified labour in an occupation can work under the supervision of qualified workers. This illustrates how, for some occupations, employers can respond in multiple ways to shortages, such as informal upgrading and adjusting to surplus and shortage of labour by varying the quality of workers.

The principal conclusions from this discussion are that limits to the identification of labour imbalances, especially those involving forecasts over a number of years into the future, need to be recognised. In particular, it is important that researchers and government avoid the trap of false quantitative precision that can be so easily generated by various methods and indicators. Clearly, quantitative data and modelling are essential, but they must be supplemented by qualitative assessments from employers, unions and other labour market participants, to understand the complex economic and social forces driving shortage and oversupply.

The question for APEC is how to find an APEC-wide measure of skills imbalances that can be readily and reliably used in the 21 economies. The following section will provide a summary of the current labour force data collections and methods for determining skills imbalances across the 21 member economies.

⁴ Studies in Australia have found that there is, in aggregate, only an indirect connection between the VET qualifications people acquire and the jobs they get. ‘In 2008, only 30 per cent of recent VET graduates reported that they were employed in an occupation group that was related to their training course’ (Productivity Commission 2011: 120).

⁵ For example, around 25 per cent of carpenters in Australia based on the 2011 Census did not have the minimum Certificate III qualification (Australia Workplace Productivity Agency, 2013: Table 2b).

3. Current and Emerging Labour Market Imbalances

Skills shortages are identified by business sectors throughout the APEC region as one of the most significant problems impinging on economic development. The need to monitor, on a regular basis, the nature of skills shortages or surpluses is a critical prerequisite for generating a comprehensive and evidence based regional response to the problem.

The following sections draw on the economy reports prepared for this project and the literature that is available to report on the status of skills shortages across APEC economies. While some economies don't identify current skills shortages they do identify occupations where a growing demand is predicted. Although growing demand does not necessarily equate to a skill shortage, it does suggest an occupational niche where a skill shortage might appear.

Some economies have a well-established and well-resourced labour force monitoring system that has been developed over many decades. For others, this is a comparatively new process. As a consequence there is considerable variability in the level of data available for analysis. Moreover, comparability of occupational data across economies is variable because the level of skills and competencies ascribed to a particular occupation in a particular economy is not the same across the region. Thus, if an economy has in place a qualifications framework it allows for a greater potential for comparison across economies.

Given the great diversity across APEC economies in their industrial structure, labour markets and approaches to assessments of labour market imbalance, a five-way classification of these economies has been employed in this section. Many different systems could have been employed though it is believed this approach will assist the reader to compare and contrast the considerable quantity of empirical detail and draw out major themes.

The first section below introduces, as far as possible, a regional perspective of labour force shortages and potential over-supply. This is followed with more detailed description of each economy, discussed according to the five-way classification.

3.1 APEC Wide Observations

From a review of economy-level data collections a common theme throughout recent literature on skills shortages is that employers are increasingly demanding both specific technical skills and knowledge as well as what are defined across some of the economies as 'soft skills'. This latter set of skills refers to personal attributes such as entrepreneurial and creative spirit, team work, flexibility and communication skills.

The type and causes of skill imbalances and their solutions differ across APEC economies, and are strongly affected by factors such as the economy's stage of development and industrial structure. For example, at present there is considerable concern that weak economic growth in some economies is leading to skill atrophy amongst unemployed or under-employed workers, even amongst those with high levels of human capital. In turn, this 'scarring experience' can adversely affect their future labour force participation and productivity. This type of skill imbalance is markedly different from that applying in say Viet Nam, where large scale movement of labour from agriculture to industry is occurring. In the case of Viet Nam movement is induced, in part, by rapidly growing foreign direct investment and can impose large demands for the creation of human capital and workforce skills and strain vocational education capacity.

Table 1: Summary overview of regional level occupation shortages

Broad occupations/industry descriptors *	Number of economies with occupation shortage in this area ** (n = 21)	More detailed level occupation examples when Identified
Executives/managers	16	senior executive, production manager, finance manager
Technical/trade specialists	14	electrician, welder, auto mechanic, chef, specialised machine operator
Health care specialists	13	home health care, registered nurse, physician, surgeon, pediatrician, mental health counsellor, geriatric carers
Engineering	13	mining, civil, electrical, IT
Finance occupations	9	accountant, actuary, financial planner
Sales/customer service	7	merchandise manager, customer representative, retail sales, wholesale sales rep.
Food/agri-business	4	agri-business manager, food process workers, farm manager,
Semi and unskilled labour	3	production line worker, cleaners, sanitation workers, housemaids

Notes:

* Lack of detailed occupational data across all economies means that only very general occupation categories can be identified. That is, additional economies may also have shortages in some of the descriptive areas but existing data do not allow for more fulsome enumeration.

** According to data provided by member economies or from economy specific literature. In the absence of detailed economy level literature broader international data sets such as Manpower Group have been utilised to identify economies with shortages in the broad categories shown in column 1.

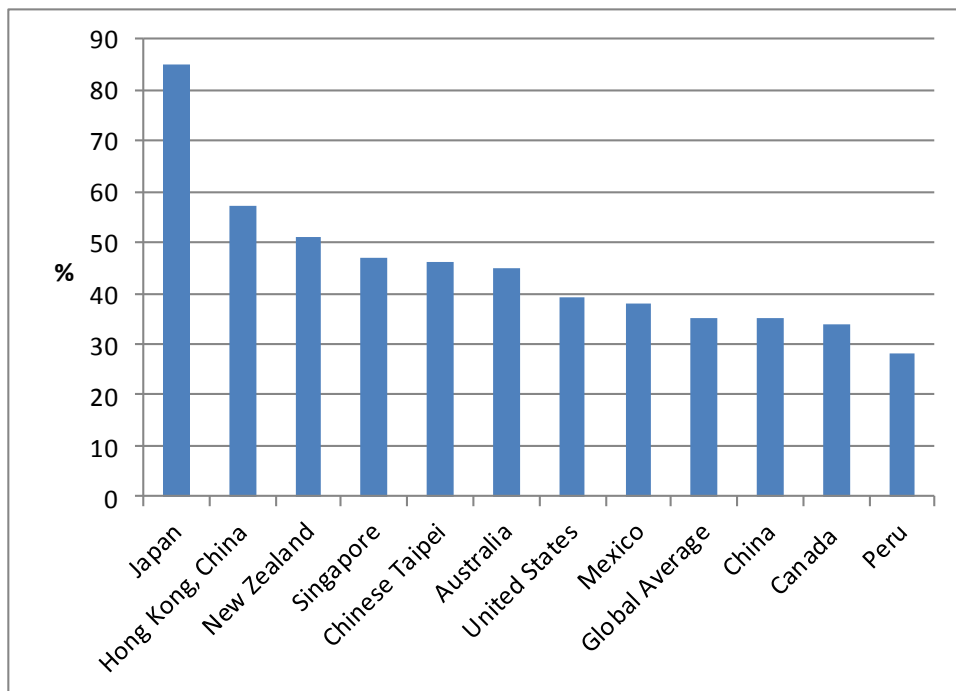
Drawing on the various combinations of data available for each economy it is possible to summarise, at a very general level, the nature of skills shortages and the extent to which these are common across the region as a whole. Table 1 summarises the broad nature of reported skill shortages and the extent to which there is evidence of such shortages across APEC economies.

The data summarised in Table 1 show that at a general level the major shortages are among: the professional management and executive occupations; technical and trade occupations; a range of health and medical specialisations; engineering, and finance occupations. There is also evidence of shortages in what have been described as the ‘soft skills’ across a wide range of occupations across at least six APEC economies. It should be noted however that the number of economies in each field are also affected by the extent of data available for each economy. A further point is that at present there are a number of further barriers preventing any fine-grained analysis of occupations and skills across the region. The following chapter discusses the nature of these barriers.

Table 2 presents a summary of the top ten jobs that employers have difficulty filling. The data for this table are drawn from the Manpower Group’s published data from their 2013 global survey of employers. Although not all APEC economies are included in the Manpower Group’s Asia Pacific survey it does allow for some comparison with global shortages. It can be noted that while skilled trades workers are at the top of the global list, they are lower on the Asia Pacific list. A shortage of Sales Representatives appears to dominate occupations difficult to fill in the Asia Pacific region.

Figure 1, drawing on the same Manpower Group data, shows the extent to which some employers in selected economies have difficulties, overall, in filling vacancies. Japan stands out in this group as the economy with the greatest difficulty in filling jobs, more than twice above the global average level.

Figure 1: Per cent of employers in selected economies having difficulty filling vacancies : 2013



Source: Manpower Group (2013), Figure 2: p. 5

Table 2: Top ten jobs employers have difficulty filling

	Global	Americas	Asia Pacific
1	Skilled trade workers	Technicians	Sales representatives
2	Engineers	Sales representatives	Engineers
3	Sales representatives	Engineers	Technicians
4	Technicians	Skilled trades workers	Management Executives
5	Accounting & finance staff	Production operators	Accounting & finance staff
6	Management executives	Accounting & finance staff	IT staff
7	IT staff	Secretaries/ admin / office support	Skilled trades workers
8	Drivers	Drivers	Sales Managers
9	Secretaries/ admin / office Support	Labourers	Labourers
10	Labourers	Management executives	Researchers (R&D)

Source: Manpower Group (2013)

Note: Economies included as Asia Pacific are: Australia; China; Hong Kong, China; India; Japan; New Zealand; Singapore and Chinese Taipei. Those included in the Americas are: Argentina; Brazil; Canada; Colombia; Costa Rica; Guatemala; Mexico; Panama; Peru and the United States.

3.2 Some Sub-regional Observations

Although there is considerable variation in the nature and structure of the economies within each of our sub-groups, there are also some common themes that can be observed. These are summarised below in Table 3. For example, the industrialised group of economies have long established technical and professional training institutions and systems and also generally have migration programs that seek to attract skilled workers from abroad. However, there are often substantial mismatches in some rapidly growing occupational niches and the capacity of skills training and recruitment to meet the pace of development in some sub-sectors.

The newly industrialised economies have largely focused on industrial development in clearly defined sectors with long term training strategies for skills development in technical expertise in relevant areas. Shortages among these economies are more noticeable in the service sector.

Those economies that are undergoing transition from a largely agricultural base have more recently developed domestic training systems. International employers are present in these economies, and there is evidence of a difference between the expectations of 'quality' between domestic and foreign employers. There is evidence from the literature concerning a mismatch between employers' demands for skills and the capacity of domestic training institutions to deliver personnel with skills to match demands.

Although the Spanish-speaking economies have much in common there are important differences in the extent and nature of their economic development. Access to education, gaps between rural and urban areas, the comparative levels of poverty and presence of Indigenous populations have important implications for skill surpluses or shortages between these three APEC economies. The labour and education policies in each economy vary with potential implications for development processes, demand for specific skills and the transnational mobility of workers. The regional arrangements based on language and cultural similarities have enabled free flows of labour in response to shortages or surpluses.

The other three economies discussed in this section, Brunei Darussalam; Papua New Guinea and Russia each have their own unique labour market characteristics.

Table 3: Some sub-regional trends in skill shortage/surpluses

APEC Sub-group	Economies included	General trends/observations concerning labour market imbalances
Industrialised economies	Australia Canada Japan New Zealand United States	Most of this group have clearly identified areas of skills shortages and seek to ameliorate the problem through a combination of training and migration programs. All have well developed technical and professional training systems, but there is evidence of time-lags between identification of shortages and training institution and migration responses. Shortages of specialised engineers in specific sectors and shortages across many specialised health care areas. Shortages of skilled trades persons in certain areas.
Newly industrialised economies	Hong Kong, China Korea Singapore Chinese Taipei	This group have undergone rapid economic growth and industrial transition. Through transition phases they have sought to promote training institutions and firm-based industrial training programs through policies for high priority sectors. As a consequence this group of economies tends to have shortages among occupations in service sectors rather than in technical qualifications and skills. There is evidence of concern, in particular, about a lack of 'soft' skills among this group.
Economies emerging from a largely agricultural base	China Indonesia Malaysia The Philippines Thailand Viet Nam	The comparatively large size of the Chinese economy and its population makes this economy stand out from the others in this group. However, all have experienced transition from a predominantly agricultural base toward manufacturing. There tends to be a mismatch between the capacity and output of training institutions and the evolving demands of their manufacturing sectors. There is also evidence of a mismatch between the expectations of domestic firms and foreign transnationals. Evidence of shortages in service sectors and of 'soft skills' across most sectors.
Spanish speaking economies	Chile Mexico Peru	Some high agriculture but emerging mining, manufacturing and services. Important differences concerning the extent and nature of skills imbalances between rural and urban areas in these economies. High informal labour market participation. High mobility of workers across these three economies as a means of alleviating shortages or surpluses.
Other economies	Brunei Darussalam Papua New Guinea Russia	<i>Brunei Darussalam:</i> High proportion of expatriate workers across most sectors. Current policies to diversify the economy rely on imported labour. <i>PNG:</i> Skilled human capital scarce across most sectors. Estimated high proportion of workers in the informal economy. Strong reliance on foreign skilled workers in engineering, mining and construction. A marked shortage of 'soft skills'. <i>Russia:</i> Experiencing considerable economic and labour market restructuring. Evidence of shortages in skilled trades occupations in some sectors but surpluses in others.

3.3 Summary Descriptions for Each Economy

3.3.1 Industrially Developed APEC Economies

Australia

Structural changes in the Australian economy over the past three decades have led to quite significant changes in labour force demands. Growth in the services sector has led to increased demands for skills in health care, finance and tourism. In contrast, demand for skills in primary and secondary industries such as manufacturing and agriculture has declined. Meanwhile, demand for scientific and specialised technical services across many growing industry sectors has increased (see *Australian Skills Mapping Project Report*, 2013). However, Australia's labour force demands need to be understood in the context of the 'two speed economy' with some sectors and geographic regions experiencing skills shortages (a product of the mining and minerals boom) while others, particularly in manufacturing are shedding jobs.

The Australian Bureau of Statistics maintains a monthly labour force survey that collects detailed information on employment status, occupation, and industry. Summary data are produced monthly and more detailed data quarterly. Occupational categories in Australia are classified according to the Australian and New Zealand Standard Classification of Occupations (ANZSCO). Australia has a National Qualifications Framework (AQF) which establishes the quality of Australian qualifications on a ten level classification. It also aligns with the New Zealand Qualifications Framework (NZQF)

Australia, through the Department of Employment, also maintains a list of occupational shortages across 100 selected occupations. This 'Skilled Shortage List' is developed from a survey of employers who have recently advertised and collects information on the number of vacancies filled, the number of applicants, the number of qualified applicants as well as a labour market rating that indicates whether the occupation is in shortage. These data are published on an ongoing basis at www.employment.gov.au.

