



Skills Shortages in the Greater Brisbane Labour Market 2012-2021

A Report Prepared for Regional Development Australia (RDA) Brisbane Inc.
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Background and Disclaimer

“Skills Shortages in the Greater Brisbane Labour Market 2012-2021” is the final report of a labour force capability study that was commissioned by Regional Development Australia (RDA) Brisbane. RDA Brisbane identified Brisbane’s skills base and labour force availability as critical to the region’s economic future, and has recognised this as one of five priorities in its Regional Roadmap (see www.rdabrisbane.org.au). Accordingly, RDA Brisbane has been working with Brisbane City Council and Brisbane Marketing to examine future skills needs as the first stage in developing further strategies to address the key issue, and hence commissioning of the study.

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Executive summary

Synergies Economic Consulting (Synergies) has been engaged by the Regional Development Australia (RDA) Brisbane to review likely labour market conditions in the Greater Brisbane Labour Market over the period 2012-2021, with special attention to issues relating to labour force skill.

The issue of skill shortages

Skill shortages represent labour market imbalances and as a result reduce potential growth and the creation of economic wealth¹. Defined simply, a skill shortage exists where the supply of skill services, under current wage, working conditions, spatial location and institutional arrangements, does not meet the current demand for these services.

However, as a number of economists have pointed out, skill shortages are both difficult to define and to measure². The issue encompasses much more than an inadequate supply of labour to meet the demand at the current wage levels. For those that subscribe to a fully informed and flexible labour market, the concept of a long lasting skill shortage is difficult to conceive. In such cases the market will solve the problem by raising wages which, in the short-term, will attract workers from other related and substitutable occupations or through migration, and in the long run increase the numbers entering training places.

Similarly, firms faced with short term skill shortages may substitute labour for capital, work existing workers³ more intensely or lower desired recruitment standards to fit short-term circumstances⁴. On the supply side, skill shortages may act as a signal for workers with the required skills to work longer hours or return to the labour market in which the skill shortage exists. Those lacking the required skills may undertake training to acquire the necessary skills⁵.

¹ Shah, C and Burke, G (2003) "Skills Shortages, Concepts, Measurement and Implications" Working paper 53, Centre for Education and Training, Monash

² United States Bureau of Labor Statistics (1999) "Can occupational labor shortages be identified using available data?". *Monthly Labor Review*, 15,21

³ McMullin, J and M Cooke, "Labour Force Aging and Skill Shortages in Canada" WP 24 Canadian Work Research Network.

⁴ It is recognised that in service based industries, firms are likely to relocate the work to another office in another city if capital is constrained or substitute labour for labour via skill migration.

⁵ Haskell, J and Martin, C (2002) "Technology, Wages and Skill Shortages; evidence from UK micro data" *Oxford Economics papers* 53 (4), 642-658

In analysing the extent of the skills shortages in the Greater Brisbane Labour Market the well-known skill shortage definitions developed by Richardson (2006) were used. Specifically these are:

- **Level 1** (or absolute) shortages: where the total supply of sufficiently trained persons is currently being fully utilised. Long lead times often exist for training new workers and the possibilities for cross entry from other skill areas is limited.
- **Level 2** shortages: when there are few persons currently possessing the needed skill but lead times for training are short and spare capacity exists for training institutions to take on more trainees.
- **Level 3** shortages, best referred to as 'skills mismatch': these occur when there are sufficient suitably trained persons available in the labour market but for a variety of job-related and institutional reasons these workers chose not or are unable to work in the profession where there is a shortage.
- **Level 4** shortages: relate to gaps in worker quality (qualifications and experiences) and occur where there are sufficient numbers of formally skilled persons available for hire but some are not offered employment because employers have concerns over their quality or reliability.

These types of skill shortages differ in their fundamental causes and hence the types of remedial policy actions required to address these shortages.

Approach

The report employed a dual approach, being analysis and industry consultation.

Analysis

Labour force data for the Greater Brisbane Labour Market over the period 1989-2011 was analysed independently to test for evidence of structural breaks⁶ in labour demand and supply across occupations, industries and educational qualification classes. In examining structural breaks, shift share analysis⁷ was used to quantitatively test for the existence and significance of structural shifts.

Conclusions were then drawn concerning the current state of the Greater Brisbane Labour Market in terms of vacancies and gaps in labour force skill. Historical data was

⁶ A 'structural break' is where we observed an unexpected shift in time series data indicating a possible shift in the underlying structure of the economy. This in turn could signal shifts in the distribution of employment by industry and employment by occupation.

⁷ Shift-share analysis is a commonly used technique to decompose changes in employment in a region.

used to design a forecasting model to predict likely employment patterns by industry and occupation for the period 2012-2021. Simultaneously, the results were used to produce a “Business as Usual” case on the assumption that the distribution of employment by industry and occupation across the Greater Brisbane Labour Market workforce would remain constant at 2011 levels.

The difference between the two sets of estimates generated reflects the potential shortfalls in labour force requirements that the Greater Brisbane Labour Market may face in the absence of remedial policy actions. This analysis also identified the areas where skill development needed to be concentrated.

Consultation

Operating in parallel to this analysis was a series of stakeholder consultations with relevant industry groups to obtain their views on the likely labour market issues facing the Greater Brisbane Labour Market over the 2012-2021 period. In essence, these discussions acted as a “litmus test” of our “desktop” research. A high degree of unanimity was found to exist between our general conclusions and the collective opinions of the industry groups.

Findings

The Greater Brisbane Labour Market environment

An overview of the Greater Brisbane Labour Market was conducted as at 2011. This analysis found that the Greater Brisbane Labour Market was an open labour market with a surprisingly high inflow and outflow of labour. Whilst this is a strength in dealing with skills shortages it represents a challenge for the retention of workers.

Using Queensland data as a proxy, it was also noted that significant groups of “marginally attached workers⁸”, both skilled and unskilled, existed in the Greater Brisbane Labour Market and as such represented a potential reservoir of labour. This was particularly evident post 2007 where the Greater Brisbane Labour Market had a slight oversupply of labour overall.

Overall, the principal skill shortages identified in the Greater Brisbane Labour Market were Type 1 shortages, being absolute shortages of high skill occupations, and Type 3

⁸ Marginally attached workers refers to people who are willing and able to work, and who have looked for a job sometime in the past 12 months (or since the end of their last job if they held a position within the last 12 months), but are currently not actively seeking employment and therefore not counted as unemployed. Workers who have stopped looking for jobs due to lack of success in finding employment opportunities fall within this broad category of marginally attached workers.

& 4 shortages, where employers were forced to downgrade labour force quality standards.

Structural changes

To determine the future skill needs of the Greater Brisbane Labour Market, shift share analysis was performed to gain an understanding of the degree of structural change that has been occurring in the Brisbane economy. Structural change relates to changes in the structure of production through changes in the relative share of industries and occupations in the economy in terms of a measure of economic activity such as employment, output or value added, both in a local sense and relative to some larger economy such as Australia as a whole.

This shift share analysis is based on the assumption that local economic growth, and in turn employment growth, is explained by the combined effect of three components: national share, industry mix and regional shift⁹. The analysis confirmed that the Greater Brisbane Labour Market has experienced significant structural change, particularly during the period 2000-2011.

The key trends were:

- a pronounced shift into the Managerial, Professional and other service positions in Mining, Public Administration and Safety, Health Care and Social Assistance, Education and Training, and Accommodation and Food Services; and
- an underperformance and even partial withdrawal from processing, trades and labouring positions.

This in turn produced a shift in the distribution of workforce qualifications compared to the 1989-1999 with:

- above national growth in higher level post school qualifications;
- growth in diplomas and upper level Certificates consistent with national trends; and
- lower than expected growth in lower level and technical qualifications.

⁹ The national share measures how much total employment in a local area has increased because of growth in the national economy during the period of analysis. Industry mix compares an industry's growth in a local area to that industry's national growth. This estimates how many jobs were created/not created in each industry due to differences in industry and total national growth rates. The regional shift is the residual that illustrates the competitiveness of a local area's industry to that of the nation, in particular, it highlights a local area's leading and lagging industries.