In addition, the Department of Employment publishes a monthly report on job vacancies. This is based on a count of online vacancies recently lodged on key Internet vacancy sites and comprises an Internet Vacancy Index (IVI). The IVI is the only source of detailed online vacancies: it covers around 350 occupations and all Australian states and territories.

According to the Australian data, skills shortages have been less acute in recent years with fewer occupations being defined in shortage at any time over the past six years (*Australian Skills Mapping Project Report*, 2013). The Australian report prepared for the present project notes that the greater availability of professionals through the growth in the numbers of domestic students completing higher education has been a significant factor in easing shortages at the economy level.

Nevertheless, 17 occupations have been defined as being in long-term shortage for at least nine of the past ten years. These longstanding shortages include occupations in:

- the *automotive trades* such as auto electrician, panel beaters and motor mechanics;
- the *engineering* profession, such as electrical, mechanical, mining and petroleum engineers;
- the *food trade* sector including bakers, pastry cooks and chef/cooks.

Some longstanding shortages in the health professional sector have eased, but there are still shortages in some specialised occupations such as physiotherapist, midwife and enrolled nurse.

Although there has been a fall in the overall level of occupations defined as in shortage there has concurrently been a rise in reported recruitment difficulties in some regional areas. This regional complication in skills mismatch leads to a situation where skills shortages can coexist with relatively high levels of unemployment in a particular occupation (*Australian Skills Mapping Project Report, 2013:7*).

Canada

Over the short to medium term, Canada faces an aging population and slowing labour force growth. At the same time, ongoing technological change has been skill-biased, raising the complexity of the skills required of the workforce. This in conjunction with the economic recovery has raised concerns about the prevalence of skills shortages. At the economy level, labour market indicators suggest that skill pressures are below their pre-recession peak and have not significantly worsened over the last two years. However, Canadian businesses and business associations are voicing concerns about shortages of workers with the skills they need. A Canadian Chamber of Commerce report (2013a) indicated that skill shortages were the number one barrier to competitiveness. The Canadian Federation of Independent Business', in their Business Barometer (Mallet, 2013a), reported that thirty-three per cent of business owners reported shortages of skilled labour as a constraint on their business, which was second in rank only to insufficient customer demand.

There is limited quantitative evidence of significant or worsening skill shortages at the economy level. Recent labour indicators suggest that skill pressures may have eased or have been steady over the past year, and that the current degree of labour market tightness corresponds approximately to that prevailing in 2011. For example, a Bank of Canada survey (Bank of Canada, 2013) indicates that the percentage of firms reporting that labour shortages are restricting their ability to meet demand is still below the long-run historical average. Statistics Canada Job Vacancy data (Statistics Canada, 2013) indicates the labour market in Canada has loosened over the past year with the unemployment to job vacancy ratio up to 6.4 in August 2013 from 5.2 in May 2012. The Canadian Federation of Independent Business' Help Wanted report (Mallet, 2013b) also suggests that pressures have eased, with the percentage of jobs unfilled in the private sector dropping from 2.5 to 2.4 per cent in the last quarter.

However, skill pressures are evident in certain occupations requiring post-secondary education. According to a CIBC Economics report (Tal, 2012), at the economy level the occupations that are showing signs of shortage conditions are mainly high-skilled occupations requiring some form of postsecondary education. These include occupations in engineering, numerous health-related occupations, and occupations related to the natural resource sectors. The majority of occupations showing signs of surplus conditions – that is to say, where there are more workers willing to supply their skills than there is demand for those workers – typically require high school or on-the-job training only.

The extent of skill pressures varies across sectors and the economy. According to recent vacancy data produced by Statistics Canada, sectors such as health care and social assistance, finance and insurance, and professional, scientific and technical services have a particularly large number of vacancies relative to the number of available workers. Furthermore, labour markets are generally tighter in Western Canada than in other regions. A TD Economics report (Burleton, 2013) similarly finds that while there is no evidence of skill pressures at the economy level, there is evidence of pressures in certain occupations in certain provinces.

The Government of Canada (GoC) prepares ten year projections of the balance between labour supply and demand, by occupational groupings (140 occupations) at the economy level. The most recent projection, covering the period 2011-2020, does not find evidence of widespread shortages of skilled labour at the economy level.

Recently, concern over the increasing wages gap between new arrivals and locals led to questions of how well immigrants were integrating into the Canadian economy. The GoC's policy response has been to alter the migrant selection policies, for both permanent and temporary migrants, to attract particular tradespersons and to revamp the points system for permanent migrants. Canada's new points system places greater emphasis on: an immigrant's fluency in the nation's two official languages; how closely applicants' qualifications match Canadian credentials; whether they have employment arranged in Canada and, in the case of the post-August 2013 arrivals, if they have specific skills in demand, such as plumbing. The system also gauges so-called adaptability: factors such as time spent previously in Canada (MacDonald, 2013).

The GoC has also undertaken a number of other measures to address skills challenges. In Budget 2013, the GoC announced that it would create a Canada Job Grant (CJG). *Through the CJG, nearly 130,000 Canadians each year are expected to have access to the training they need to fill available jobs. The GoC has stated its intention to renegotiate the Labour Market Development Agreements with provinces to reorient training toward labour market needs. The Government also supports skills training in high demand fields such as the skilled trades, science, technology, engineering and math; providing youth with information and opportunities to make informed education, training and employment choices; and providing a variety of supports to help newcomers, older workers, Aboriginal people, and persons with disabilities get the skills and employment opportunities they need. Finally, the Government is developing a student outcomes web tool which will enable youth and their parents to search for information on labour market outcomes by field of study and, thereby, better support the alignment of skills supply and demand.*

New Zealand

New Zealand uses the ANZSCO 2013 occupational classification system. It also has a ten level New Zealand Qualifications Framework (NZQF). Immigration New Zealand maintains a Skill Shortage List which is reviewed on an annual basis and reported in two categories: an Immediate Skill Shortage List (ISSL); and a Long Term Skill Shortage List (LTSSL). The ISSL identifies 98 occupations at a detailed 6-digit level. In summary, the ISSL occupations identified in the agriculture sector include farm managers and specialised herd or crop managers across a range of production. In construction and engineering key occupations include project managers, engineers and survey technicians. The Finance and Business sector shortages include accountants and auditors. Health and Social Service sector occupations includes an extensive range of occupations and the Oil and Gas sector includes, geologists, production managers and plant operators. A number of occupations are identified in Recreation, Hospitality and Tourism. These are primarily associated with the horse breeding and racing and snow-sport sectors. There are also 12 occupations in the trades sector including: baker and scaffolder. The LTSSL identifies over 100 occupations, also detailed at the 6-digit level. Both lists also identify the required qualifications or experience for work visa applicants. A third category was introduced following the South Island earthquake in 2011: the Canterbury Skill Shortage List.⁶ New Zealand operates a comprehensive system for identifying skills shortages, including numbers of job seekers, visa approvals, employment growth in occupations and the terms and conditions of employment. In addition online job vacancies are monitored by the Ministry of Business, Innovation and Employment through the Jobs Online series. The series began in May 2007 and is updated monthly. It is published online at <http://dol.govt.nz/publications/jol/index.asp>.

These shortage lists are compiled through a nominations process whereby industry stakeholders such as employers' groups, trade unions and industry training bodies submit

⁶ All lists of skill shortages can be found online at:

http://www.immigration.govt.nz/migrant/stream/work/skilledmigrant/LinkAdministration/ToolboxLinks/essential_skills.htm?level=1

proposals for an occupation to be included, removed or moved between lists. The Ministry may also add occupations for review from its own information. Evidence Reports are then used to assess relevant data for each nominated occupation. Then there is a submission process, through which industry stakeholders are invited to provide additional information and evidence about the nature and extent of skill shortages in the occupations under review. Finally the Ministry carries out further consultation to ensure that the evidence is robust.

Future areas of labour force demand are for long-term growth in personal care occupations. This is primarily due to an ageing population and the consequent demand for aged care health workers. Strong growth is also forecast in the building and construction sector, particularly for architects, engineers and trades people. Professional occupations in computing and finance are also predicted to be in strong demand (King, 2013).

United States

The US is the largest economy in the world and is increasingly service-based. Education and training policies are guided by the US states due to the federalist structure of the government. While this enables policymakers to adapt their education and skills training to the state and local-level needs and demands, training requirements can differ across industries and geographic locations. In the US there is no comprehensive direct measure of economy labour shortages. However, the Bureau of Labour Statistics (BLS) produces detailed occupational employment growth forecasts. These data are based on the Standard Occupational Classification (SOC): a classification used only by the US.⁷ While occupational growth does not necessarily imply a labour shortage it does suggest some of the areas where there may potentially be a mismatch between demand and supply.

The Department of Labour's Bureau of Labour Statistics has developed a 'crosswalk' (concordance) between the 2010 US Standard Occupational Classification (SOC) system and the 2008 ISCO system (Bureau of Labour Statistics, 2013).

Data published in 2012 (Lockard and Wolf, 2012) show occupations classified down to a 6-digit level with projected growth from 2010–20. Occupations such as personal care aides and home health aides are among the highest growth areas. Other service sector occupations with high projected growth include customer service representatives, post-secondary teachers, nursing aides, information clerks, medical secretaries, sales representatives and teacher assistants. In the health sector, there is also growth predicted across a range of health related specialists including physical therapists, dentists, medical scientists and medical sonographer and mental health counsellor.

This data collection and analysis also shows occupations in decline. Again, while this does not necessarily indicate an oversupply, it does offer a potential insight into areas where a labour surplus might exist. However, as noted earlier in Chapter 2, for some industries in decline there may still be some skills shortages because industry restructuring can lead to new occupation demands or new levels of specialised expertise. Occupations identified in the occupation decline list include shoe machine operators, mail sorters and processors, switchboard operators, sewing machine operators and data entry personnel.

Industry level employment growth predictions for 2010–20 are also available from BLS statistics. Almost all the forecast growth is in the service sector, accounting for 90 percent of all projected industry growth. Health care, education and business services are the major sub-sectors contributing to the service sector projections.

⁷ In the US, industry is classified according to the North American Industry Classification System (NAICS), which is also used by Canada and Mexico. There are concordances between various versions of NAICS and ISIC available at <http://www.census.gov/eos/www/naics/concordance/concordances.html>

Another source of data in the US that can contribute to the identification of labour imbalance is the Job Openings and Labour Turnover Survey (JOLTS). The JOLTS survey collects data on a monthly basis from business establishments. Data collection is achieved through a combination of computer-assisted telephone interviews, touchtone data entry, fax, e-mail and mail. Respondents include private and public sector non-farm establishments. Survey output includes monthly estimates of rates and levels of job openings, hires and separations (Wohlford, 2009). As noted in Chapter 2 job turnover data can be a very useful indicator of labour imbalance. In addition, JOLTS data is combined with unemployment rates to conduct Beveridge curve type analysis, as described in Chapter 2 (Clayton, Spletzer and Wohlford, 2011). However, there is little evidence of the data being used to identify occupational shortages at a disaggregated occupational level.

The experience of the JOLTS program over its 12 year life span underscores the difficulties of using regular economy level labour force data sets to monitor occupational shortages, even in economies with sophisticated and comparatively well-resourced statistics agencies. For example, the JOLTS survey is derived from a relatively small random sample and differentiates industry sectors but not occupations. As the US respondent to the present project noted:

JOLTS does not measure skill (occupation) shortages. Only extremely broad inferences can be made about occupational information based on industry data (US Skills Mapping Project Response, 2013:2).

Specific and comprehensive methods and instruments focussed on gathering skill imbalance data, based on comparable definitions of occupations, are required for this task.

Both the public and private sectors in the US have funded tertiary education and vocational training. On-the-job training is an important component of many enterprises efforts to build employee capacity. Nevertheless, imbalances occur and internal mobility – moving from areas of declining opportunity to places where more jobs are available – addresses skills shortages.

At the same time international migration has been an important mechanism for filling labour market gaps for workers with a wide range of skills and education levels. Temporary migration, often changing to permanent migration, has enabled skilled workers and students to enter the US. The wide range of visa categories is indicative of the importance of this tool over a long period of time. Under most circumstances, legally hiring foreign workers in the United States requires certification by the US Department of Labor that there are not sufficient US workers who are able, willing, qualified, and available for the employment offered to the foreign worker, and that the wages and working conditions of similarly employed US workers will not be adversely affected. The US Department of Labor also uses a portion of the visa fees paid by employers hiring highly skilled foreign workers to fund training for US workers to obtain the skills needed for in-demand occupations in the high-growth industries that utilize these foreign workers.

Japan

Japan is typical of other advanced economies in that it is highly industrialised and has a large service sector. The Japanese economy started industrialising early and has now reached the stage where manufacturing is contracting and the service sector is rapidly expanding. But it faces serious problems with the size and composition of its labour force. It is at the extreme end of the 'aging advanced' spectrum and is already experiencing a declining labour force, due to persistently low fertility since the 1950-60s and limited immigration. On the other hand, Canada, the US and the UK are described as 'young advanced' economies and their labour forces are still growing. Higher fertility and more immigration have reduced the rate of population aging. The other outstanding feature of Japan is the low female labour force participation rate, especially of older women. Overall

the female labour force participation rate is under 50 per cent compared with almost 75 per cent for males. Moreover, only 65 per cent of college-educated women are employed, with many of them in low-paid temporary jobs' (Thompson, 2012). Socio/cultural attitudes and expectations often keep many out of the workforce, especially in the higher level jobs.

The Japan Occupation Classification System was established in 1960 and has frequently been refined in response to changing occupations and to enhance its comparability with ISCO. The industrial classification is the Standard Industrial Classification for Japan. There are major groups (14 items) and intermediate groups (48 items). The 2012 Economic Census for Business Activity shows that the number of employees by industry was largest in the Wholesale and Retail Trade with 12 million (21.3 per cent of all industries), followed by Manufacturing with 9.4 million (16.7 per cent) and Medical, Health Care and Welfare with 6.3 million (11.1 per cent). These three industries employed just under 50 per cent of all workers, and the tertiary sector engaged 76 per cent of all employees (Ministry of Internal Affairs and Communications, 2013).

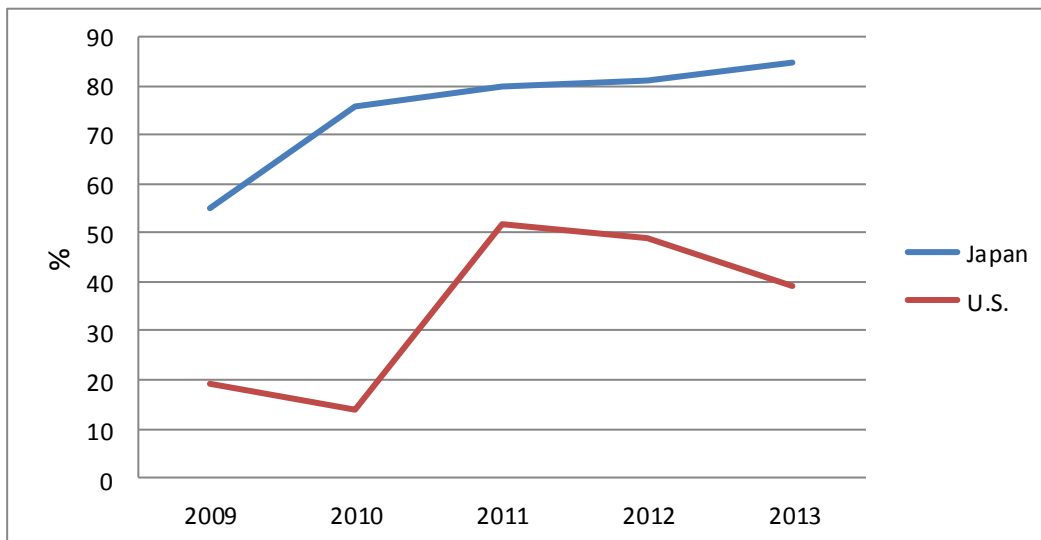
The Japanese labour force consists of around 66 million people, most of whom are highly educated. The Statistics Bureau and the Director-General for Policy Planning (Statistical Standards) of Japan play the central role in the official statistical system in producing and disseminating basic official statistics, and coordinating statistical work under the Statistics Act and other legislation. The Statistics Bureau of Japan regularly conducts Labour Force Surveys to assess the employment/unemployment situation. This survey also includes non-regular employment and working hours (Ministry of Internal Affairs and Communications, 2011).

Structural adjustment has been occurring, as there is a move out of manufacturing into the service sector. As part of this, many manufacturing firms have relocated offshore for cheaper wages and other competitive advantages. The growth of sectors such as finance, insurance and real estate, calls for new types of skills and workers cannot necessarily be retrained into these jobs easily. On top of this, the Japan economy suffered a major blow in 2011, as a result of the Great East Japan Earthquake and Tsunami. This has had an effect on hiring decisions but the evidence seems to suggest that confidence is returning, except in the medical industry where biotech firms are considering their options (Thompson, 2012).

Data on Japanese skills shortages are mostly obtained from private surveys undertaken by international agencies. The most recent Manpower Group survey found that 83 per cent of employers responded that they found it difficult or extremely difficult to source the personnel that met their needs (see Figure 1). This is the second consecutive year that Japan has ranked highest in the world. Figure 2 shows that the situation in Japan has been on an upward trend since 2009, compared with the US A recent HAYS Japan survey of hiring managers found 'that 64% of employers were looking for personnel with a global mindset as they were confronted with a more globalized marketplace' (HAYS, 2013). The largest shortages occurred for engineers, sales representatives, accounting and finance staff, technicians, IT staff, sales managers, IT managers, doctors and other health professionals, customer service workers and supervisors. Employers are looking for skilled, experienced personnel with a 'global mindset' (HAYS, 2013).

Thus, the importance of 'soft skills' is reiterated and advanced communication skills, flexibility, and cultural adaptability, etc are valued. Terms such as an 'English crisis' are circulating as Japanese employers (78 per cent) stress the importance of advanced communication skills (HAYS, 2013).

Figure 2: Per cent of firms in Japan and the US claiming difficulty filling vacancies: 2009-2013



Source: Manpower Group (2013) Figure 4, p. 7

In the context of strict immigration laws and integration challenges, Japan generally attempts to overcome its skill shortages locally (Rosselet, 2013). This involves: new technologies to replace workers; encouraging those not in the labour force or unemployed people to rejoin the workforce (women, people with a disability, new graduates); rehiring retired workers, and outsourcing. Immigration is strictly controlled and there are only two million foreigners, mostly filling less skilled positions (Thompson, 2013). Figures are hard to find but only 21.8 per cent of the estimated 709,000 foreign workers in Japan in 2000 were professional or technical workers (Ducanes and Abella, 2008). In addition to these, there were 54,000 foreign 'trainees' (a specific Japanese concept) in 2000, some of whom may have been working (Yoo *et al.*, 2004).

3.3.2 Newly Industrialised Economies

Hong Kong, China

Hong Kong's economy is focused heavily on tertiary sectors. Both its proximity to Mainland China and its development into a regional hub for many transport, financial and telecommunications activities place it in a unique position. The four pillar economic sectors of Hong Kong are: trading and logistics (25.5 per cent of GDP in 2011), tourism (4.5 per cent), financial services (16.1 per cent), and professional services and other producer services (12.4 per cent). On the other hand, selected emerging industries (formerly known as the six industries) in which Hong Kong has been identified as enjoying advantages for further development are cultural and creative industries, medical services, education services, innovation and technology, testing and certification services and environmental industries, which together accounted for 8.5 per cent of GDP in terms of value-added in 2011 (HKTDC Research, 2013). 'Multinationals are investing heavily in Hong Kong, a strategically located world-class business centre. This is a key driver behind the growing demand for professional workers', according to Anthony Thompson (HAYS Asia Salary Guide, 2013).

The occupation classification of Hong Kong is mainly based on the International Standard Classification of Occupations (ISCO-08) with local adaptation. The classification consists of three levels: major groups, sub-major groups and minor groups. There are 10 major groups, a maximum of six sub-major groups in each major group, and a maximum of eight minor groups in each sub-major group. While the General Household Survey collects information on unemployment and underemployment, reflecting the extent of unused capacity in the

labour force, the establishment-based Quarterly Survey of Employment and Vacancies provides statistics on the number of persons engaged and vacancies in major economic sectors. The Government also conducts exercises for projecting medium-term manpower supply and requirement situation, and there are some other data coming from global or regional employer surveys conducted by private firms such as recruitment agencies. Hong Kong has an NQF for all sectors, but within the broad sector categories, some sub-sector areas are still being developed.

The Manpower GTS survey of 2012 found that the top ten occupations where there were shortages were: sales representatives, engineers, labourers, technicians, management/executive, IT staff, accounting and finance staff, insurance staff, marketing/public relations/communications staff, and cleaners and domestic staff. Eight of these are skilled occupations.

According to the most recent 2013 Hays Survey, 49 per cent of employers in Hong Kong stated that skills shortages would 'without a doubt' affect their operation. This was up from 38 per cent in 2012. The demand for professionals is outweighing supply across professional occupations and this is expected to intensify. Employee turnover is also a major issue for employers with expected turnover rates outstripping those of China, Australia and Singapore. As pointed out earlier, this is a key indicator of shortages.

Some of the gaps in Hong Kong's labour markets have been filled from overseas, including returning Hong Kong residents. In addition, Hong Kong administers an open and liberal immigration regime and welcomes people with valuable skills, knowledge and experience to work and live in Hong Kong.

Republic of Korea

There are a range of Korean data sources for monitoring labour-force supply and demand. These include the Local Area Labour Force Survey (3-4 digit level) and the Economically Active Population Survey (by industry and occupation at the 1-3 digit level). There are also data available from surveys of major companies that identify short-term trends in the labour market. Occupation classification for these data is according to the Korean Classification of Occupations (KSCO) 6th version. KSCO has been established on the basis of the International Standard Classification of Occupations (ISCO). It defines five levels of aggregation and the structure is as follows: 10 Major groups; 52 sub-major groups; 149 minor groups; 426 unit groups; and 1,206 sub-unit groups. Korea was in the process of developing an NQF for vocational qualifications as at 2009 (APEC HRDWG, 2009).

According to Seoul (2013), there are now two major ways of identifying shortages in the Republic of Korea. The first is by the Occupational Labour Force Survey at Establishments, conducted by the Ministry of Employment and Labour. The purpose is to produce and disseminate basic data on labour demand and labour shortages needed for making the foreign labour policies and the workers vocational training policies. It is conducted biannually. The second is the Foreigners' Employment Survey conducted by the Korea National Statistical Office which provides data on the labour market participation of foreign residents. This survey was first conducted in June 2012.

The Republic of Korea has had various migrant worker recruitment mechanisms to fill shortages in the labour market for many years. On 1 January 2012, there were 647,177 less-skilled and 44,264 highly-skilled migrant workers (Seoul, 2012). Half of the latter were Foreign Language Instructors and around 5-6 per cent were Professors, Researchers and Arts and Entertainment (mostly Filipinas working in the entertainment industry and defined as 'highly-skilled') workers. According to Seoul (2013), the Korea government, applies special immigration and settlement policies to attract 'global talent professionals' for 'brain gain' into Korea.

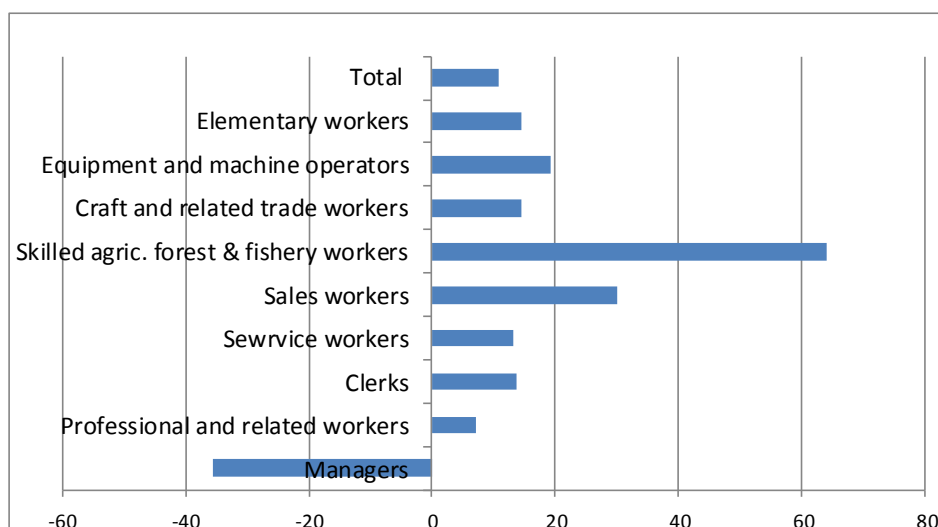
In 2012, the Republic of Korea produced a detailed analysis of medium to long-term labour supply-demand (KEIS, 2012). According to the KEIS data most employment growth through to 2020 at the industry sector level will be in the service sector. Sub-industry sectors predicted to lead this growth are human health and social work, sewage and waste management, materials recovery and remediation, business facilities, sport and recreation, ICT and scientific and technical activities. The current decline in manufacturing job growth is expected to slow while job decline in agriculture, forestry and fishing is predicted to continue. A gradual increase is expected in electricity, gas and water and construction. Industry level job growth predictions are available in KEIS at the two-digit level.

KEIS (2012) also provides predictions in occupational growth/decline. The strongest predicted annual growth rates are for professional and related workers, clerks and managers. The top ten growth occupations at the two-digit level are health, social welfare and religion-related occupations, cleaners and security guards, engineering professional and technical occupations. The biggest declining group is agriculture, especially livestock-related skilled occupations. At a more disaggregated level, cleaner and sanitation workers, administration related clerks, technical sales representatives and brokerage related workers and finance and insurance related clerks are expected to show large employment growth over the next 10 years. Although these predictions of job growth don't necessarily imply labour shortages, they do indicate potential areas of shortage.

The Korean job forecast data have been analysed in the context of 'new entrant' predictions from the Korean education system and mismatch forecasts produced by field of higher education study and occupation for the period 2011-20). Overall, the Korean new entrant labour market is expected to remain in a state of oversupply. This is expected to be particularly high among graduates from the natural sciences but suggests a mismatch oversupply across all fields of study, with the least oversupply predicted for medicine (KEIS, 2012).

The mismatch forecast by KEIS for the period 2010-20, according to occupation, is for a 36 per cent shortage among managers. In contrast 64 per cent oversupply is predicted for skilled agriculture, forestry and fishery workers and a 30 per cent oversupply among sales workers (see Figure 3). It is not clear from these data how the supply of skilled trade related occupations will fare over the same period, because the field of study among new entrants' data appear to be drawn solely from four-year university and two-year college output data and subsequently may be under-representing other vocational training outputs.

Figure 3: New entrant supply–demand mismatch forecast by occupation: Korea 2011-20



Source: Korea Skills Mapping Project Response (2013)

Note: Excess supply ratio = excess supply/new supply

Singapore

Singapore's rapid industrialisation was initially based on encouraging transnational corporations (TNCs) to provide a basis for domestic industrial development. Branches of electronics, software and biotechnology have provided a major focus for science and technology (S&T) based industrial expansion. Decisions taken by Singapore, to invest very heavily in IT and then in biotechnology and in the attraction and retention of major leading edge firms in IT and the attraction and creation of biotech firms has enabled the economy, with a comparatively small population, to attract highly skilled science and technology personnel (Turpin *et al.*, 2010:74).

The Singapore Standard Occupational Classification (SSOC) 2010 is based on the International Standard Classification of Occupations 2008 (ISCO-08). There are five levels (Major Group, Sub-major Group, Minor Group, Unit Group and Occupation): 10 Major Groups; 43 Sub-major Groups; 104 Minor Groups; 400 Unit Groups, and 1,124 Occupations (United Nations Statistics Division, 2013). Singapore has a VET only qualifications framework (APEC HRDWG, 2009).

Services in Singapore account for 76.2 per cent of all employment (ILO, 2010). The Singapore Ministry of Manpower maintains a list of 'strategic skills in demand' (see www.mom.gov.sg/skills-training-and-development/skills-in-demand). The list is compiled from surveys of industries and government sources and is intended to serve as a guide for skilled workers planning to relocate to Singapore. The current list indicates anticipated high demand for occupations in manufacturing, construction, healthcare, finance, IT and digital media, and tourism and retail (Rikvin, 2013).

Occupations listed in high demand in manufacturing include firmware engineers, electrical, process and design engineers and a number of related technical specialists. The construction sector skills in demand include civil engineers, architects, draftsmen and other trained professionals. In the healthcare sector, professionals are required for registered nurses, as well as physicians, surgeons, and other healthcare professionals.