Views on current skill shortages

Our results are consistent with the Department of Employment, Education and Workplace Relations (DEEWR) Employer Experience Surveys. According to the 2010 DEEWR survey, employers found it difficult to obtain workers with the adequate level of skills in the Professional, Managerial and Technicians and Trades position. In particular, employers experienced hiring difficulty in the Professionals and Managerial positions took the characteristic of a Type 1 skills shortage. It was found that approximately one out of seven applicants for a Managerial position is suitable and approximately one out of six applicants applying for a Professional position is suitable. Employers' responses also indicated that in today's labour market, job seekers need to have both technical or job-specific skills and employability skills.

Discussions with key industry contacts were used to gather local knowledge on skills shortages currently impacting or likely to impact the Greater Brisbane Labour Market. These discussions also confirmed some of the findings of our analyses. Overall, there was broad agreement among stakeholders that Brisbane is increasingly becoming a hub for professional and administrative services for the rest of Queensland and Northern New South Wales. Also, the growth areas in employment and current skill shortages are in the Management, Professionals, Clerical and Administration, and the Technicians and Trades-related areas.

Projections

The occupational employment baseline growth rates for 2012-2021 suggest Brisbane will continue to develop as a professional service hub for the rest of Queensland. The factors supporting this view are:

- predicted high growth rates in the Managers, Professionals, Technicians and Trades Worker areas;
- Queensland's resources boom, will continue to draw on high skill labour residing in the greater Brisbane area; and
- increased affluence boosting consumption of high skill services.

Using observed time series data in a regression model we predicted total employment by occupation and industry for the Greater Brisbane Labour Market until 2021. Based on our projections of a 2.9% annual growth rate in labour force needs. On this basis, the

Greater Brisbane Labour Market will expand by 343,000 jobs by 2021¹⁰. The components of the calculated employees required are shown in the tables below.

The following employment growth numbers by major occupational groups were identified by 2021 (by broad ANZSCO 2006 code).

Forecasts of additional employees required for the period 2012-2021, by major occupational groups^a, Greater Brisbane Labour Market

Occupations	Persons to Employ
Managers	62,403
Professionals	136,410
Technicians and trades workers	46,202
Community and personal service workers	26,937
Clerical and administrative workers	34,288
Sales workers	16,786
Machinery operators and drivers	9,681
Labourers	10,626
Total	343,333

^a Occupational major groups are classified according to ANZSCO 2006 classifications structure.

Note: Forecasts of additional employees required by major occupational groups for the Greater Brisbane Labour Market were estimated by subtracting baseline predictions of total employment by major occupational groups in 2021 by total employed persons by major occupational groups in May quarter 2011.

The industry breakdown of the employment growth number required by 2021 was also identified and is shown in the table below.

¹⁰ A breakdown of this figure into the amount of people that required from the Greater Brisbane, intrastate, interstate, and international markets was unable to be performed at the time of the study due to lack of information on Brisbane resident population components in 2011.

**Forecasts of additional employees required for the period 2012-2021, by industry divisions^a,
Greater Brisbane Labour Market**

Industry	Persons to Employ
Agriculture, forestry and fishing	-270
Mining	10,297
Manufacturing	3,836
Electricity, gas, water and waste services	3,726
Construction	43,359
Wholesale trade	-3,221
Retail trade	23,070
Accommodation and food services	27,030
Transport, postal and warehousing	12,452
Information media and telecommunications	7,776
Financial and insurance services	1,028
Rental, hiring and real estate services	10,717
Professional, scientific and technical services	52,123
Administrative and support services	18,770
Public administration and safety	34,457
Education and training	28,013
Health care and social assistance	58,519
Arts and recreation services	6,567
Other services	4,084
Total	342,333

a Industries are classified according to ANZSIC 2006 divisional structure.

Note: Forecasts of additional employees required by industry divisions for the Greater Brisbane Labour Market were estimated by subtracting baseline predictions of total employment by industry divisions in 2021 by total employed persons by industry divisions in May quarter 2011. Results differ with the previous table due to rounding in the employment by industry and occupation numbers as at May Quarter 2011.

Estimates of baseline projections and Business as Usual employment growth by industry were also produced (see, table below).

Forecasts of structural change adjustment by major occupational groups^a in 2021, Greater Brisbane Labour Market

Occupation	Baseline Predictions	Business as Usual Scenario	Structural Change Adjustment ^b
Managers	180,903	156,317	24,586
Professionals	398,710	346,009	52,701
Technicians and trades workers	189,802	189,691	111
Community and personal service workers	133,937	141,147	-7,210
Clerical and administrative workers	207,688	228,738	-21,050
Sales workers	127,586	146,161	-18,574
Machinery operators and drivers	73,581	84,293	-10,712
Labourers	106,126	125,977	-19,851
Overall	1,418,333	1,418,333	0

a Occupational major groups are classified according to ANZSCO 2006 classifications structure.

b This last column "structural change adjustment" identifies areas of potential shortfall (positive number) and over supply (negative number).

Concordance ratios¹¹, drawn from the Household Income and Labour Dynamics Survey (HILDA), were then used to assign these projected shortfalls across industry and occupation (both by major and sub-major occupational groups). On this basis, and after application of the latest vacancy rate data for the Greater Brisbane Labour Market, the following key occupations are expected to experience skill shortages over 2012-2021.

¹¹ The HILDA ratios are capable of performing one-to-one concordance between the 1-digit ANZSIC code and the 2-digit ANZSCO code. Using these ratios, the number of employed persons working in an industry can be disaggregated down to an approximation of the occupational distribution of those people working in that particular industry.

Occupations of particular skills needs for the period 2012-2021, Greater Brisbane Labour Market

Major occupational groups	Sub-major occupational groups
Manager	[11] Chief executives, general managers [12] Farmers and farm managers [13] Specialist managers (construction, production, distribution, health education) [14] Hospitality, retail and service man (retail, accommodation)
Professionals	[22] Business, human resource and market (sales, marketing public) [23] Design, engineering, science and training [25] Health professionals [26] ICT professionals (ICT/ information) [27] Legal, social and welfare professionals
Technicians and trades workers	[32] Automotive and engineering trades workers [33] Construction trades workers [34] Electro technology and telecommunication workers [35] Food trades workers [36] Skilled animal and horticultural workers [39] Other technicians and trades worker (Hairdressing)
Community and personal service workers	[42] Carers and aides [43] Hospitality workers [44] Protective service workers [45] Sports and personal service workers
Clerical and administrative workers	[53] General clerical workers [55] Numerical clerks [59] Other clerical and administrative workers

Note: The Hilda Concordance and the Internet Vacancy Index published by the Department of Education, Employment and Workplace Relations were used to identify occupations requiring particular skills needs in the table.

While the above list is not exhaustive it is consistent with our overall conclusions about the direction of the Greater Brisbane economy and its increasing service and tertiary industry focus.

Policy Recommendations

The implications of the findings from our analysis reinforced by industry discussions, is that this pattern of job creation and destruction will intensify over the period 2012-2021.

Issues with institutional arrangements primarily relate to wage flexibility and in-migration of labour. In many ways these are national rather than local issues but local employers will face wages issues driven by our predicted overall shortage of labour across the board and by competition for labour between industries. The Greater Brisbane Labour Market will be able to cope with the expected labour and skill demands over the period 2012-2021.

However considerations should be given to the following recommendations to more appropriately respond to changes in labour market requirements. Our recommendations are:

1. Active moves to stop excess labour demand pressures emerging by an active policy of retaining skilled workers in the workforce, particularly in health related areas where a significant number of trained persons have left the industry.
2. Increase efforts to attract inward migration including addressing issues relating to housing and infrastructure.
3. Place emphasis on bridging course to retrain and up-skill workers who may be caught up in the structural change issues discussed in this report.
4. Assist the predicted structural changes to occur rather than attempting to resist change by supporting non-performing industries.
5. Educationally, plan for a greater role for VET in the provision of less traditional areas such as Arts, Media and ICT and strengthen the capacity of VET as a pathway to further education in line with the recommendations of the Bradley Report to increase tertiary access to disadvantaged groups.
6. Examine institutional and legislative arrangements that reduce the ability of workers to fill higher level skill jobs, not as a means of diluting skills but as a means of fast tracking the creation of suitable labour.

Finally, there is a need to increase labour market intelligence gathering. In undertaking this report it was found that, while a number of agencies provide useful information in an aggregate level, very little industry or enterprise level work is currently undertaken.