In the finance sector senior financial and investment managers, IT professionals, underwriters and actuaries and research analysts are in demand. In the tourism and retail sector, demand occupations include lighting designers, production managers, sound and set designers and museum curators. In the information, communication and digital media sectors industries there are shortages of software engineers, systems analysts, computer systems administrator, animator, artist project managers and a range of media technical specialists.

Singapore has a well-developed training system in the graduate market but there is still a significant inflow of intra-company transferees and independent skilled migrants. There is a sophisticated points system to attract high skilled workers, a small minority of whom may eventually become permanent immigrants. In recent years Singapore has become a hub for higher education training that draws students from across the region. Aside from income to higher education institutions students provide a pool of domestically-qualified labour supply (Iredale *et al.*, 2010: 4).

Singapore is much less able to supply its own technician and trade needs. The vocational training system is given much less emphasis and it is expected that demand will largely be met from overseas, for many occupations. It is also reliant on migration to fill semi-skilled occupations e.g. housemaids and care-workers (see Yeoh and Lin, 2012; Yue, 2008).

Chinese Taipei

Chinese Taipei's economy is dominated by small and medium size firms spread across the services and manufacturing sectors. It is regarded as one of the most innovative and digitised economies in the world. The labour market consists of 11.2 million people but this is expected to decline with the low birth rate and aging population. It has been moving from a low wage to a high technology, service-oriented economy.

Labour force data in Chinese Taipei is compiled from manpower surveys and published by the Directorate-General of Budget, Accounting and Statistics (DGBAS). Since 1977 regular surveys have been carried out based on international classifications and standards. Data are currently produced monthly. In addition, supplementary surveys have focused on selected subject areas such as 'job expectations' and 'Manpower utilization' (DGBAS, 2013). There are no regular surveys covering occupational shortages or over-supply.⁸

According to some observers there is currently a labour shortage in Chinese Taipei 'at rates not seen for 13 years' (Thompson, 2012b). There are more than 230,000 job openings, a 44 per cent increase from 2010. Almost half of all employers responding to the 2012 Manpower GTS survey reported having difficulty finding qualified employees. The ten most hard-to-fill jobs are: sales representatives; engineers; technicians; management/executive staff; researchers (R&D); IT staff; accounting and finance staff; production operators; customer service representatives and customer support, and designers. The industries most impacted by skills shortages are: consumer, retail and fast moving consumer goods; IT; banking and financial services, and asset management.

Employers report a lack of both 'soft' and 'hard' skills. The soft skills most frequently identified as lacking are: interpersonal skills; enthusiasm/motivation; collaboration and teamwork, and flexibility/adaptability/agility. Other soft skills in short supply are: problem solving and decision-making; professionalism; attention to detail, and ability to deal with ambiguity/complexity. In terms of hard skills, the shortage of applicants with industry qualifications and certifications and language and verbal skills are most evident. This is especially the case for engineers and IT staff.

⁸ A detailed description of the Chinese Taipei Manpower Survey' is available at <http://eng.stat.gov.tw/ct.asp?xItem=4384&ctNode=1607&mp=5>

Chinese Taipei has a significant labour migrant recruitment program, based mostly on temporary contract labour supply. Much of this is of less skilled labour but policies and programs to encourage the return of qualified nationals have been in place since the 1960s. Population ageing and skills shortages provide challenges but the government's willingness to embrace more skilled foreign workers may help alleviate some of the shortages.

3.3.3 Economies Emerging From a Largely Agricultural Base

To cope with expected demand from employers, all six economies in this group have been encouraging the growth of tertiary education enrolments. However, there is a strong and growing demand for high-quality, high-skilled talent across a variety of fields in these economies, contributing to skill mismatches or shortages.

The People's Republic of China

Continued economic growth in China throughout the period of the GFC has generated continuing demand for skilled workers. In spite of the significant numbers of domestically and foreign trained new entrants to the labour force, there are warnings of skills shortages for the near future. The limited capacity of education and training institutions within China to keep pace with demand, uneven development (concentrated mainly in the eastern regions) and the extensive operations of multinationals in the Chinese economy have all contributed to this situation (Davies *et al.*, 2012). In particular, multinational companies operating in the Chinese economy have drawn attention to what they describe as a lack of necessary skills for service sector occupations and a persistent shortage of engineering, accounting, managers and related skilled personnel. Both MNCs and domestic employers report a shortage of 'soft skills', including in relation to communication and critical thinking.

As with most other APEC economies there does not appear to be any regular economy level comprehensive monitoring of labour market shortages across occupations or industry sectors. The Chinese National Statistics System has a detailed classification of occupations (CSCO) with an ISCO concordance. However, the most detailed information available on skills shortages by industry and occupation appear to be from specialised private surveys.

A recent AmCham business survey of Chinese firms noted that management-level human resource constraints were considered the top business challenge by over 40 per cent of company respondents (up over 10 per cent on the previous year). Further, 20 per cent of firm respondents considered labour shortages, overall, as the greatest risk facing their organisation. This was up from only seven per cent in 2010 (AmCham China, 2012).

The manufacturing sector in China is predicted to continue growing over the next two decades with potential shortages of technicians, production operators and skilled trade workers (Manpower Group, 2012). The service sector is likely to experience shortages among managers, executives, administrative support staff and health professionals (Xu, 2013).

A recent global study has noted, in a section focused on China, large growth in demand for professional occupations in the finance sector, particularly financial analysts, commercial directors, tax managers and strategy directors (Michael Page, 2013). This study also identifies shortages in the construction sector, including architects, project managers and urban planners. Retail shortages identified include retail, merchandising and purchasing managers. In these occupations there are strong demands for soft skills such as communication style and customer communication skills. The Michael Page forecast (Michael Page, 2013) is focused solely on professional occupations and consequently has little to offer about trade related occupations. However, they do draw attention to a growing demand in the medical and pharmaceutical sectors, as well as the IT, software and e-commerce sectors.

Responses to the skills mismatch in China generally fall into three categories: increased training of workers within domestic firms and MNCs; recruitment of personnel from foreign countries; and improving the capacity of the domestic education and training system.

Indonesia

The Indonesian economy was traditionally based on the extraction and export of raw materials. More recently there has been a trend toward diversification. According to The Economist Intelligence Unit nearly half of the labour force is employed in the service sector. Following recovery from the 1997/8 Asian financial crisis Indonesia has made a significant recovery. In 2012, the economy recorded its highest annual growth rate, since 1998 (APEC Policy Support Unit, 2012). Current observations are that while Indonesia does not suffer from a lack of graduates, it does suffer from a 'lack of appropriately skilled workers' (Economist Intelligence Unit, 2012:26).

Descriptive employment data are collected in Indonesia through various large scale surveys (*Indonesian Skills Mapping Project Report*, 2013). The National Labour Force Survey (NLFS) is the most significant and this is conducted twice a year. This survey provides data on employment numbers by occupation and industry. Indonesian labour force data appears to be based on the ILO system of classifications.

NLFS data for 2012 show that occupations experiencing the greatest shortages are administrative and managerial workers, service workers and production and related workers, transport equipment operators, labourers and 'others'. The rapid growth of services such as finance, insurance, real estate and business services account for the shortage of skilled labour in these areas. The industries experiencing the greatest shortages are Agriculture, Forestry, Hunting and Fishery (3.6 million) and Transportation, Storage and Communication. There is a skills mismatch in Agriculture, etc but there are also surpluses in these industries.

Similarly, data are available on surpluses in 2012. The largest occupational surplus was Sales Workers and the sector where there was the greatest surplus was in Community, Social and Personal Services.

A 2008 World Bank survey of employers found that 'soft skills' and practical experience were perceived to be nearly as important as theoretical knowledge for professionals and skilled workers (EIU, 2012: 22). That is, even though there was an adequate number of university graduates, the quality of their training and their soft skills were often questioned by employers.

Future demand for labour is expected to be highest for university and vocational senior high school level occupations, especially managers and professionals. The quality of workers in these occupations also needs to be improved. The highest demand is expected in the construction industry. Low numbers of 'scientists and engineers could be an obstacle as the Indonesian economy attempts to move up the global value chain' and fields that have traditionally been neglected, such as environmental science and aerospace or defence engineering, could experience shortages (Economist Intelligence Unit, 2012: 27-28).

Malaysia

The Malaysian economy has transformed recently from one based essentially on the export of primary commodities to a multi-sector. During the last decade the economy emerged as one of the region's leading exporters of high technology products. Current growth is almost exclusively driven by exports - particularly of electronics, followed by palm oil and palm oil based products and other manufactured goods and articles (Fadzilah and Krishna, 2007).

Recent data suggests that for the Malaysian economy, economic growth will remain moderate (Malaysian Institute of Economic Research, 2013).⁹

Labour force monitoring in Malaysia is based on the Malaysia Standard Classification of Occupations (MASCO) 2013. There are 10 major groups, 51 sub-Major Groups, 146 Minor Groups, 490 unit Groups and 6,366 Occupations. Malaysia uses the Malaysia Standard Industrial Classification (MSIC) 2008. There are 21 Sections, 88 divisions, 238 groups, 423 classes and 1,174 items. The Malaysian Qualifications Framework (MQF) is a unified system of post-secondary qualifications covering eight levels.

Malaysia does not specifically measure labour or skill shortages or surpluses (Malaysia Project Survey data, 2013). However, the Jobs Malaysia (Portal) in the Department of Labour has published monthly data on job vacancies and jobseekers since 2002. It is available online at <http://www.jobsmalaysia.gov.my/jcs/index.faces>. The Department of Statistics Malaysia publishes data from the Labour Force Survey (LFS) on a quarterly basis and provides information on employment levels.

As noted in Chapter 2 cultural attitudes that diminish the worth of vocational training can be a real cause of skill shortages. Yussuf and Wilkinson (2008) found that in Malaysia, vocational education is poorly regarded compared to academic education and consequently there was a large surplus of tertiary educated graduates and a severe shortage of trades and technical workers. Further, the majority of employers, when hiring new workers, now place more emphasis on soft skills and these are often lacking. The 2013 Jobs Malaysia data supplied by the Malaysian government for this project states that:

- the top three major group occupations that currently have the highest vacancies are: 1. Elementary Occupations; 2. Services and Sales Workers; 3. Plant and Machine Operators and Assemblers;
- the top three major group occupations that currently have the highest jobseekers are: 1. Professionals; 2. Clerical Support Workers; 3. Technicians and Associate Professionals.¹⁰

The number of foreign workers has grown from 1.6 million in 2005 to 3.5 million in 2011. Most are engaged in agricultural, manufacturing and household work and come from neighbouring countries. Malaysia still has many labour intensive jobs due to the lack of both 'technology innovation and Foreign Direct Investment' (Tuan, 2009).

For higher level jobs, Malaysia previously attempted to encourage the return of skilled nationals living overseas but there has been a decline in the number of foreign workers and returning expatriates in recent years. The share of migrants in skilled occupations has declined sharply from a peak of 10 per cent in 2002 to 5.8 per cent in 2008. This is apparently due to rising domestic education levels and a decline in the need to import skilled labour from overseas or encourage the return of nationals (Malaysia Factbook, 2013).

The Philippines

The Philippines economy suffered a considerable down-turn after the 1997/8 Asian financial crisis. However, more recently increased rates of investment and private and public consumption have enabled the economy to avoid much of the instability created by the GFC (Economic Intelligence Unit, 2012). The economy has continued to diversify and there has been increased access to higher education. The service sector has continued to expand

⁹ Available at: <http://www.mier.org.my/outlook/>

¹⁰ These data are published online at:

http://www.jobsmalaysia.gov.my/jcs/jobsm_general/vacanciesAvailable.faces, and

http://www.jobsmalaysia.gov.my/jcs/jobsm_general/activeJobSeekers.faces

creating strong demand for employment among clerical, tourism and real estate occupations (Economic Intelligence Unit, 2012: 34).

The Philippines uses the Philippines Standard Occupational Classification (PSOC 2011), which is based on ILO's ISCO. The 2011 PSOC is identical to the 2008 ISCO up to the four-digit level or unit group level except in Major Group 6 (Skilled Agricultural, Forestry and Fishery Workers wherein some modifications were made at the four-digit level. It is used by government as the basis for manpower planning, program formulation, and policy decision-making in job placement or matching of job seekers with job vacancies as well as in the management of short or long term migration of workers between countries. It is also being used by the Technical and Skills Development Authority (TESDA) and accredited educational institutions in the development of vocational training programs. The Philippines has a qualifications framework that covers all sectors but is in two parts: they are managed separately by the Higher Education and TVET sectors.

The Philippines has managed to increase access to higher education but there remains a need for competitive skills among its workforce. Data on labour shortages are available from a 2009-10 survey of job vacancies among 24,000 establishments, conducted by the TESDA. Clerks comprise the single largest group of vacancies (26.3 per cent), Professionals ranked second (15.1 per cent) followed by Plant and Machine Operators (14.4 per cent) and Service Workers and Shop Market Sales Workers (14.3 per cent).

At a more disaggregated level the 'top ten' vacancies were: back-office support staff, sales representatives, factory assemblers and security guards which accounted for 46.5 per cent of the vacancies reported by employers. Vacancies also existed for customer service representatives or call-centre agents in the rapidly growing outsourcing sector, which is expected to widen to include highly specialised services in healthcare, engineering, animation and accounting. The six occupations that had the largest number of vacancies were customer service representatives, hotel and restaurant service staff, garment workers, electronic equipment assemblers, college, university and higher education teaching professionals and professional nurses. The hardest-to-fill vacancies were in the Professional Workers category: engineers and accountants. The Philippines government maintains a list of the top 50 vacancies at Phil-JobNet, available online at www.phil-job.net/?action=top50&mode=vacancy.

As noted in Chapter 2 quantitative information on vacancies is useful but needs to be supplemented by qualitative data to explain the cause of recruitment difficulties. For the Philippines two categories of 'hard-to-fill' vacancies have been observed: (1) occupations with few applicants reflecting a shortage; and (2) occupations with a large number of applicants, but with few qualified ones, reflecting excess supply or surplus (Economist Intelligence Unit, 2012: 36). In the case of (2), there were many applicants but few who met the specific skill requirements of the job. In the case of (1) there were few applicants with or without the required skills. The highest applicant-to-vacancy ratios were reported for occupations belonging to professionals, technicians and associate professionals.