Contents

Executive summary	3
1 Introduction	17
1.1 Purpose	17
1.2 Overview of the issue	17
1.3 Structure of this report	19
2 Types and costs of skill shortages	20
2.1 Types of skill shortages	20
2.2 Cost of skills shortages	21
3 The Greater Brisbane Labour Market environment	23
3.1 Key characteristics	23
3.2 Sources of labour supply for the Greater Brisbane Labour Market	25
3.3 General labour market supply and demand in Queensland	27
3.4 Unemployment to vacancy relationships	29
3.5 Structural change	30
3.6 Summary of structural change in Greater Brisbane Labour Market	37
4 Current views on Brisbane skills shortages	39
4.1 DEEWR survey	39
4.2 DEEWR views	41
4.3 Industry discussions	44
5 Baseline and business as usual employment projections by industry and occupation	45
5.1 Baseline estimation procedures	45
5.2 Baseline and business as usual employment estimates by industry and occupation compared	51
6 Ability of the Greater Brisbane Labour Market to cope with project baseline skill needs	54
6.1 Analysis	54

6.2	Conclusions	59
7	Policy implications	62
A	Shift share results	64
B	Labour market diagrams for the Greater Brisbane Labour Market	71
C	HILDA concordance tables	78

Figures and Tables

Figure 1	Queensland labour market framework as at September 2010	24
Figure 2	Inflows and outflows, Greater Brisbane Labour Market, 2001-2006	26
Figure 3	Labour supply and labour demand for the period February 2006 to May 2011, Queensland	27
Figure 4	Queensland labour supply and labour demand by major occupational groups, February 2006 to May 2011	28
Figure 5	Unemployment vacancy ratio ^a Australia and Queensland, February 2006 to May 2011	29
Figure 6	Unemployment vacancy ratio ^a Greater Brisbane Labour Market, May 2010 to May 2011	30
Figure 7	Proportions of vacancies unfilled and filled with staff lacking the desired skills/capabilities, Greater Brisbane Labour Market, March 2010	43
Figure B.1	Employed persons by non-school qualifications for the period 1996-2011, Greater Brisbane Labour Market	71
Figure B.2	Growth projections of employment by industry divisions ^a for the period 2012-2021, year on year growth rates (%), Greater Brisbane Labour Market	72
Figure B.3	Growth projections of employment by major occupational groups ^a for the period 2012-2021, year on year growth rates (%), Greater Brisbane Labour Market	73
Figure B.4	Projected employment by major occupational groups ^a for period 2012-2021, baseline and business as usual projections, Greater Brisbane Labour Market	74

Figure B.5	Baseline predictions of employment by industry divisions ^a for the period 2012-2021, Greater Brisbane Labour Market	74
Figure B.6	Seasonally adjusted U/V ratios ^a of major occupational groups, for the period February 2006 to May 2011, Australia and Queensland	75
Table 1	Structural change, industry in the Greater Brisbane Labour Market, May 1989 to May 2011	31
Table 2	Structural change, occupations in the Greater Brisbane Labour Market, May 1998 to May 2011	35
Table 3	Structural change, non-school qualifications in the Greater Brisbane Labour Market, 1996 to 2006	36
Table 4	Vacancies unfilled and filled with staff lacking the desired skills/capabilities, by major occupational groups, Greater Brisbane Labour Market, March 2010	39
Table 5	Competition for vacancies by major occupational groups in 2010, Greater Brisbane Labour Market	40
Table 6	Recruitment conditions selected skilled occupational groups, Greater Brisbane Labour Market, 2011	41
Table 7	Growth projections of employment by industry divisions ^a , 2012-2021, year on year growth rates (%)	46
Table 8	Growth projections of employment by major occupational groups ^a , 2012-2021, year on year growth rates (%)	47
Table 9	Forecasts of additional employees required for the period 2012-2021, by industry division ^a , Greater Brisbane Labour Market	49
Table 10	Forecasts of additional employees required for the period 2012-2021, by major occupational groups ^a , Greater Brisbane Labour Market	50
Table 11	Forecasts of employment by industry 2012-2021, Greater Brisbane Labour Market ('000)	51
Table 12	Forecasts of employment by major occupations ^a ('000) 2012-2021 Greater Brisbane Labour Market ('000)	53
Table 13	Summary of trends in non-school qualifications for the period 2012-2021, Queensland	56
Table A.1	Structural change in total employment by industry divisions ^a from May 1989 to May 2011, Greater Brisbane Labour Market	64

Table A.2	Shift share results on vacancy by occupations ^a from May 2006 to May 2011, Queensland	65
Table A.3	Shift share results on total unemployment (weeks) by industry divisions ^a from May 1995 to May 2011, Queensland	68
Table A.4	Shift share results on total unemployment (weeks) by major occupational groups ^a from May 1997 to May 2011, Queensland	70
Table C.1	Forecasts of employees required by 2021 for occupations identified as having particular skills needs, Greater Brisbane Labour Market	78
Table C.2	Occupations of particular skills needs for the period 2012-2021, Greater Brisbane Labour Market	82
Table C.3	Concordance of employment by occupation to education levels acquired, Australia, for total employed persons ('000) by major occupational groups and percentage rate (%) of employment for sub-major occupational groups to major occupational groups	84
Table C.4	Concordance of employment by occupation to education levels acquired, Queensland, for total employed persons ('000) by major occupational groups and percentage rate (%) of employment for sub-major occupational groups to major occupational groups	89
Table C.5	Concordance summary of employment by occupation to education levels acquired, Australia and Queensland, for total employed persons ('000) by selected major occupational groups ^a and percentage rate (%) of employment for sub-major occupational groups to major occupational groups	92
Table C.6	Concordance of employment by occupation to employment by industry, Australia, using percentage rate (%) comparisons of employment by sub-major occupational groups to industry and employment by major occupational groups to industry	96

1 Introduction

1.1 Purpose

Synergies Economic Consulting (Synergies) has been engaged by the Regional Development Australia (RDA) Brisbane to review likely labour market conditions in the Greater Brisbane Labour Market over the period 2012-2021, with special attention to issues relating to labour force skill shortages.

1.2 Overview of the issue

Skill shortages represent labour market imbalances and as a result reduce potential growth and the creation of economic wealth¹². Defined simply, a skill shortage exists where the supply of skill services, under current wage, working conditions, spatial location and institutional arrangements, does not meet the current demand for these services.

However, as a number of economists have pointed out, skill shortages are both difficult to define and to measure¹³. For those that subscribe to a fully informed and flexible labour market, the concept of a long lasting skill shortage is difficult to conceive. In such cases the market will solve the problem by raising wages which, in the short-term, will attract workers from other related and substitutable occupations or through migration, and in the long run increase the numbers entering training places.

Similarly, firms faced with short term skill shortages may substitute labour for capital, work existing workers¹⁴ more intensely or lower desired recruitment standards to fit short-term circumstances¹⁵. On the supply side, skill shortages may act as a signal for workers with the required skills to work longer hours or return to the labour market in which the skill shortage exists. Those lacking the required skills may undertake training to acquire the necessary skills¹⁶.

There is both a stock and a flow aspect to skill shortages. The stock factor refers to the current numbers of persons able to perform a particular task(s) to an acceptable

¹² Shah, C and Burke, G (2003) "Skills Shortages, Concepts, Measurement and Implications" Working paper 53, Centre for Education and Training, Monash

¹³ United States Bureau of Labor Statistics (1999) "Can occupational labor shortages be identified using available data?". Monthly Labor Review, 15,21

¹⁴ McMullin, J and M Cooke, "Labour Force Aging and Skill Shortages in Canada" WP 24 Canadian Work Research Network.

¹⁵ It is recognised that in service based industries, the ability to substitute labour for capital is limited.

¹⁶ Haskell, J and Martin, C (2002) "Technology, Wages and Skill Shortages; evidence from UK micro data" *Oxford Economics papers* 53 (4), 642-658

standard, which is normally attested to by some form of employer accepted qualification. The flow refers to the amount of hours supplied. Within institutional requirements, such as workplace health and safety rules, the stock and the flows of skill labour can be adjusted from both the supply side (workers) and the demand side (employers).

Given this relatively large range of potential remedial actions, why is it that so much attention in Australia is given to current and emerging skill shortages in the labour force?

In part it is because the underlying concept of labour market flexibility which is essential to the stock and flow options listed above does not fully exist. For example, in many high skill occupations, institutionally mandated qualification requirements prevent less qualified, but available, workers from accepting vacancies. Similarly, restrictions on work intensity often prevent existing workers from working extended hours.

As well, equity considerations often constrain employers from offering higher (efficiency) wages to attract additional workers in the knowledge that currently employed workers would need to be paid an equivalent amount to maintain workplace morale and efficiency. In such situations the standard “raise wages” response from economists becomes less feasible as a policy weapon for skill shortages.

Definition also plays an important part. Simply put, one employer’s skill shortage can be another’s labour cost issue. The employer who is not paying market wages cannot reasonably hope to attract staff and even one who is paying average market wages may not attract workers to remote areas where amenity and job opportunities for other members of the family are limited.

To this point the discussion has focused largely upon micro issues. Short-term skill shortages occur because employers and potential employees fail to agree upon a specific wages/qualifications/location mix or are prevented from doing so by the institutional setting.

These issues also have a macroeconomic dimension;

- where shortages in a particular industry lead to wage inflation, which creates labour hiring issues in other industries (via poaching), as well as adding to general wage inflation issues in the economy as a whole;
- where market failure exists to the point that certain skills deemed necessary to the national economy are habitually undersubscribed. Frequently cited examples include science graduates and health-related occupations.

In both these cases, skill shortages impact economic performance and reduce general social welfare. In these circumstances, Governments are often tempted to address the market failure problem by funding increased training programs and/or varying migration intake.

Finally, there is often confusion between labour supply shortages (the solution to which lies in increasing participation rates) and skill shortages, whose ultimate solution lies in a general and specific increase in education and training. To explore these issues more fully it is necessary to examine the circumstances in which skill shortages arise and the types of skill shortages that occur.

1.3 Structure of this report

This report is structured as follows:

- section 2 discusses the types and costs of skill shortages;
- section 3 provides background on labour markets in the Greater Brisbane region;
- section 4 summarises the outcomes from the industry consultation;
- section 5 presents the results of our modelling to identify projected skills shortages in the Greater Brisbane Labour Market;
- section 6 considers whether the Greater Brisbane Labour Market will be able to close the projected baseline skill gaps; and
- section 7 concludes with the key policy implications.

2 Types and costs of skill shortages

2.1 Types of skill shortages

Richardson identified 4 areas of skill (labour) shortage.¹⁷ These are:

- **Level 1** (or absolute) shortages: where the total supply of sufficiently trained persons is currently being fully utilised. Long lead times often exist for training new workers and the possibilities for cross entry from other skill areas is limited.
- **Level 2** shortages: when there are few persons currently possessing the needed skill but lead times for training are short and spare capacity exists for training institutions to take on more trainees.
- **Level 3** shortages, best referred to as ‘skills mismatch’: these occur when there are sufficient suitably trained persons available in the labour market but for a variety of job-related and institutional reasons these workers chose not or are unable to work in the profession where there is a shortage.
- **Level 4** shortages: relate to gaps in worker quality (qualifications and experiences) and occur where there are sufficient numbers of formally skilled persons available for hire but some are not offered employment because employers have concerns over their quality or reliability.

These types of skill shortages differ in their potential to disrupt economic activity and in their fundamental causes.¹⁸

Type 1 shortages may arise when new processes are introduced and/or where there is a long lead time in training. They may also arise where professional bodies or unions limit the output of graduates. These shortages are less likely to be wage related and in essence represent a form of market failure, either through institutional pressure in the accreditation process and/or from lack of foresight and planning from employers. Essentially two groups are involved with Type 1 shortages:

- high skill professionals where the chief barriers to entry are length of training (opportunity costs of time); or
- those employees in industries where innovative and emerging processes on the production side are not matched by adequate workforce planning (this is common in emerging industries).

¹⁷ Richardson, S (2007) “What is a Skill Shortage” NCVER, Canberra

¹⁸ Haskell, J and Marin, C (1996) “Do Skill Shortages reduce Productivity” Economic Journal 103 (2), 386-394

Type 2 shortages are most likely to occur during booms in the production cycle which (temporarily) fully absorb existing trained staff and sends out signals for others to engage in short-term training. This traditionally initiates a program of training designed to solve the issues, accompanied by short-term quality adjustments to meet immediate needs. The danger in this situation is that a “cobweb” process may occur where the training cycle and the production cycle are not synchronised, leading to successive rounds of over and under demand for the type of skill.

Skills mismatch occur for a number of reasons and may be the result of the earlier described cobweb effect. They are also essentially supply side driven. For example, institutionally determined wages or job conditions may not be sufficient to meet the reservation wage¹⁹ of some workers with the available skills. Within the Greater Brisbane Labour Market, nursing is a case in point, with large numbers of suitably trained nurses choosing to remain outside the workforce while there is strong demand for their services within the labour market²⁰.

Quality gaps relate to differences between formal and effective skill profiles among workers. For example, a person may be formally qualified but have bad work habits including reliability issues which lead them to be rejected by employers. Quality gaps are essentially a demand side issue. In this sense mismatch and quality gaps are reciprocals of one another, basically resulting from a failure of markets to adjust to reservation wage requirements of workers and/or the inability of formal training to meet employer expectations²¹.

2.2 Cost of skills shortages

In recent years the potential economic costs arising from labour market imbalances such as skill shortages have been highlighted from a number of sources. For example, Heather Ridout from the Australian Industry Group stated: ²²

'Of particular concern is that shortages are intensifying in occupations associated with manufacturing, construction and engineering, which are pivotal to the Australian economy...

¹⁹ Including monetised lifestyle expectations.

²⁰ Nugent, P., Ogle, KR., Bethune, E., Walker, A & D. Wellman. (2004). Undergraduate pre-registration nursing education in Australia: a longitudinal examination of enrolment and completion numbers with a focus on students from rural and remote campus locations', a report prepared for Rural and Remote Health.

²¹ This latter issue is often difficult to resolve given the long lead time taken, particularly in Vocational training to introduce new courses or tailor existing courses to employer needs.

²² Sydney Morning Herald, September 2010, 'Ridout lashes costly climate policies'.

Her concerns related to several potential cost factors arising from skill shortages:

- postponed or lost production as a result of absolute skill shortages which cannot be overcome, often as a result of statutory requirements;
- inefficiently produced output, as a result of the need to substitute lower quality or less trained labour within the production process. The costs of this type of skill shortages are often manifested in low productivity and low productivity growth in an economy with endemic skill shortages.

Clearly then skill shortages impose additional economic costs through the processes described above. They also impact upon future growth prospects by making it more difficult to attract inward investment.

3 The Greater Brisbane Labour Market environment

3.1 Key characteristics

This section considers the current labour market environment within the Greater Brisbane area. It does this to understand the environment in which skill shortages, perceived and real, exist. As a result, such issues as openness of the market to inward and outward migration and structural change within the industrial and occupational framework need to be understood by policy makers attempting to devise an effective skill shortage strategy.

As a capital city, Brisbane does not dominate the State labour market like Sydney or Melbourne. For example, in 2010, the Greater Brisbane Labour Market accounted for approximately 47% of the overall Queensland labour force. This compares with Sydney's share of the New South Wales Labour market (approximately 65%) and Melbourne's share of the Victorian labour market (approximately 73%).²³ The implication here is that Brisbane does not exert the same pull upon skilled labour as the two other Eastern States and to some extent competes with the regional centres of Townsville and the Gold Coast for skilled labour especially in the professions and in public administration.

Part of the reason for this is that Brisbane has significantly fewer company head offices than Sydney or Melbourne, which again has implications for its ability to draw on skilled labour from interstate. Nevertheless as the State capital and centre of government Brisbane is able to attract labour from other regions to meet skill shortages. In this sense it is important to understand the structure of the Queensland labour market as a whole before examining the Greater Brisbane Labour Market environment²⁴.