At the same time as these shortages existing, the Philippines has been expanding its overseas labour deployment program to the 2011 record-high new hires figure of 1,687,831, which is far above the 2010 figure of 1,470,826 (14.8 per cent increase). Of the 437,720 new hires in 2011, 201,512 (48 per cent) were service workers, 141,215 (32 per cent) were production workers and 61,598 (14 per cent) were professional, technical and related workers (Philippines Overseas Employment Agency, 2013: 8).

It was pointed out in Chapter 2 that migration can be a way to fill vacancies as well as a cause of labour shortage. In the Philippines hard-to-fill vacancies result from a combination of emigration and low quality of education and training (Iredale and Guo, 2000). At the same time the Government, through the Department of Labour and Employment (DOLE),

manages a fairly tight program for importing skilled labour. Positions cannot be filled easily by foreign workers and a process involving advertising in the newspapers and DOLE publishing a list of occupations in the newspaper, where permission has been sought to import a worker, are in place.

Steps are being taken to improve the quality and relevance of higher education as well as better guidance for students in the selection of their course of study. However, the lure of overseas labour markets is a major factor as the wages that can be earned overseas are far in excess of what can be earned in the Philippines. In 2000, some people earned 14 times what could be earned in the Philippines (Iredale and Guo, 2000).

Thailand

The Thai economy has, in recent years, steadily expanded its export manufacturing sector. By 2030 Thai exports have been predicted to generate 80 per cent of GDP. As Thai industrial firms have moved up the value chain their demand for skilled professional and technical workers has increased. The government has placed high priority to high technology manufacturing stimulating demand for a wide range of occupations in these areas (Economist Intelligence Unit, 2012:8). More recently there has been increased growth in services. The tertiary sector now accounts for 40 per cent of total employment: 12.6 million people work in this sector and it is expected to grow 5 per cent annually. The shortage of both skilled and unskilled labour 'has been a chronic issue for businesses in Thailand' (Economist Intelligence Unit, 2012: 43).

Thailand has developed the Thailand Standard Classification of Occupation (TSCO, 2001), using the International Standard Classification of Occupation version 1988, ILO as the reference. The TSCO 2001 now comprises 10 majors, which are then further subdivided into a total of 28 sub majors, 116 groups and 391 units (United Nations Statistics Division, 2013). Thailand has a qualifications framework for the higher education sector only.

There are macro data on shortages in Thailand in 2008 from the National Statistical Office. These data reveal an overall shortage of 250,000 workers with shortages in all occupational categories but especially for technical and associate professionals, service workers, craft and related trades workers and plant and related machinery operators (Economist Intelligence Unit, 2012: 44). The picture is one where human capital formation has not kept pace with economic growth. The higher education system does not produce the number and quality of graduates that are currently required, or will be in the future. For example, 14,652 engineers were produced from Thai universities in 2010 and yet predicted demand was for 100,000 (Economist Intelligence Unit, 2012: 46).

In a 2007 survey of manufacturing firms, the *Thailand Productivity and Investment Climate Survey*, 20 per cent of firms reported shortages of professional workers and 30 per cent reported a shortage of skilled production workers, including 50 per cent of auto parts firms. Firms complain about a high turnover of new recruits and the lack of basic and technical skills among applicants. Universities and training institutes are perceived to not be producing employees that meet the expectations of employers, again contributing to problems with skills mismatch.

The *Thailand Productivity and Investment Climate Survey* also found that firms spent an average of 7.4 weeks hiring a professional worker while firms in the export sector spent 7.9 weeks. On the other side of the coin, 90 per cent of those searching for a job for longer than 3 months were individuals with higher education. The quantity and quality of the skilled workforce is holding back growth in productivity. Since Thailand's intention is to promote its high-skills manufacturing, services and R&D capabilities, skilled labour shortages are likely set to continue.

Thailand does not readily admit foreign workers into skilled occupations. Most migrant workers are in the agriculture and fishing industries. If, and when, ASEAN enables the freer flow of skilled labour (projected for 2015), there is a possibility that Thailand may lose more professionals, technicians and managers to more developed ASEAN states for better wages and opportunities (Iredale *et al.*, 2010).

Viet Nam

Viet Nam has become increasingly integrated into the world economy, particularly after liberalisation within the economy and accession to the World Trade Organization (WTO) in 2007. Manufacturing and service sectors each account for 40 per cent of GDP and agriculture accounts for 20 per cent. However, the majority of the workforce, 48 per cent, is still employed in agriculture, while industry employs 22.4 per cent and services 29.6 per cent. One million workers a year, out of total of 51.33 million in 2010, are expected to continue to leave agriculture for the other sectors for the foreseeable future (Economic Intelligence Unit, 2012: 51). On the manufacturing side, Viet Nam is expected to lose some of its low-wage comparative advantage in the near future and needs to compensate with higher productivity gains in the economy in order to sustain past growth rates.

Labour force data in Viet Nam are collected according to the Viet Nam Standard Occupational Occupation and Industrial Classification (VISIC), managed by the General Statistics Office (Viet Nam Skills Mapping Project Survey Response (2013). There is an economy-level monthly labour force survey but there is no official measure of job vacancies or skills shortages/surpluses.

There do not appear to be economy-level statistics on shortages but some data are available from a number of cross-economy enterprise surveys. The 2011 Manpower GTS survey shows that one third of employers reported not being able to find the skills they need. A separate survey found that 40 per cent of executives in Viet Nam reported having trouble filling jobs—across different levels, industries and professions (Economic Intelligence Unit, 2012: 54). The Manpower GTS survey also revealed acute shortages in technical and industry expertise in certain industries: for example, (1) in food processing; (2) healthcare; (3) construction; (4) transportation and logistics; (5) chemicals and fertiliser industries, and (6) the textile industry. The skills gap is also very pervasive at the management level. A wide variety of skills are required to run a productive, efficient, environmentally responsible, safe and innovative firm.

Viet Nam appears to be experiencing occupational shortages in four out of six major categories—labourers, management, engineers and skilled manual trades workers. There appears to be a shortage in many jobs requiring higher and vocational education. A Japan External Trade Organisation (JETRO) survey found that the shortage of engineers, technicians and middle managers was comparatively higher in Viet Nam than in Malaysia, Thailand, Indonesia and the Philippines. More blue-collar workers with technical and computer skills will also be needed in the future (Economic Intelligence Unit, 2012: 56).

While the literacy rate is high, skills shortages have been a persistent problem due to inadequate higher education and training. Skills development has not kept pace with economic growth and the demand for skilled workers. Future high demand for skilled workers is expected in the garment industry, tourism and hospitality services and information and communications technologies. Improving the education systems to develop the appropriate sets of skills will be imperative to address current and anticipated shortages.

Viet Nam has been open to filling many labour shortages from other economies for some time. In 1992 Pang noted that since 1985 there had been a considerable flow from Chinese Taipei to Viet Nam and China. In a recent ASEAN project conducted by two of the authors of this report, Viet Nam indicated that it is increasingly opening up the freer inflow of managers

and professionals from within the ASEAN group, as part of the ASEAN Framework Agreement on Services (AFAS) (Iredale *et al.*, 2010).

3.3.4 The Spanish Speaking APEC Economies¹¹

The three Spanish speaking APEC economies, Chile, Mexico and Peru, are culturally homogeneous in terms of language and historical background and there is much in common across the institutions and practices related to education, and labour. These commonalities facilitate the mobility of workers between these economies, as well as others in Latin America. International organisations such as CEPAL (Economic Conference for Latin America), OEI (Organization of Iberian American States) and BID (Inter-American Development Bank) play an important role in the formulation and application of policies in the region.

Chile

Chile has a relatively high level of economic development. Mining, gas, fishing, maritime resources and agriculture are important and the economy has been comparatively open to international trends. Its economic growth has been consistent at around six per cent per year over the last decade. National unemployment is impressively low by historical standards, recording six per cent in 2012 (OEI, 2013).

Labour force data are collected by the Chilean statistics office using a standard classification that aligns reasonably well with the ILO standard occupation and industry classifications. Ready-to-use tables with detailed occupation and industry classifications, however, are not readily available. Chile also has an observatory (Futuro Laboral), developed in close cooperation with the educational institutions, which provides detailed accounts of employability in most of the existing degrees in the economy, although mostly focused on higher education. It is perhaps a good example for forecasting the supply of and demand for tertiary graduates. The Department of Labor and the Institute of Statistics (INE) also provide detailed analysis of labor and statistics. Chile is in the process of developing a qualifications framework (APEC HRDWG, 2009).

Through 2000-10 employment in agriculture and manufacturing decreased while that in the mining, construction and services sectors increased (OIT, 2011: 47-49). With economic growth there have been dramatic improvements in educational participation, with around 80 per cent of young people entering upper secondary, and 40 per cent entering tertiary education (OECD, 2009). Yet as with many other APEC economies, observers have noted there is increased need to more effectively mobilize human capital to underpin future economic growth (Kis and Field, 2009). Informal employment remains an important factor so too is youth unemployment. Chile has one of the lowest participation rates of women in the labour market of all OECD countries (OECD, 2009). Many of the new jobs for young people are temporary, insecure and poorly paid. On the other hand, some emerging sectors are having difficulties recruiting, especially the more skilled jobs in energy, mining, construction and fisheries. The boom in the construction sector and mining are attracting specialist workers with good salaries. Some of the bigger Chilean firms are seeking qualified workers from abroad, mostly from neighbouring Latin American countries and Spain (Arenas and Cuarite, 2009; Ministerio de Educación, 2009).

The Futuro Laboural, (2011) also surveys the employment outcomes of university graduates one year after graduating. For 2011, those professional degrees with high employability included audiology, nursing, chemistry and pharmacy, geology, statistic, engineering, medical technologies, mining engineering and pedagogy related to math, risk prevention and most of the engineering degrees. For those with technical degrees (lower tier higher education) high employability was noted for plant managers, financial officers, business and

¹¹ Note, references cited in this sub-section for the Spanish-speaking APEC economies are listed separately in Appendix 1.

human resources administrators, financial trading, quality control, industrial design and drawing, electronics, and tax administration. The degrees with lower employability are related to humanities, history, art and design, some specialties of biology, chemistry and veterinarian studies, and some fields from the social science, such as pedagogy, primary education and social work.

For an overview of most demanded occupations, some human resource management firms provide useful accounts. For instance, Adecco Chile regularly provides a list of the jobs more demanded by firms. For 2012 they highlighted a high demand for web managers, financial analysts for energy projects, project engineers, production managers, commercial specialists, sales delegates, and health related professions (dermatologists, gynecologists, and pediatricians).

In addition to traditional academic and technical skills, employers are looking for social and emotional skills related to behaviour such as critical thinking, responsibility, team-work and capacity to resolve complex problems. More than half of recently surveyed entrepreneurs noted that their requirement for these personal skills has increased significantly in recent years and 80 per cent of respondents noted that supply of these skills is scarce and creates a barrier for development (Bassi *et.al.*, 2012).

Mexico

The situation of Mexico is more complex because of the size and diversity of both territory and population. There are important differences between cities and rural areas, and between northern and southern regions. Agriculture is important, although manufacturing has developed around the outsourcing process, mainly from the USA (the so called “maquila” factories). Oil related sectors have an important role, while services and tourism are important in metropolitan areas and the coast. There are very different social and economic structures in large metropolitan areas such as Mexico City and rural peripheral regions.

Mexico uses an occupation and industry classification system (SINCO) and (SCIAN) based on the North American system. There is no formal measure of job vacancies and no official measure of skills shortages or surpluses, although there are estimates. The Mexican Labor Observatory (OLA) is implemented by the Federal Government. The OLA represents a public effort to provide information for practical purposes for young people, families, entrepreneurs and public officials interested in the development of the labor market. It includes practical recommendations, foresight exercises, lists of occupations and degrees, and annual reports adapted to different types of audiences. The data are obtained systematically from the National Survey on Employment and Occupations, the registries of the ‘Employment Site’ and the National Catalogue of Occupations. Because of this effort detailed information about occupations by sector and demand of workers is easier to find in Mexico than in other countries in this sub-region (see <http://www.observatoriolaboral.gob.mx/>).

The Mexican economy has confronted significant problems during the last decade. In 2009 the economy contracted by nearly seven per cent (Rodríguez, 2010). International rankings related to competitiveness also declined from 33rd in 2000 to 60th in 2009 among a total of 132 countries (World Economic Forum, 2011). Although since 2012 the performance of Mexican economy is increasing.¹²

The current economic environment has led to a mismatch between available jobs and the new cohorts entering the labour market. The number of students in secondary and tertiary education has increased significantly. An important issue is related to the difficulty of the young population to integrate into the labour market while the economy is stagnant. Low

¹² <http://www.bancomundial.org/es/country/mexico/overview>,
<http://www.cnnexpansion.com/economia/2013/08/29/recesion-pena-videgaray-desempleo-pib>

productivity is limiting the creation of new jobs and many people are in precarious informal employment (Rodríguez, 2010; OIT, 2007).

Despite widespread labour over-supply, some sectors of the Mexican economy are experiencing skill shortages. Sectors where skills are in short supply are construction, specialised services for businesses, secondary and higher education sector, agri-food, energy and financial services and tourism (Pieck, 2005; OLA, 2011). Other important needs are related to the adaptation of rural and Indigenous communities to new economic trends in the Mexican economy (Secretaría de Educación Pública de México, 2007). In the manufacture of electrical appliances, Salieri *et.al.* (2010) found shortages in basic competencies of technical workers and an unsatisfied demand in specialised areas such as, welding, electrical calibration, and the use of specialised tools.

According to the *Global Talent Survey* by the Manpower Group (2013), 34 per cent of entrepreneurs found that new job applicants had a lack of technical skills, 32 per cent claimed that there weren't enough candidates for the jobs on offer, and 24 per cent claimed that candidates did not have sufficient previous experience necessary to fill the positions. According to this survey, the following occupations were the most difficult to fill: specialised technical workers; engineers; trade representatives; technicians, accounting and finance personnel; managers and executives; IT personnel; specialised drivers; qualified secretaries, administrative and office assistants; and construction workers.

The Mexican Observatory for Labour (OLA) provides a systematic account of the current situation of new degree graduates, occupations and global trends in the labour market. The following list from the OLA includes those occupations with an estimated shortage of workers for 2012: auxiliary personnel in legal services; auxiliary personnel in hospitals and medicine; auxiliary personnel and technicians in audio engineering, video, and related fields; technicians in topography, hydrology and geology; public transport checkers; area coordinators in legal services, attorneys, judges, and related positions; technical drawing; plague control specialists; teachers of foreign languages; officers in security public bodies and detectives; equipment operators for the production of beverages; journalists; auxiliary workers in agriculture; specialised workers in green houses for agriculture; private porters and security personnel.

The mismatch between education and labour market demands in Mexico is widely acknowledged. Only around 10 to 14 per cent of new graduates found appropriate jobs in the labour market (ANUIES, 2010). On the other hand, there is an unmet demand in some sectors for those with professional degrees. (ANUIES, 2010; Álvarez y Pérez de Lao, 2005).

Peru

Peru has high population density in rural areas, and a large Indigenous population. Compared to Chile, the economy is more concentrated in agriculture, although modern agri-business and food processing are becoming more important. Mining is also a strategic sector and the service sector is of growing importance. Peru has the lowest level of economic development of the Spanish speaking APEC economies, a higher level of illiteracy and poverty, especially in rural and suburban areas. Unemployment is relatively low (7.5 per cent of the active population). As with Chile, the informal economy is significant (CEPA, 2012; OIT, 2012).

Peru, like Chile and Mexico, uses the standard regional CEPA classification system. But this economy has a more decentralised system of observatories at regional and local level coordinated by the Ministry of Labor. OSEL is a network of smaller observatories with the goal of facilitating the observation of behaviors of employment and its link with vocational training. They combine information and diagnosis from several locations in the economy

with local experiences and interpretations of labor and education indicators.¹³ The local observatories collect both qualitative information and basic indicators on education and labour market conditions. The network functions as a space for exchange of information, experiences and practice in order to obtain an integrated analysis of regional and local labour markets and coordinated policies, although at the moment the flow of information is mostly internal in the network.

The recent growth in agri-business, mining, construction, banking and commerce is causing some skills shortages (IPAE, 2012; Trabajando.com, 2012). The Ministry of Labour recently noted that engineers in mining, labour security and health and safety in workplaces are in short supply (Ministerio de Trabajo y Promoción del Empleo, 2013a). There is evidence that the traditional drain brain of skilled workers from Peru to more developed economies is slowing down. Moreover, some of the more dynamic sectors are recruiting foreign born workers. This is a new phenomenon in the Peruvian labour market. Workers recruited from other countries are usually more qualified and are balancing the shortages in some technical areas. In addition, some Peruvian professionals and qualified workers are returning from abroad (see GRADE, 2012).

There is growing consensus that the Peruvian educational system has not kept pace with the increasing demands for skilled labour in firms and that this has led to a growing mismatch in the Peruvian labour force, particularly with respect to the faster growing sectors (IPAE, 2010; Piscocya Hermoza, 2008). A recent industry survey (GRADE, 2012) found that the main problem in recruiting new staff was not the quantity, but the quality of skills and the adaptation of skills to their needs. Similarly, IPAE (2012) points out that firms are looking for skills that are not provided by the formal educational system, such as responsibility, commitment, team-work and capacity to work under pressure.

3.3.5 Other APEC Economies

Brunei Darussalam

Brunei Darussalam is the least populous APEC economy with a population of just over 400,000. Its economy is primarily concentrated in oil and gas, accounting for just under 60 per cent of total GDP (Brunei Economic Bulletin, 2013). Strategic development plans over the past decade have sought to diversify the economy though there is a strong reliance on foreign workers, ranging from unskilled labourers to highly skilled professional managers (Learn4good, 2013). Brunei Darussalam has a qualifications framework that covers only technical and vocational qualifications (APEC HRDWG, 2009).

Expatriate employment is controlled by a labour quota system from the Labour Department and employment passes are issued by the Immigration Department. Work permits are valid for a period of two years. However, an employment pass can be extended for up to another 2-3 years.

Labour force surveys were conducted in Brunei Darussalam in 1985 and 2008, but there is no regular labour force survey. There are also no systematic data available on skills shortages by occupation or industry (Brunei Department of Statistics, 2009). However, recruiting agency data identify vacancies available for foreign workers across the following occupational areas: accountants, customs services, education, engineering, hospitality, management and skilled labour/trades (Learn4good, 2013).

Papua New Guinea

The most recent census in 2000 showed that only 12 per cent of the PNG workforce was in paid employment. Most (66 per cent) were subsistence farmers. The Asian Development Bank has stated that 'skilled human capital is scarce in most of the formal sectors of the

¹³ <http://www.mintra.gob.pe/mostrarResultado.php?id=444&tip=444>.

economy, and is considered a critical constraint by the private and public sectors' (Asian Development Bank, 2012: 24). The low level of education and problems with poor access to education are major problems.

A survey of firms indicates severe shortages in engineering, mining and construction. These shortages were anticipated to become worse when the construction of the PNG Liquefied Natural Gas Project and associated public investments commenced. Government Departments, such as the Department of Works, experienced similar shortages. Shortages also occur in manufacturing as the sector has difficulty attracting workers away from the more highly paid mining sector. In the informal private sector, another survey indicates that the lack of business management skills is hindering agricultural productivity improvements as well as progress in the development of basic livelihoods.

The sharp increase (336 per cent) in the number of permits issued to foreign workers, from 6,880 in 2001 to 30,000 in 2009, indicates how some of the skill shortages are being met (Asian Development Bank, 2012: xii). The majority of work permits are for professional/technical and managerial/administrative staff. According to feedback from employers, the 'top reasons for employment of foreign workers were to bridge the skill gaps and to acquire workers that were more diligent and had good work ethic' (Asian Development Bank, 2012: xii).

Russia

Russia has an occupational classification system; the Russian Classification of Workers and Employees' Occupations and Wage Grades, but it is only in Russian and the date of implementation was not known for the present report (United Nations Statistics Division, 2012). The transition from a centrally-planned economy to one that is market-oriented has led to considerable restructuring in the labour force. Observers report that between 1991 and 1998, 40 per cent of all workers changed occupations (Tan *et al.*, 2007).

Labour force mismatches in the Russian economy have been the focus of much debate over the past two decades (Gimpelson *et al.*, 2009). Since 2006 there have been growing claims from employers of skills shortages in some sectors and in some industries (Tan *et al.*, 2007) and although some analysts have questioned the extent of the shortage of skills, others have described the mismatch as a major threat to economic growth (Rutkowski, 2007). Gimpelson *et al.* (2009), using the Russian Economic Barometer (REB) surveys have shown that between 30 and 50 per cent of firms in the textiles, metallurgy and machinery sectors claim to have difficulty attracting skilled and professional workers. However, in contrast, over 20 per cent of firms in the chemical and petro-chemical sector claimed that they were over-staffed.

The only data that appear to be available on skills shortages are derived from firm-based surveys such as the Investment Climate Survey (ICS). The ICS comprises two parts: a large and medium enterprise survey, and a small enterprise survey. Respondents to both components identified the lack of a skilled and qualified workforce as a major or severe barrier to development and competitiveness. The Russian data indicate that skills shortages among professional and skilled workers can coexist with overall over-staffing at the enterprise level. Thus some enterprises are experiencing both labour shortages and surpluses.

Little data is available at a detailed occupational classification on shortages in Russia, but the available evidence demonstrates that firms are consistently identifying difficulties in filling positions requiring professional and skilled workers. The lack of detailed occupational level data presents a barrier for any more detailed assessment of the nature of skills mismatch in the Russian economy.

3.4 Conclusion

This chapter shows a very diverse situation within APEC, but one where classification systems are similar enough to provide the basis for a comparative analysis. However, many other factors need to be addressed before skill shortages can be comprehensively mapped. They will be reviewed in the following chapter.

4. Factors limiting the ability to identify labour market imbalances

4.1 Common occupation and industry classification systems can still be problematic

As far as can be determined, the economy-level classification systems of APEC economies are based on ILO's ISCO and ISIC models. Some economies have produced concordances, which allow direct conversion from the economy's system to the international equivalent.¹⁴

One element that is problematic is that different vintages of ISCO and ISIC are used as the basis for different economy-level classification systems. This can introduce difficulties in establishing reliable comparisons, even if concordances are supplied. In addition, multiple concordances may be required to update an older version of ISCO or ISIC to the most current version and at each step more assumptions and errors are introduced. It would be optimal if all economies modified their classification systems so that they are based on the most recent ILO classifications, though such a change would be time and resource intensive in some economies.

This is further complicated by frequent changes to economy-level systems due to acceleration in the rate at which new occupations are being created, as well as frequent changes to the job content and qualification requirements of existing occupations. As an example of the impact of these changes, the US standard occupational classification was revised in 2010 and of 840 occupations in the revised 2010 manual, 61 experienced content change through merging or splitting of occupations (Cosca and Emmel, 2010: 35). The Australian Bureau of Statistics (2013) latest revision to ANZSCO also added, revised or deleted 151 occupations, based on analysis of changes to the labour market occurring over just a three-year period. In economies lacking this type of expertise such changes are either not incorporated into statistical standards or are only done with considerable delay.

A more pressing issue is the differing levels of disaggregation at which occupational data are collected. Data available at the 1 or 2-digit level are less useful for identifying specific occupational imbalances than those available at a 3 or 4-digit level. However, the 1 or 2-digit data are more readily available, as shown in Chapter 3.

It has long been recognised that in developing economies, in particular, the application of international labour statistical standards can be problematic. This is especially the case with respect to the International Classification of Status in Employment (ICSE). Developing countries differ from developed countries in that in the latter, the labour market is dominated by paid employment and the distinctions in law and social security systems between different types of labour market status are well established. As noted in Chapter 2, the informal sector in developing economies may engage a very large proportion of the population but the persons and entities for which they work are difficult to categorise in terms of standard labour force definitions and may be difficult to locate for inclusion in surveys (Elias, 2002).

4.2 Quality of statistical data

With respect to developing economies the ILO has continually noted problems relating to methods of collecting data. Their observations still remain pertinent:

[The] quality of available labour market data has been open to question and sometimes seriously impaired by weak survey design, low response rates to questionnaires, faulty sampling, poorly phrased and wrong or irrelevant questions, insufficiently instructed survey personnel. Other shortcomings are frequently changed definitions and concepts

¹⁴ These concordances show the similarities and differences between the economy's classification systems and ILO classification systems.

applied to the same survey or the use of different definitions in different surveys undertaken by different data producers, but relating to the same subject of investigation' (ILO, 1989: 16).

Aside from these issues related to the quantum and quality of resources committed to maintaining labour market information systems, there are other characteristics of economies that may impose barriers to efficient data collection. A few of these are worth mentioning. According to recent research by the World Bank (2011), the share of total employment in small firms (5-19 employees) across all countries, including those in APEC, is increasing rapidly whilst employment in larger firms is declining just as fast. This shift in employment patterns is inhibiting both the ability of economies to identify skill imbalances and respond efficiently to them. This is because it is more efficient for statistical agencies to gather labour market data from a relatively small number of large firms that account for the bulk of employment than a multiplicity of small firms. Exacerbating this difficulty is the fact that small firms have a particularly high rate of job creation and destruction (Haltiwanger *et al.*, 2010). This makes the task of identifying these firms by statistical agencies for inclusion in labour market surveys especially problematic.¹⁵

4.3 Labour market data collection systems do not necessarily collect adequate information to identify shortages and surpluses

Whilst almost all APEC economies collect basic labour market data on topics such as unemployment rates as well as employment by occupation and industry, many do not collect the complementary data which is essential to identify the scale and causes of labour market imbalance.

As noted in Chapter 2, complementary data include items such as: trends in vacancy rates; duration of vacancies before being filled; qualitative data from employers on the causes of hard-to-fill vacancies; information and trends in educational attainment by occupation (useful for analysing over-qualification); flows into occupations (e.g. from training, migration and informal upgrading), and stock data on trends in employment by occupation. In addition, complementary economic data are needed to identify trends in the output of industries and how these impact labour markets.

Even those economies that do collect some of these data do not necessarily integrate the data bases. For example, information about the labour market may be separated from information about educational supply because the data are managed by different government departments. Labour market data on workers in the public sector may also be kept separately from those in the private sector.

All economies, regardless of their per capita income, face compromises and trade-offs in collecting, compiling and analysing labour market information. The ILO (1989: 53) observed there are necessary and unavoidable trade-offs between the conflicting objectives of 'timeliness and cost-effectiveness' and 'accuracy and statistical representativeness'. The recommendations in the final chapter of this report seek to balance these conflicting objectives and give strong weight to measures that are both effective and feasible to countries at differing stages of economic development and with differing capacities to improve their labour market information systems.

¹⁵ Of course, these barriers only apply to labour market surveys of employers; household surveys are unaffected by these particular shifts in industrial structure.

4.4 Uncertain validity of non-official labour market studies

While some non-government cross-economy studies offer global or regional overviews of occupational demand and shortage, they are either too broadly aggregated to offer useful insights into specific occupations (Manpower Global Talent Shortage survey) or don't comprehensively cover all sectors (Michael Page, 2013). None of the surveys cover all APEC economies. Moreover, the surveys are generally directed toward specific groups of potential client users, such as international human resource recruiting firms or training institutions (e.g. see KEIS, 2012; Tan *et al.*, 2007) and in other cases toward human resource recruitment agencies (see HAYS Asia Salary Guide, 2013; Michael Page, 2013). Some surveys have focused mainly on large scale enterprises (see Manpower Global Talent Shortage survey 2012) while others have focused more on the labour force demands of SMEs (see Canadian Chamber of Commerce, 2013).

Many of these surveys are produced by recruitment and other commercial entities, whose primary activity is the sale of human resource related services. Therefore, the results of these surveys may be subject to some degree of bias. Rarely is the methodology of these reports described in detail nor are tests of statistical significance and representativeness of data sources cited. Caution should therefore be exercised in the interpretation of these results.

4.5 Lack of comparable National Qualifications Frameworks (NQFs)

Skills and qualifications are not synonymous though they are sometimes directly linked (e.g. a particular formal qualification is mandatory for becoming a registered medical practitioner or a licensed plumber) or indirectly linked (trade certificates and university degrees may be recommended for particular jobs but this does not necessarily exclude people without the qualification).

Nine APEC economies (Australia; Brunei Darussalam; Canada; Hong Kong; China; Malaysia; New Zealand; Singapore; the Philippines and Thailand) have developed some form of National Qualifications Framework (NQF). NQFs are hierarchies of levels of qualifications/skills that apply to all sectors of the economy (APEC HRDG, 2009). 'An NQF is essentially a framework which classifies and registers qualifications, according to a set of nationally agreed standards/criteria for levels of learning/skills obtained' (ILO, 2013). This makes qualifications/skills comparisons across industry sectors possible. NQFs also make comparisons across economies possible as occupations that are described as being in shortage or surplus in one economy (at say Level 1) are then comparable to another economy where the occupational qualification/skills are also at Level 1.