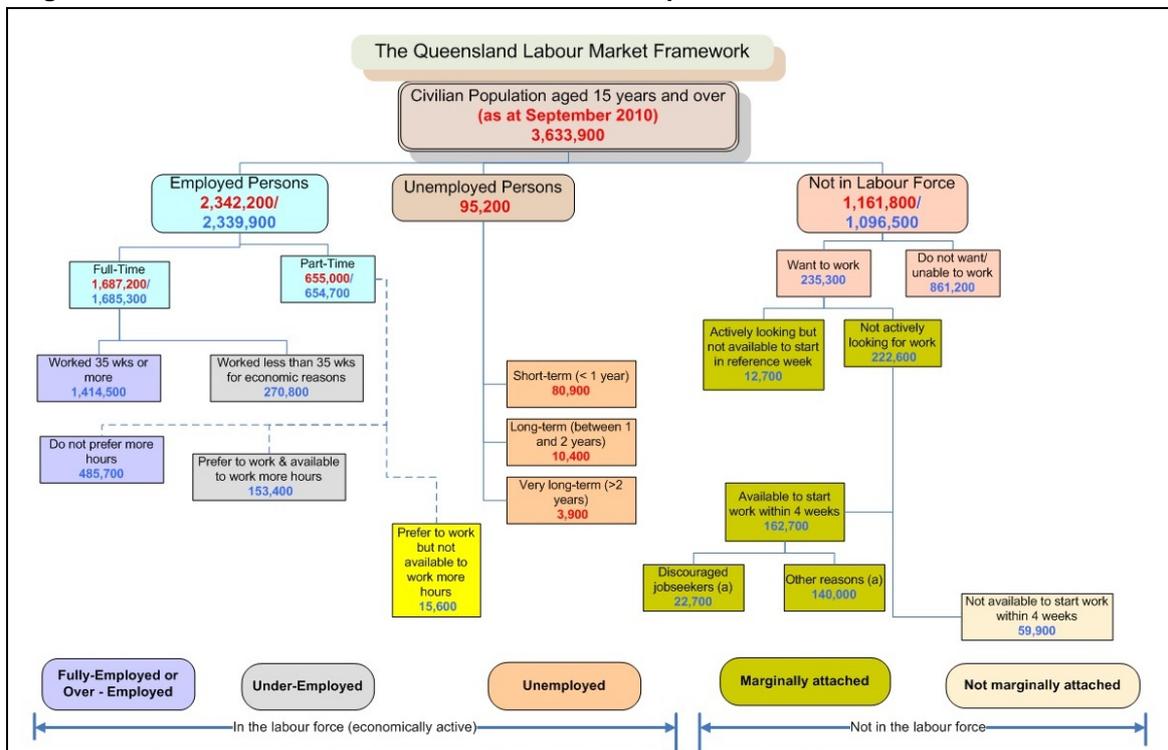
Figure 1 provides a recent indication of the current structure of the Queensland (and by inference, Greater Brisbane) labour markets.²⁵

²³ See, Mangan, J (2001) "The Capital Cities Effect on State Labour Markets", Labour Market Research Unit, Department of Employment and Industrial Relations, WP 13.

²⁴ Assessment of the Queensland labour market environment is important for understanding the source and size of potential inflow and outflow of skill workers from regional Queensland into Brisbane for the period 2012-2021. This will have implication on understanding the scope of the skills shortages problem and where policies need to be directed at attracting skilled labour at an intrastate, interstate and international level.

²⁵ Note, it was not possible to provide this level of disaggregation at the Greater Brisbane Labour Market level

Figure 1 Queensland labour market framework as at September 2010



Note: (1) Data may be inconsistent when sourced from various ABS publications. Where this occurs, more than one number may appear with a population group. The colour determines the source. (2) From September 2009, 'Believes ill-health or disability discourages employers' together with 'No jobs in suitable hours' are now included with other responses to derive the population group 'Discouraged job seekers'. Prior to September 2009, 'No jobs in suitable hours' was included in the category, 'Other'. As a result of this change, there is a break in time series and users need to exercise care when comparing estimates from 2009 with previous years' data. (3) Totals may not sum due to rounding. (4) Numbers indicated in red if from sources 1 or 2. (5) Numbers indicated in blue if from sources 3 or 4.

Data source: (1) ABS Cat No. 6202.0 September 2009, Labour Force, Australia. (2) ABS Cat No. 6291.0.55.001, Unemployed persons by duration, September 2009. (3) ABS Cat No. 6265.0, Underemployed Workers Australia, September 2009. (4) ABS Cat No. 6220.0, Persons not in the Labour Force Australia, September 2009.

Figure 1 demonstrates the complexity of a modern labour market. Currently Queensland has a potential workforce of about 3.6 million persons aged 15 years or over. Of these:

- between 66% and 68% are participating (employed or actively unemployed);
- the large majority (64%) are employed with effective unemployment operating at around 4.5% of the labour force;²⁶
- full time employment is 72% of the total employed and 28% is part-time employment;

²⁶ This is a slightly different measure than the normal unemployment rate and measures those unemployment and immediately able to start work

- within the labour market are the very active (working or actively seeking work) and those that want to work but are constrained in some way from starting within four weeks;
- the long term unemployed (those unemployed for more than 12 months) are often classified as active but there may be some doubt on this. In any event they are unlikely to be suitable for immediate employment;
- the 30%-32% non-participating group are a diverse but important dynamic in the labour market and include those constrained by commitments (study, carer duties), those that are hidden or discouraged unemployed. This group also contains a substantial pool of potential workforce skills who are not participating.

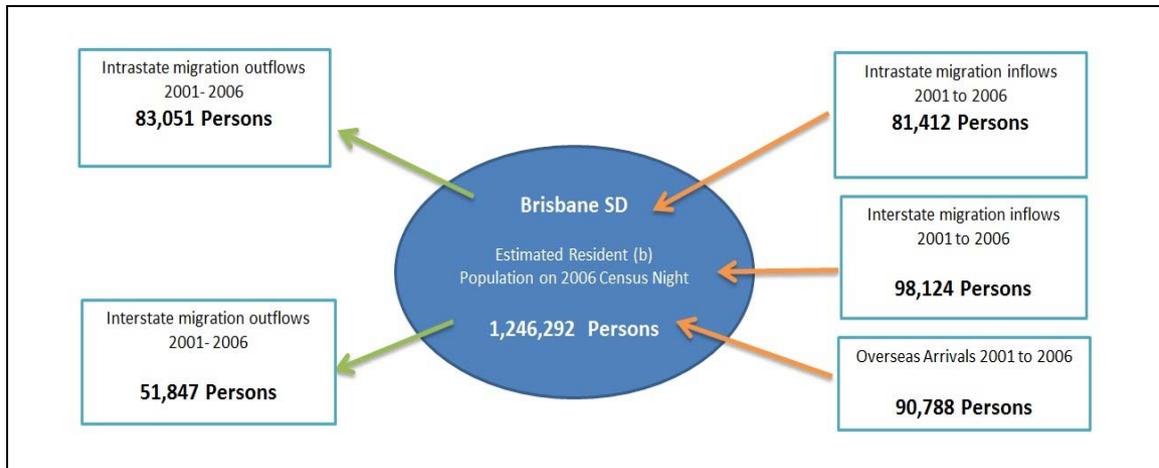
The current Queensland labour market could be described as relatively tight with low unemployment rates and a number of unfilled vacancies. This view is reinforced in later analysis. The implication here is that tight labour markets have implications for the occurrence of all types of skill shortages.

Type 1 shortages occur because tight labour markets go hand in hand with economic growth. Types 2 and 4 shortages will also occur, particularly as employers who are skills constrained will (unwillingly) substitute lower skilled workers. Only Type 3 shortages contract in a tight labour market because of the wages pressures for those outside of the labour market to return to work. In tight labour markets, perceived skill shortages may often be better described as labour supply shortages.

3.2 Sources of labour supply for the Greater Brisbane Labour Market

Despite being less centralised than the Greater Sydney or Greater Melbourne Labour Markets, it needs to be recognised that the Greater Brisbane Labour Market is an open labour market with considerable in and out flows. The main sources of labour supply are detailed in Figure 2.

Figure 2 Inflows and outflows, Greater Brisbane Labour Market, 2001-2006



Note: (1) Interstate arrivals excludes not stated responses to the address five years before census night question and off-shore areas and migratory and Queensland no usual address responses to the address on census night question. (2) Overseas arrivals excludes temporary visitors and off-shore areas and migratory and Queensland no usual address responses to the address on census night question. (3) Interstate inflows to Brisbane excludes Queensland undefined and not stated responses to the address of usual residence five years before census night question. (4) Resident population is defined as persons with an address of usual residence on census night and five years before census night in the same statistical division.