The absence of a regional national qualifications framework (RQF) presents an additional impediment to the identification of skill imbalances and to the compilation of reliable data on the stocks and flows of qualifications. Without a consistent qualifications framework that has been agreed upon by relevant regulating authorities, educational and training institutions may be granting and thus comparing qualifications that vary greatly in terms of their scope and quality.

Such a framework is valuable for making comparisons between occupations that are described as being in shortage or surplus in one economy with those in other economies in the region. An alternative approach of ensuring transparency in qualifications' scope and

quality is viable but involves the complexity of comparing qualifications across 21 economies and often many states or provinces within economies.¹⁶

NQFs can also be made consistent across economies enabling useful comparisons of educational attainment in labour forces. Common reference frameworks (as between Australia and New Zealand¹⁷ and within the European Union) are helpful for the purposes of transparency as well as learner and labour mobility. A 2009 APEC HRDWG report recommended that a proposal for a voluntary regional framework aligned to the core features of the European Qualifications Framework (EQF) should be developed and circulated among member economies for comment (APEC HRDWG, 2009: 30). At this stage it is not clear what progress has been made in this and related recommendations.

In October 2012, ASEAN Member States 'affirmed that NQF and RQF are excellent tools to assist individual economies and are only useful if used and linked to a Quality Assurance system or framework' (UNESCO, 2012). While there is still significant work to be done across ASEAN countries regarding the promotion of the purpose and functions of a common reference framework, the task is underway and is pressing as ASEAN moves to an ASEAN Economic Community, incorporating the freer flow of students and labour, in 2015. ASEAN's decision to align an ASEAN RQF to the EQF is a sound one and could form the basis for an APEC RQF.

4.6 International data on selected indicators of skills

An important observation from the present study is that qualifications are not necessarily a clear indicator of skill acquisition, especially when international comparisons are made. Skills are acquired from many places through life-long learning. Many skills are acquired informally and on the job. There is a need to document the status of foundation skills in the populations across each economy in a way that they can be used to complement data on formal qualifications.

The OECD in recent years has developed international standardised tests of 'foundation' skills of literacy, numeracy and problem solving. These tests of critical foundation skills have been developed for both school students (OECD, 2013a) and adults (OECD, 2013b). Such tests could serve as useful descriptive tools to enable economies to compare the level and distribution of foundation skills within their populations, but also as diagnostic tools to remedy fundamental problems that may be revealed. Tests relating to problem solving capacity in particular may be a useful partial indicator of the level and distribution of some soft 'skills'.

4.7 Inadequate data on 'soft' skills

A common theme from economy specific data collections in this review and other literature on skills shortages is the demand for specific technical skills and knowledge, on the one hand, and on the other hand for what are defined across some of the developing economies as 'soft skills' (e.g. in Chile; China; Chinese Taipei and Peru). This latter set of skills refers to personal attributes such as entrepreneurial and creative spirit, team-work, flexibility, and 'human skills'. In Mexico and South America; China; Malaysia and PNG, there is evidence of a mismatch between the technical qualifications provided through formal training institutions and the 'personal skills' sometimes referred to as 'soft' skills that are required by employers.

¹⁶ The US would argue that the most important issue is transparency in how quality is determined so economies can compare and contrast their systems, not the need for a standardised framework.

¹⁷ The Australian Qualifications Framework Council (AQFC) and the NZQA have agreed to conduct an alignment of their frameworks in 2014.

Despite widespread recognition of the importance of 'soft skills' for an effective workforce, there are at present no robust and widely implemented systems for the collection of data on the type and extent of the demand for and supply of soft skills. This is due, in part, to the difficulty of defining and measuring in concrete terms attributes such as 'creativity', 'empathy' and 'flexibility', in a manner that these attributes can be evaluated in a survey instrument. Until such measures are developed, data on the nature and extent of workforce soft skills will be inadequate, not just within APEC, but globally.

4.8 The motivation is not necessarily present to identify shortages and surpluses

It may be the case that not all economies currently have an equally strong need to commit scarce government resources to collecting high quality information on labour market imbalances. This review found that the most strongly motivated are those that have permanent migration (Australia; Canada; New Zealand and the US) and/or temporary worker (Chinese Taipei; Singapore and the US) programs to acquire skills in demand. On the other hand, surpluses may be deliberately developed (e.g. Philippines) with the purpose of sending workers off-shore.

4.9 No protocol for sharing economy-specific data

Economy-specific data that are available on shortages and surpluses are currently not shared among APEC economies. That is, no mechanism exists for centralising data so that economies can work together to alleviate shortages or dissipate surpluses.

An APEC-wide database has been established for the purposes of this *Skills Mapping Project* and this is a very valuable start. Over time, more economies may populate the database but at the moment it is outside of the scope of many. Alternatively, APEC might consider moving toward a web portal rather than a database so that every economy is responsible for their data and updating data, as opposed to a centralised database.

4.10 Conclusion

In conclusion, there is no current regular comprehensive and comparable data collection across the region sufficient to adequately inform the *APEC Skills Mapping Project*. There are no on-going multilateral data collections that are adequate for monitoring regional trends in APEC labour market shortages and imbalances. While most member economies maintain a labour market information system they are not, for a variety of reasons, necessarily adequate for the purpose of meeting the objectives of the *APEC Skills Mapping Project*. In the short term, improvement of these labour market monitoring systems needs attention and various types of input, dictated by need and available resources.

These observations suggest that the *APEC Skills Mapping Project* will not always be able to build on existing economy level labour force data sets. A regular monitoring process such as that proposed through the *Skills Mapping Tool*, is unlikely to be fulfilled in the short term. Moreover, there may be potential inaccuracies due to time-lag, quality of data or uneven sources of data.

Therefore, it is evident that some other mechanism needs to be devised for collecting consistent and current data on labour market imbalances. The final chapter will outline the need for a specifically designed survey that can be managed and implemented by economies, if they choose. Other steps that could be taken to improve the monitoring of skills will also be suggested.

5. A strategy to better monitor skills shortages and surpluses

This report has shown the huge importance of skills or human capital for economic growth and development. Shortages lead to delays, loss of investment opportunities, less R&D and innovation, fewer trade opportunities and higher turnover rates. Surpluses lead to wasted educational resources, frustration for individuals, unemployment and emigration.

In Chapter 2 it was argued that the supply of skills or skill formation, broadly defined as developing the capacity of humans to engage in productive economic activity, occurs in multiple locations. These include formal education and vocational training institutions, in-firm training, specialised employee training outside the firm, and learning on-the-job. Thus, 'skills' and 'qualifications' are not synonymous though they are often directly or indirectly linked.

5.1 Improving labour market monitoring systems

Better monitoring of trends in relation to the supply of and demand for skills is the goal of this APEC study. There is considerable variation across APEC economies in terms of level of industrial development and consequent labour market demands. Further, there is varying capacity across economies to monitor labour force trends and efforts need to be made to help economies with limited monitoring capacity. Chapter 2 showed the complexity of undertaking this task.

Recommendation 1

It is recommended that economies assess their needs and priorities in relation to the development of labour market monitoring systems. Then short and long-term strategies can be implemented to improve their systems.

Chapter 4 outlined the major barriers to achieving comparable monitoring systems across APEC economies. It also emphasised first, that data must be comparable and reliable across APEC (and internationally) and second, a strategy for dealing with these barriers needs to include both short-term and long-term actions.

5.2 Developing short-term strategies

This study found that almost all APEC economies use occupational and industry classification systems that are adapted from ILO standards. For data to be comparable, alignment with the most recent ILO occupation and industry classification systems would be preferable. A corresponding statement of concordance between the ILO and the economies' classification systems could then be produced. Given the resource limitations of some economies this is a major ongoing task. For the longer term, data to the 3-digit level are necessary for identifying specific shortages, e.g. welders, as opposed to a shortage of metal workers generally.

Such data need to be accessible and readily available. Online publication would be one way to ensure accessibility for all member economies and other stakeholders.

Recommendation 2

Each economy should work toward establishing and publishing a concordance between its occupation and industry classification systems and the most recent ILO International Standard Classification of Occupations and International Standard Classification of Industries.

Recommendation 3

Each economy should take steps to publish their concordance online in internationally consistent formats, either individually or in cooperation with multilateral bodies, in a way that can best inform stakeholders.

Analysis in the preceding chapters has drawn on the experience of economies that have developed reasonably effective mechanisms for identifying shortages, in particular. The use of lists of occupations where there is an identified shortage is important in some economies, especially for the purpose of selecting skilled immigrants but also to influence the allocation of government and personal training dollars and to encourage employers to provide more workplace-based training. The role of skills shortages in impeding development is widely acknowledged in these economies. However, shortages of 'soft skills' should also be acknowledged and included in monitoring.

Skill surpluses can also be a problem for the reasons identified earlier. Individuals in occupations facing over-supply respond by changing occupations, moving internally or emigrating. These strategies may involve the wastage of valuable skills. The opportunity arises for economies to benefit from skilled labour surpluses by promoting them as of benefit for investment and/or by facilitating offshore employment, such as has been the case with the Philippines and Viet Nam.

Recommendation 4

The APEC HRDWG should promote the value of knowing the skills imbalances. Some of the major reasons are:

- the value to the economy of having an adequate and appropriate supply of human skills;
- the ability to better target training programs, incentives, etc to develop the skills that suit current and emerging labour market needs;
- the opportunity that surplus skilled labour provides for both domestic and foreign investment;
- the importance of many personal ('soft') skills to employers, especially multinational corporations;
- the better tailoring of migration programs—both immigration and emigration.

The *APEC Skills Mapping Project* has put in place a *Skills Mapping Tool*. If this is regularly and effectively completed by all APEC member economies it will serve as a valuable tool for monitoring labour forces, and particularly regional skills shortages and surpluses. However, the small number of APEC economies that have so far filled out this database suggests that it is not a simple task: this may be because the data are not collected, there is a shortage of labour market analysts and/or the cost of collecting the underlying data is prohibitive. Nevertheless, existing data that are available could be entered into the database.

Recommendation 5

Economies should be encouraged to populate the *APEC Skills Mapping Tool* based on their existing data.

The above recommendations are relatively short-term options though the amount of data requested to fully populate the APEC Skills Mapping Tool is extensive. Some economies may not be able to provide all of the data that has been sought. Other long-term options involving multilateral organizations could be considered.

5.3 Longer-term strategies

The importance of comparing qualifications from one economy with those from another (i.e. ‘apples with apples’) was stressed in Chapter 4 of this report. Nine APEC economies have so far developed either comprehensive or partial National Qualifications Frameworks. Progress on the 2009 HRDWG report’s recommendation for developing a voluntary Regional Qualifications Framework needs to be reviewed, as this can be a step for enabling intra-APEC and international comparisons.

Economies should be transparent in sharing information on their qualifications. For example, an electrician’s qualification in one economy may have a different set of competencies and standards compared to that occupation in another economy. It is important to note these differences in qualifications when monitoring occupational imbalances, so the consumer understands the comparison.

APEC does not need to start from scratch with a voluntary RQF and would be well advised to use an existing QF, such as the European Qualifications Framework (EQF) as a model to consider. This would be a huge saving in time and money and ensure international comparability on a voluntary basis.

Recommendation 6

The APEC HRDWG (2009) recommendation for a voluntary regional qualifications framework should be revisited and promoted.

In the light of the current data situation, there is a need to collect quite specific and comparable data on skills imbalances across all economies from a representative cross-section of employers. The existence of data collected by the Manpower Group and other agencies, such as HAYS, illustrate how such data might be collected, though their data are not necessarily appropriate for APEC purposes.

One option is for APEC to promote a common online survey of employers (private and public) in order to collect information about current and projected skills shortages or over-supply in each economy. This could be undertaken in collaboration with local Chambers of Commerce. A common survey instrument and sampling method need to be designed. The next step would be for each economy to identify a sample, in collaboration with their Chamber of Commerce or other relevant agency, and implement the survey instrument. Some economies may require assistance in this process.

Once established the survey could be repeated at regular (two or three year) intervals, with a selected rotation of respondents in and out of the survey sample. Analysis of the survey data would be required to identify the major shortages and surpluses, within economies and in the region.

Recommendation 7

APEC should promote a voluntary common survey of private and public sector employers seeking responses on:

- (a) Hard-to-fill skilled occupational vacancies, equivalent of an ISIC 3-digit level classification – and the nature of those skills;
- (b) Occupations where there is a high ratio of applicants to jobs available;
- (c) Current mechanisms for filling occupations in shortage (i.e. on-the-job training, foreign recruitment, etc); and
- (d) Anticipated occupations in demand over next five years.

Some important themes to emerge from this study of skill imbalances are that qualifications are not necessarily a clear indicator of skill acquisition, especially when cross-economy comparison are made, and that skill acquisition occurs in many locations, notably informally and on the job. To remedy this it was noted that international standardised tests have been developed of 'foundation' skills of literacy, numeracy and problem solving. These tests of critical foundation skills have been developed for both school students and adults. Such tests serve as important descriptive tools to enable economies to compare the level and distribution of foundation skills within their populations, but also as diagnostic tools to remedy fundamental problems that may be revealed. Without an adequate level and distribution of foundation skills in their population, economies are constrained in their development progress.

The OECD collects data on student foundation skills (OECD, 2013b) that already cover most APEC economies. Further, some APEC economies participated in the OECD's survey of adult competencies (OECD, 2013b). While these surveys were costly to implement they provide a powerful and important evidence base. There appears to be scope to make greater use of these cross-economy studies of basic literacy, numeracy and problem solving capabilities.

Recommendation 8

The APEC HRDWG should propose that all member economies participate in international standardised literacy and numeracy tests.

The analysis in this report has drawn attention to the need for collaborative action between economies to share information about their labour force monitoring systems and their analytical techniques for analysing labour force data. An important first step is to ensure labour force data are available across economies. But a second and important step is to share analyses of these data. Recommendation 9, below, is intended to promote the sharing of analytical approaches with the longer-term objective of building a common analytical system across the region.

Recommendation 9

Each economy should provide a brief English language labour market analysis for their economy and make this accessible online for all APEC economies.

Implementation of these strategies is obviously a major task but one that the APEC WG could begin to discuss. Sharing of knowledge and other resources among APEC members is a vital part of this process and one that will be of mutual benefit to all. APEC's successes in many other areas demonstrate its capacity to pull together so that the largest regional bloc works cooperatively and effectively.

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Appendix 1: Annotated Bibliography for Spanish Language References

General data sets

Banco Interamericano de Desarrollo. BID. <http://www.iadb.org/es/banco-interamericano-de-desarrollo,2837.html#.U>.

Includes the database “sociómetro”: useful for selecting elaborated indicators ready to use, including education and employment in Latin America. Only 2009 and before. <http://www.iadb.org/research/sociometroBID/tables.cfm?indicator=2&lang=es> It also includes a large collection of reports, mostly on economics.

CEPAL (Economic Conference for Latin America) <http://www.eclac.cl/> Includes a site for publications and a statistical data base. CEA-CEPAL. Conferencia estadística de las Américas. (Statistical Conference for America).

<http://www.eclac.org/deype/ceacepal/index.htm>.

This resource is a network for developing common statistical schemes. From the site it provides access to several statistical sources. Inside this organisation there is a network called Red RTC (network for knowledge transfer). <http://www.ceacepal-rtc.org/rtc/> The networks focus on how to develop studies and statistics at regional level. They have developed an international survey about the needs of statistics. These resources can be useful for identifying shortages in skills and training.

The CEPAL-STAT (CEPAL service for statistics) offers economy-specific profiles on several topics, including education and the labour market, although the data in the national reports are very basic. There are economy profiles for Chile, Mexico and Perú. There is also an online data base for comparisons.

OIT- Organización Internacional del Trabajo- Oficina Regional para América Latina y el Caribe (International Labour Organization, Regional Office)

<http://www.ilo.org/americas/oficina-regional/lang--es/index.htm>.

This resource elaborates CEPAL data, sometimes using more detailed analysis and categories.

OEI (Organization for Iberian-American States for Education, Science and Culture).

This resource offers a profile for each economy, with basic data about access to education, distribution of income and poverty. There are profiles for Mexico, Perú and Chile. It is the most comprehensive source in Latin America for science and technology indicators. <http://www.oei.es/index.php>

Red ETIS <http://www.redetis.iipe.unesco.org/> (*Network for education, work and social integration*).

Funded by UNESCO, this resource includes a repository of interesting documents on education and training.

Specific Latin American Publications

CEPAL (2012) Panorama Social de América Latina. Capítulo II. Necesidades de formación de recursos humanos y absorción de empleo calificado en América Latina, CEPAL. (*Social Panorama of Latin America*).

There are versions of this resource for every year. Some years include specific chapters on requirements for human resources training and the absorption of qualified workers in Latin America.

OIT (2011; 2012) Panorama Laboural América Latina y el Caribe 2011, Organización Internacional del Trabajo (*Labour Panorama in Latin America*). Lima: OIT.

This publication includes comparative indicators on the current situation of labour markets for several economies, including Mexico, Chile and Perú. It is produced regularly by the Latin American office of OIT-ILO. Not all the annual reports include the same information, but each annual report includes an overview of basic indicators and special chapters. The 2011 issue includes a more detailed statistical annex with tables for each economy.

Universia (2010) Informe de Competencias Profesionales en Preuniversitarios y Universitarios de Iberoamérica, Madrid: Fundación Santander-Universia (*Report on professional competences on pre-university and university graduates in Ibero America*).

Made by the Universia Foundation. It is a foundation and a think tank which specialises in higher education. Funded by the Spanish “Banco de Santander” – The largest bank in the economy, it has an important presence in Latin America. The report includes analysis from México, Chile and Peru among other countries.

Chilean publications

Arenas, Alba Cristina M. y Rigel Cuarite L. (2007) Revisión de las brechas educacionales presentes en el mercado laboral chileno, Consejo Asesor Presidencial, Trabajo y Equidad. (*Revision of educational gaps in Chilean Labour Market*).

Provides a basic review of the literature and available data. Useful for identifying key problems and further references.

Bassi, M. et. al. (2012). Desconectados. Habilidades, educación y empleo en América Latina, BID-Banco Interamericano de Desarrollo. (*Disconnected: skills, education and employment in Latin America*).

Especially useful for analysing work trajectories of young people and demands for skills. It includes a survey about demand of skills in Chile, Argentina and Brazil. The survey results are disaggregated for each economy in the appendix. The report is produced made by the BID (Interamerican Bank of Development). Its goals are to show the skills demanded by employers and the skills offered by the young labour force. The project included several surveys: a survey to 1200 firms (sectors: automobile, hotels, trading, finance and the food industry) in Argentina, Brazil and Chile; a survey to 5000 people between 25 and 30 years old to obtain information on education, skills and results on the labour market. The survey does not focus on the usual classification of sectors and formal qualifications of workers, but on specific social and cognitive skills, such as emotional abilities, commitment to work, teamwork and so on. The report shows skill shortages related to personal issues not provided by the formal education system. The findings relate the quality requirements by new knowledge services and complex manufacturing with such skills.

Instituto Nacional de Estadísticas de Chile (2004) ENCUESTA SOBRE CAPACITACIÓN Y FORMACIÓN EN LOS PAÍSES DE LA CEPAL (Informe de Avance para discusión interna). (*survey on skills and training in CEPAL countries*)

Directly related to this APEC project, with disaggregated data for several CEPAL countries, including Chile and Mexico. It is rather dated but more recent updates do not appear to exist.

Millenaar, V. y Paz, G. (2011) Relevamiento de estudios sobre educación, formación profesional y desarrollo de competencias de jóvenes en América Latina. El caso de Chile, Buenos Aires: IPE-UNESCO – IDES, RedEtis (*Renewing studies on education, training and competence development of young people in Latin America*).

This resource provides a basic review of existing reports and research related to vocational and professional training, and development of competences. Useful for identifying key issues and further references. (Red Etis is the “Network for education, work and social integration and is funded by UNESCO. A similar report exists for Mexico).

Kis, V. and Field, S. (2009) *Learning for Jobs: OECD Reviews of Vocational Education and Training. Chile: A First Report*, Paris: OECD.

This report includes basic data about enrolment on secondary and tertiary education. It focuses mainly on policy issues.

Ministerio de Educación (2009) *BASES PARA UNA POLÍTICA DE FORMACIÓN TÉCNICOPROFESIONAL EN CHILE*, Gobierno de Chile (*Foundations for a policy on technical and professional education in Chile*).

Report from a commission formed by the Ministry of Education. It includes a diagnosis of the secondary and tertiary education system, current directions and prospects for future policies.

OECD (2009) *Chile: Overview of the Labour Market*, Paris: OECD.

Futuro Laboural (2011): *Boletín Futuro Laboural 2009 / 2010. Profesionales y técnicos en Chile: información fundamental*. Gobierno de Chile.

A basic statistical report of the observatory for university degrees called “Labour future”. It includes statistical information on the degrees with higher employability.

Mexican Publications

Álvarez, L. y Pérez de Lao, C. (2005) *Evaluación y certificación de competencias laborales en México: el caso de las dependencias del gobierno federal*, en *Revista de la Facultad de Contaduría y Administración, UNAM*, N° 216 p.14-34.

A case study on the problems of specialisation and competences candidates for jobs offered by the federal government.

ANUIES (2010) *Mercado Laboural de profesionistas en México. Diagnóstico y prospectiva en 2010 (Labour market for professionals in Mexico. Diagnosis and Prospective from 2010)*.

A foresight exercise using statistics on tertiary education degrees and labour statistics.

CISS - Conferencia Interamericana de Seguridad Social (2012) *Mercado de Trabajo y Protección Social en México durante la Globalización (Proyecto CISS-IDRC/WB)* .

Documento de trabajo CISS/WP/1204.

Report by the Inter-American Conference on Social Security. It includes a comprehensive analysis of the consequences of economic transformation in the labour conditions and the social protection of the Mexican population.

Gobierno de Nuevo León. 2008. *Requerimientos de profesionales y técnicos de Nueva León. Tendencias y Perspectivas*. Nuevo León: Consejo de Relaciones Labourales y Productividad, Secretaría de Educación, Secretaría de Desarrollo Económico.

Statistical work by the Regional Government of Nuevo Leon on the projections of employment among professionals. It states that the profile of technical workers will play a central role in the demand for skills over the next 5-10 years and predicts a deficit in engineering students.

Ibarrola, M. (2010) Dilemas de una nueva prioridad a la educación técnico profesional. Un debate necesario". En La educ@ción digital magazine 144, Educational Portal of the Americas - Department of Human Development, Education and Culture. OEA-OAS.

Ibarrola, M. (2009) Formación de profesionales de la ETP: nuevos enfoques pedagógicos, en Blas, F. y Planeéis, J. (coords.), Retos actuales de la educación técnico-profesional. (pp.73-88). Madrid: OEI, Fundación Santillana.

Girardo, C. e Ibarrola, M. 2004. "La formación para el trabajo de los jóvenes desde las organizaciones de la sociedad civil en América Latina y el Caribe". En: Estudios Fronterizos 5,(010), pp. 9-49, Mexicali: Universidad Autónoma de Baja California, 14

The above three papers contain a useful discussions about the orientations and challenges of new trends in vocational training policies.

Manpower (2013) Encuesta empresarial sobre necesidades de empleo en México. Ciudad de México: Manpower group.

Montoya, J and Farias, G (2010) Desarrollo de actividades profesionales en estudiantes de auditoría de cuentas: evaluación de una experiencia entre universidades de España y México, Revista Española de Financiación y Contabilidad, 147, pp 551-574.

This is an empirical case study based on surveys. The authors found a positive role of comprehensive skills in the integration into the labour market in a comparison between Mexican and Spanish universities.

OCDE (2011) Preparándose para trabajar, Barcelona: Fundación Barcelona BCN
A policy discussion concerning directions about training to integrate into the labour market.

OIT-Organización Internacional del Trabajo (2007) Trabajo Decente y Juventud. América Latina, pág. 17, [en línea], http://white.oit.org.pe/tdj/informes/pdfs/tdj_informe_req.pdf
Report from the ILO on the need for 'decent jobs' for young people in Latin American Countries.

OLA-Observatorio Laboural de México (2011) Panorama Laboural de México. (Labour panorama in Mexico).

An annual synthetic report from the web site of the Mexican Labour Observatory including the latest trends.

Otero, A. (2011) Relevamiento de estudios sobre educación, formación profesional y desarrollo de competencias de jóvenes en América Latina. El caso de México, Buenos Aires: IPE-UNESCO – IDES, RedEtis.

Reviews studies on education, training and competence development of young people in Latin America.

Pieck, E. (2005) Secundaria técnica. Su contribución a la formación para el trabajo en sectores de pobreza, en Revista Mexicana de Investigación Educativa 25(X), 481-507

Offers a discussion on the role of vocational training for sectors of the population who are experiencing poverty.

Rodríguez, L. (2010) Políticas públicas para promover el empleo juvenil y el emprendedurismo de los jóvenes en México. Una visión hacia la recuperación económica, Proyecto PREJAL.

This publication includes a comprehensive assessment of labour market conditions among young people, an overview of the main policies and a useful discussion of future directions.

Salieri, G.; Santibañez, L. y Rubio, D (2010) Estudio de las necesidades de capital humano de la Industria de Electrodomésticos en México. Fundación Idea-USAID.

A study on the needs of human capital in the sector of electric appliances. This is an empirical study mostly based on surveys and interviews with entrepreneurs.

Secretaría de Educación Pública de México (2007) Programa Educativo Rural, Informe Final de la Evaluación de Consistencia y Resultados 2007. México: SEP /Direcciones generales de educación tecnológica agropecuaria y de educación superior tecnológica.

This report contains a useful description of challenges and actions related to education in rural areas.

Tapia García, G. (2006) La gestión local de la alfabetización y la educación básica de jóvenes y adulto. Tensiones y dilemas con la capacitación para el trabajo. Guanajuato, México, 1990-2005, en Girardo, C.; de Ibarrola, M.; Jacinto, C.; Mochi, P. (Coords.) Estrategias educativas y formativas para la inserción social y productiva. Montevideo: Cinterfor/OIT (Herramientas para la transformación, 31).

A useful case study from a Mexican region. It is a chapter from a reference book on educational and skill strategies for productive and social integration in several Latin American economies.

Peruvian publications

GRADE (2012): Estudio de demanda de profesionales Universitarios y Técnicos recién egresados en cuatro ciudades de Perú. GRADE. (*Demand of university professionals and technicians recently graduated in four cities of Peru*).

Report of a study based on a survey of firms in four cities (850 firms of different sizes). Most of the firms in the sample were in manufacturing, commerce, transport and communications, finance, real estate or business services.

GRADE (2013): Entre el estudio y el trabajo. Las decisiones de los jóvenes peruanos después de concluir la educación básica regular. GRADE. (*Between study and work. Decisions of young Peruvians after finishing regular basis education*).

A study based on an analysis of the national household survey. It assesses the possibilities of young people accessing technical and university education.

IPAE (2012): ¿Cómo reducir la escasez de mano de obra cualificada? Nota técnica, 2 de Julio de 2012. IPAE Acción Empresarial. Estudios estratégicos. (*How to reduce the shortage of qualified labour force?*).

IPAE is a private think on economic development supported by firms. It offers a synthetic assessment about the Peruvian labour market focussing especially on medium and bigger firms in more dynamic sectors.

IPAE (2010): Aciertos y desaciertos de la educación superior en el mercado de trabajo, Nota técnica. IPAE Acción Empresarial (*Good and bad decisions on the relationships between higher education and the labour market*).

This publication includes a critique and a review of some good practices related to higher education policies.

-MTPE-Ministerio de Trabajo y Promoción del Empleo (2013a) AVANCE DE LOS RESULTADOS DE LA ENCUESTA NACIONAL DE VARIACIÓN MENSUAL DEL EMPLEO (ENVME), JULIO 2013 <http://www.mintra.gob.pe/mostrarContenido.php?id=549&>

-MTPE-Ministerio de Trabajo y Promoción del Empleo (2013b). Empleo nacional urbano en las empresas de 10 y más trabajadores en el sector privado. Informe Ejecutivo, <http://www.mintra.gob.pe/mostrarContenido.php?id=549&>

The above documents include synthetic accounts of the survey in 2013.

Piscoya Hermoza, L. (2008) Formación universitaria vs mercado laboral, Asamblea Nacional de Rectores. (university training vs the labour market).

Report published by the national assembly of university presidents. It assesses current adaptation to the labour market.

Trabajando.com (2012) Tendencias en el mercado laboral peruano en 2012. (*Tendencias in Peruvian Labour market*)

This study was produced by a leading firm which specializes in recruitment and selection processes. They analysed demands published by firms in 2012 on their own website and in other recruitment websites, including those run by universities, chambers of commerce, professional associations, municipalities and others.