Data source: ABS, 2006 Census of Population and Housing.

Using the latest Census data (2006) as a snap shot and using the resident population as the base value:

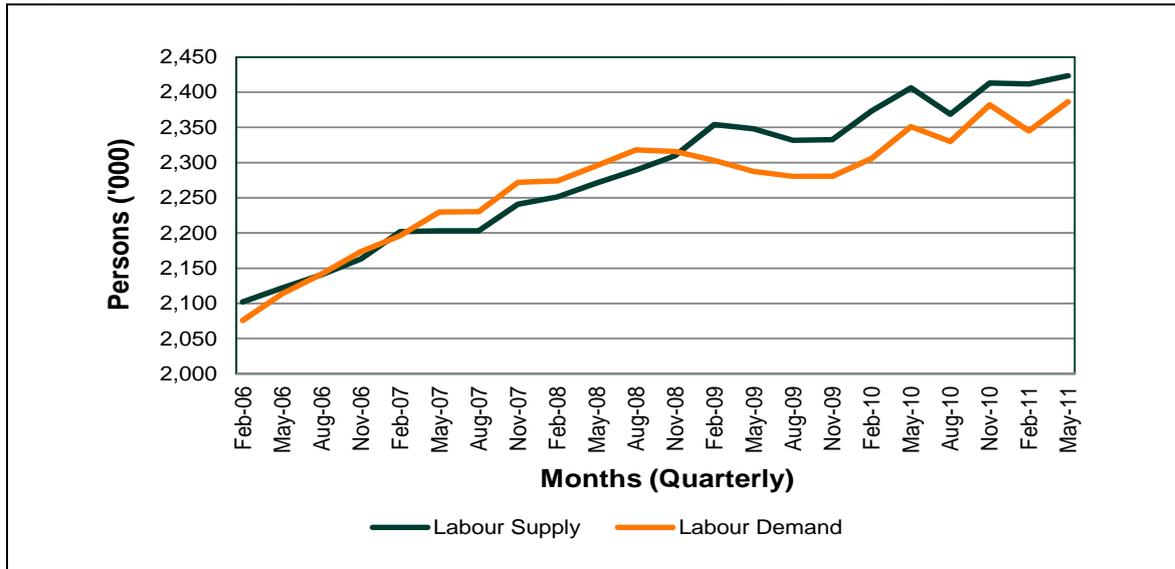
- overall, 405,000 persons (32%) of the resident population moved, in or out, of the market
- 6.7% left Brisbane for other parts of Queensland
- 4.1% left for interstate
- 6.5% in migrated from the rest of Queensland
- 7.9% in migrated from the rest of Australia
- 7.2% in migrated from overseas.

While these are population movements rather than worker movements, it is well known that the migration decision is heavily influenced by job choices. The pattern described above indicates a relatively fluid labour market and suggests that retention of workers may be as much a priority as their attraction.

3.3 General labour market supply and demand in Queensland

Figure 3 shows labour demand (employment + vacancies) and labour supply (employment + unemployment) for the Queensland labour market over the period 2006-2011.

Figure 3 Labour supply and labour demand for the period February 2006 to May 2011, Queensland



Note: Labour Supply and Labour Demand data were derived using quarterly employment, unemployment and seasonally-adjusted vacancy data for the Queensland labour market.

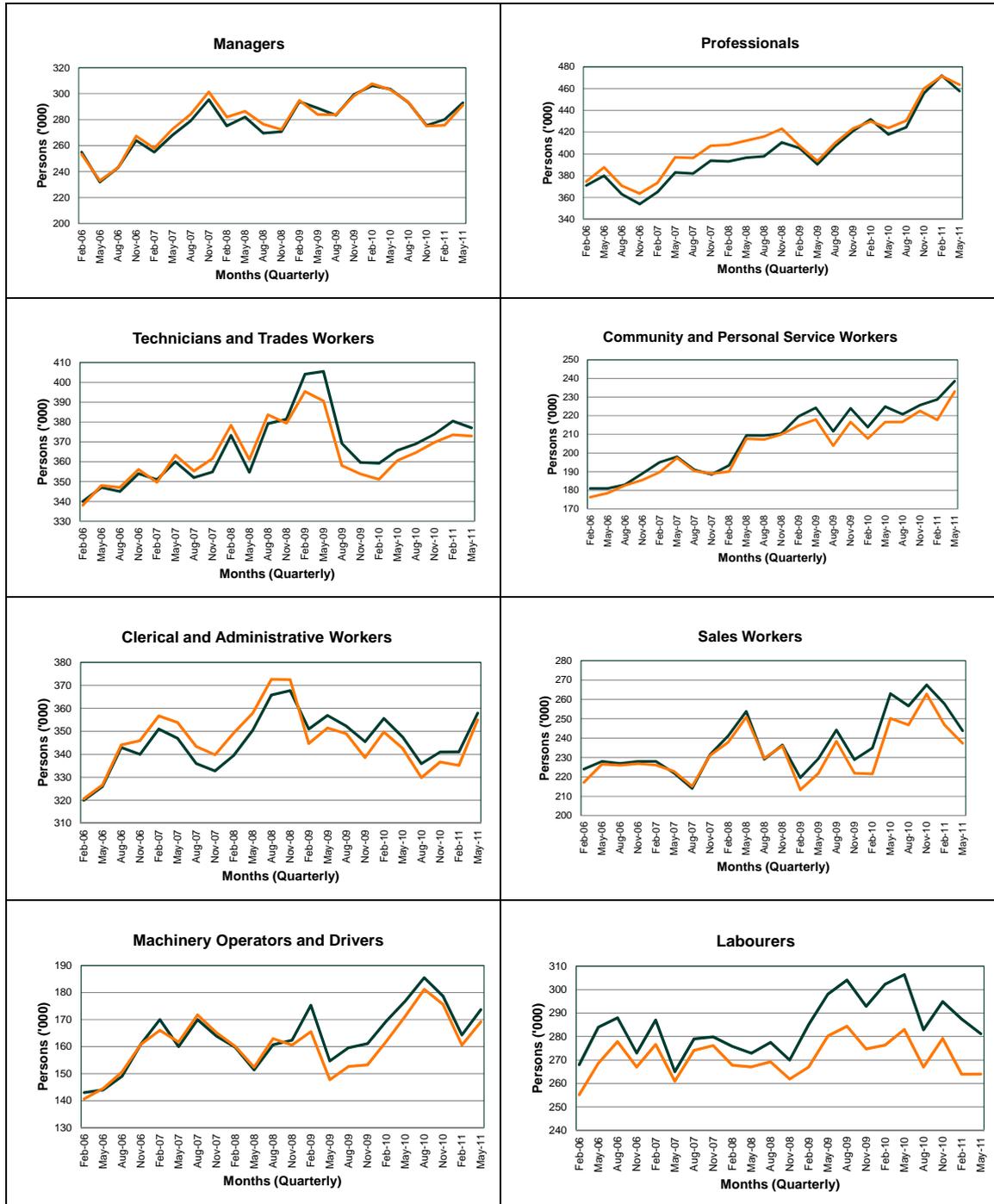
Since November 2008, aggregate labour supply has been greater than labour demand. Over supply resulted from reduced aggregate labour demand following the Global Financial Crisis (GFC) and a resultant rise in unemployment since that period, although still at a moderate level of slightly above 5%. It should be noted that since February 2010, advertised vacancies has risen to the point that demand and supply have moved closer together, indicating a tightening of labour market conditions.

Such labour market conditions are conducive to the existence of skill shortages both in a Type 1 (absolute skill shortage) sense and in terms of skill shortage Type 4 (where employers are forced to use lower quality workers than desired). Evidence presented later in the analysis from government and industry sources confirms this conclusion.

Inspection of the labour supply and labour demand diagrams by major occupational grouping in Figure 4 shows excess labour supply post-GFC for Technicians and Trades Workers, Community and Personal Service Workers, Labourers, Machinery Operators and Drivers and Sales Workers. In particular, supply and demand has been most unbalanced for Labourers²⁷.

²⁷ Labour is associated with lower-skilled work.

Figure 4 Queensland labour supply and labour demand by major occupational groups, February 2006 to May 2011



a The colour determines supply or demand: labour Supply is indicated by the green line and labour demand is indicated by the orange line.

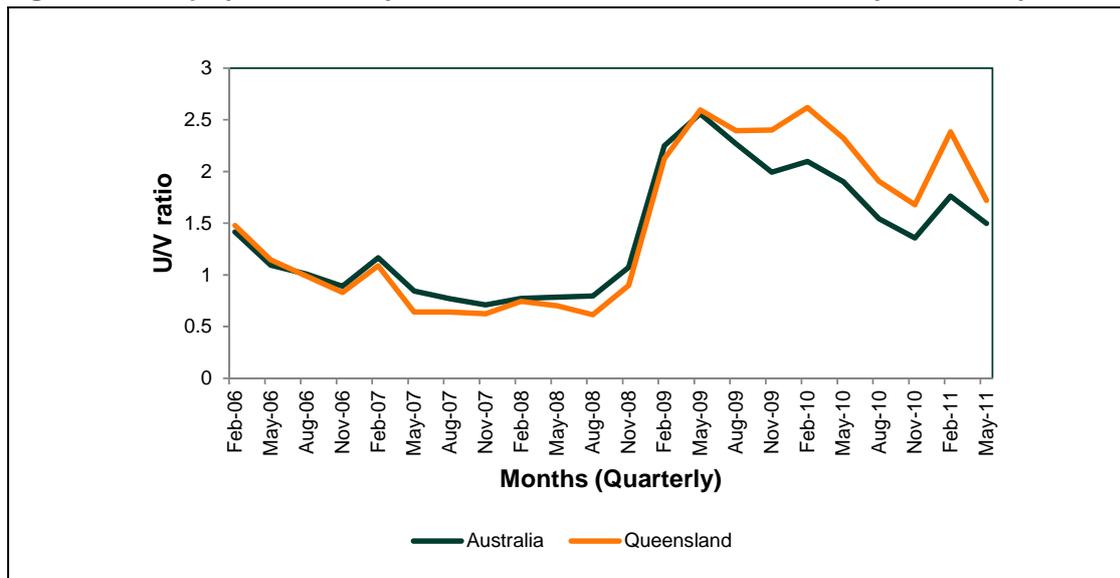
Note: Labour Supply and Labour Demand data for each major occupational group (ANZSCO 2006) were derived using quarterly employment, unemployment and seasonally-adjusted vacancy data for the Queensland labour market.

3.4 Unemployment to vacancy relationships

Another measure of the tightness of a labour market is the Unemployment/Vacancy ratio (U/V ratio) for the economy and for various occupations and industries. The data in

Figure 5 indicates that Queensland and by implication the Greater Brisbane Labour Market is a tight labour market (relatively low U/V ratios) but not as tight as the rest of Australia. This situation is expected to change as the Mining industry recovers in Queensland. Further breakdowns of labour supply and labour demand tightness by major occupational group are shown in Appendix B.3.

Figure 5 Unemployment vacancy ratio^a Australia and Queensland, February 2006 to May 2011



a Unemployment data used represents total unemployed persons ('000) by occupational division of last job using 1-digit ANZSIC 2006 Code at quarterly data intervals. The seasonally adjusted Internet Vacancy Index (IVI) were utilised as an indication for job vacancies by occupation.

Note: U/V ratios presented for Australia and Queensland has been seasonally adjusted.

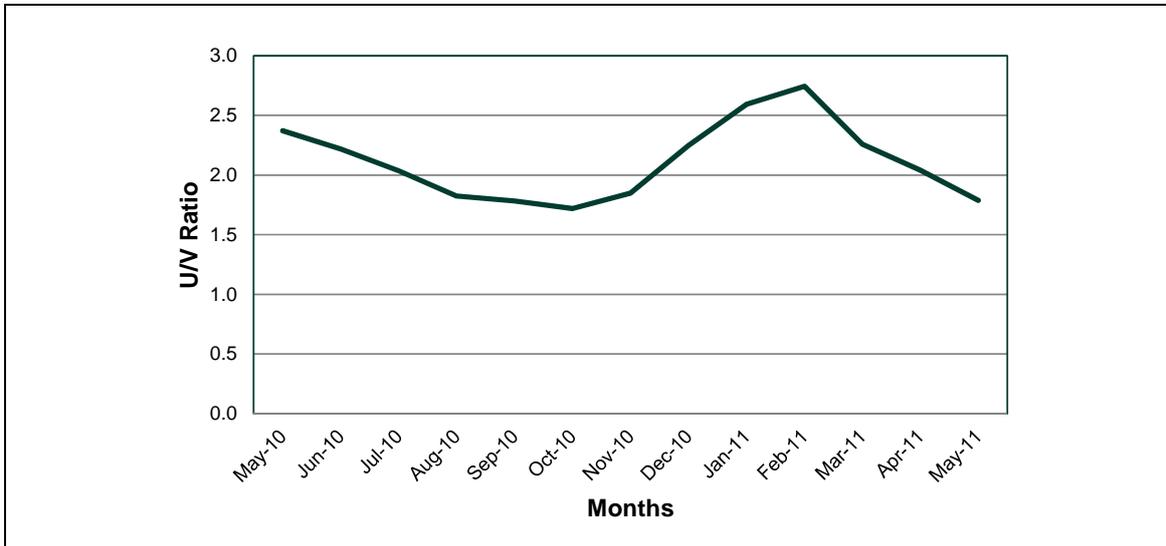
Data source: ABS Cat No. 6204.0.55.001, ABS Cat No. 6291.0.55.003 and DEEWR IVI.

Finally, Figure 6 traces movements in the Brisbane U/V ratio over the last three months. The graph shows that the Greater Brisbane Labour Market on average has had between two and three unemployed persons per advertised vacancy²⁸ for the period May 2010 to May 2011. The spike in U/V ratio in February 2011 reflects the general

²⁸ Under normal conditions a ratio of 5 (unemployed) to one advertised vacancy would be considered reasonable.

volatility in the labour market due to frictional forces (employees whose contracts ended and were looking for a new job for the start of a new year).

Figure 6 Unemployment vacancy ratio^a Greater Brisbane Labour Market, May 2010 to May 2011



^a Unemployment data used represents total unemployed persons ('000) at a three month moving average using original monthly data. The vacancy data for Brisbane were obtained from Regional IVI, which is a three month moving average data.

Note: U/V ratio presented is a three months moving average.

Data source: ABS Cat No. 6291.0.55.001 and DEEWR IVI.

3.5 Structural change

A key factor affecting future skill needs of the Greater Brisbane Labour Market is the degree of structural change in the economy. Structural change relates to changes in the relative share of industries and occupations in the economy in terms of a measure of economic activity such as employment, output or value added, both in an absolute sense and relative to some larger economy such as Australia as a whole. It is driven by changes in consumer preference, industry structure and technical change. Lewis and Connolly argue that the rate of structural change in Australia has increased markedly since 2000; a fact they put down to an increasing reliance on mining production and declines in the manufacturing base.²⁹

As part of formulating a “Business as Usual” scenario, this section assesses structural change in the Queensland and Brisbane economies.

²⁹ See, Connolly, E and Lewis, C (2010) “ Structural Change in the Australian Economy” Reserve Bank of Australia Bulletin, September

One of the most commonly used methods for measuring structural change is shift share analysis. With this measure, change in total employment in the local labour market area is decomposed into:

- the local labour market’s share of national growth due to growth in the national economy during the period of analysis;
- the mix change in activities in the local labour market (that is, the share of regional job growth attributed to the region’s mix of industries) based on the national growth rates for individual industry sectors; and
- the shift change of activities toward the local labour market (that is, how the region’s competitiveness, infrastructure base and other social and economic factors contribute to regional job growth).

The advantage of shift share analysis is that it does not need value added or production data which is often not available at the local labour market level of disaggregation. Instead, it uses a single variable indicator such as employment or education levels which are more normally available.

Shift share analysis was applied to industry and occupational employment data in the Greater Brisbane Labour Market over two periods 1989–1999 and 2000–2011. Differences between the periods were used to assess structural change.

The result of the shift share analysis for employment by industry is shown in Table 1. The shares that are included are:

- NS: national share
- IM: industry mix change
- RS: regional shift change
- TS: total share.

A positive number for national share, regional share and total share means that the industry’s share of employment increased. A negative number means that it declined. In terms of industry mix, a positive number means that this industry’s share of overall regional job growth has increased. A negative number means that it declined.

Table 1 Structural change, industry in the Greater Brisbane Labour Market, May 1989 to May 2011

Industry	May 1989 to May 1999				May 2000 to May 2011			
	NS	IM	RS	TS	NS	IM	RS	TS
Agriculture, forestry and fishing	0.7	-0.7	1.5	1.5	1.9	-3.6	-1.4	-3.0

Industry	May 1989 to May 1999				May 2000 to May 2011			
	NS	IM	RS	TS	NS	IM	RS	TS
Mining	0.4	-1.1	1.8	1.1	0.8	4.8	5.3	11.0
Manufacturing	11.2	-22.2	18.5	7.5	26.9	-38.6	5.7	-6.0
Electricity, gas, water and waste services	1.2	-5.1	0.3	-3.6	1.4	2.8	9.8	14.0
Construction	5.9	-2.4	9.1	12.6	18.0	15.2	-2.2	31.0
Wholesale trade	4.8	-3.8	2.6	3.7	10.5	-7.1	0.6	4.0
Retail trade	9.0	2.9	3.7	15.6	24.1	-2.1	-4.0	18.0
Accommodation and food services	4.2	9.8	0.8	14.8	13.6	0.1	10.3	24.0
Transport, postal and warehousing	4.1	3.3	5.0	12.4	12.7	-0.6	13.9	26.0
Information media and telecommunications	2.5	-5.9	2.5	-0.9	6.1	-6.5	-0.6	-1.0
Financial and insurance services	3.5	-7.8	-0.7	-5.0	6.6	0.5	-6.1	1.0
Rental, hiring and real estate services	1.6	1.2	-2.8	0.0	4.2	2.3	5.6	12.0
Professional, scientific and technical services	4.1	16.9	-3.5	17.5	16.9	10.7	8.4	36.0
Administrative and support services	1.7	9.3	0.9	11.9	7.8	-1.1	3.3	10.0
Public administration and safety	4.3	1.6	13.6	19.4	13.0	10.4	3.5	27.0
Education and training	4.6	4.7	9.5	18.8	14.7	6.0	14.3	35.0
Health care and social assistance	6.5	3.6	13.4	23.5	25.5	22.9	-2.4	46.0
Arts and recreation services	0.9	2.5	3.0	6.5	2.8	3.4	-0.2	6.0
Other services	3.9	2.7	0.0	6.5	9.4	-5.0	-2.4	2.0

^a Total Employment includes both part-time and full-time employed.

Note: See page 31 for table definitions. Brisbane refers to Brisbane Major Statistical Region, as data for Brisbane Statistical Division were unavailable. Industries are classified according to ANZSIC (2006)

Table 1 shows a structural shift in the employment by industry within the Greater Brisbane Labour Market away from manufacturing and process work towards managerial, professional and service employment over both periods. Specifically:

- Agriculture, forestry and fishing: in both periods 1 and period 2, employment in this industry fell as a percentage of total employment and relative to the expected national share.

- Mining: in both periods employment grew (from a low base) in Brisbane in an absolute sense and relative to the expected national share if mining in the Greater Brisbane Labour Market had moved in line with national trends.
- Manufacturing: the industry mix moved against the Brisbane area with the growth in employment, particularly in the second period, well below the expected national share.
- Electricity, Gas, Water and Waste Services: there was evidence of between-period shifts in the behaviour of this industry, with relative falls in period 1 and relatively strong growth relative to the expected national share in period 2.
- Construction: in absolute terms employment numbers grew in both periods but with a slight relative decline in period 2 in regional share, where the growth in the Greater Brisbane Labour Market was slightly below expected national share. The regional shift suggests that local conditions were responsible for the growth.
- Wholesale Trade: employment in the Greater Brisbane Labour Market grew in both periods but the industry mix in Brisbane led to a less than expected rate of increase based on expected national share and indicates a reduction in the significance of this industry.
- Retail Trade: employment grew strongly in absolute terms across both periods but the Greater Brisbane Labour Market recorded a less than expected rate of growth due to a negative industry mix effect. This indicates that had the Greater Brisbane retail employment grown at the same rate as the national retail employment between the period May 2000 to May 2011, the Greater Brisbane Labour Market would have lost 2,100 jobs.
- Accommodation and Food Services: both periods recorded strong absolute growth and growth above the expected national share.
- Transport, Postal and Warehousing: strong employment growth in both periods but small industry mix decline in later period.
- Information Media and Telecommunications: employment in the Greater Brisbane Labour Market in this area displayed a relative decline in industry mix and regional share components and a small overall growth below the expected national share.
- Financial and Insurance Services: employment in the Greater Brisbane Labour Market in this industry grew but at a rate below the expected National Share due to negative industry mix and regional share results.

- Rental, Hiring and Real Estate Services: employment trends reversed in the second period and grew strongly to be well above the expected national share.
- Professional, Scientific and Technical Services: employment in this industry grew well above expected national share in the second period.
- Administrative and Support Services: employment in this industry grew well above expected national Share in the second period.
- Public Administration and Safety: employment in this industry grew well above expected national Share in the second period, particularly through a strong industry mix component.
- Education and Training: employment grew across both periods in an absolute and relative sense. The regional share component was particularly significant in the second period.
- Health Care and Social Assistance: strong growths in employment in both periods with growth in the second period being approximately double the expected national share.
- Arts and Recreation Services: employment growth in both periods and above the expected national share.
- Other services: employment fell in a relative sense and in relation to the expected national share. This is line with a decline in the relative significance of lower skill work in the Greater Brisbane Labour Market overall.

In summary, higher than expected growth occurred in: Mining; Accommodation and Food Services; Electricity, Gas, Water and Waste Services (second period); Professional, Scientific and Technical Services; Administrative and Support Services; Public Administration and Safety; Education and Training; Health Care and Social Activities, and Art and Recreation Services. The Greater Brisbane Labour Market experienced relative declines (below the expected National share) in the employment significance of Agriculture, Forestry and Fishing; Manufacturing, Construction, Wholesale Trade, Retail Trade, and Financial and Insurance Services.

Shift share analysis was also applied to observe structural shifts in the distribution of employment in the Greater Brisbane Labour Market by major occupational groups. The full results appear in Table 2.

Table 2 Structural change, occupations in the Greater Brisbane Labour Market, May 1998 to May 2011

Occupation	May 1998 to May 1999				May 2000 to May 2011			
	NS	IM	RS	TS	NS	IM	RS	TS
Managers	0.8	0.3	-6.1	-5.0	15.8	7.8	38.0	61.5
Professionals	1.8	1.8	1.4	5.0	41.0	29.5	43.8	114.3
Technicians and trades workers	1.4	-2.1	16.7	16.0	32.4	-7.7	2.1	26.8
Community and personal service workers	0.8	2.2	1.0	4.0	18.6	14.6	6.8	40.0
Clerical and administrative workers	2.0	-0.6	-15.4	-14.0	43.5	-21.0	-6.1	16.4
Sales workers	1.1	-0.6	0.5	1.0	24.9	-9.4	5.3	20.8
Machinery operators and drivers	0.7	0.6	-0.4	1.0	15.8	-5.9	-3.0	6.9
Labourers	1.2	-1.5	-4.7	-5.0	25.2	-15.6	-5.1	4.5

^a Total Employment includes both part-time and full-time employed.

Note: See page 31 for table definitions. Brisbane refers to Brisbane Major Statistical Region, as data for Brisbane Statistical Division were unavailable. Occupation classified according to ANZSCO (2006).

In summary, the results show:

- Managers in the first period employment of this group fell well below that which would have occurred if demand in the Greater Brisbane Labour Market had grown at the national average because of a negative Industry Mix effect. This trend was completely reversed in the second period where demand for Managers and Administrators grew at approximately four times what would have applied if the Greater Brisbane Labour Market had followed national trends.
- Professionals experienced modest growth (above national share) in period 1 but accelerated to four times that expected from the national share in period 2.
- Technicians and Trades Workers experienced slightly above national share in period 1 but fell 15% below expected national share in period 2.
- Community and Personal Services Workers experienced growth above the national share in period 1 due to a strong Industry Mix effect. This accelerated in period 2 where effective demand (employment) for this occupation increased at twice the rate expected from observed outcomes at the national level.

- Clerical and Administrative Worker employment declined in period 1 relative to the national share in period 1 and was 20% less than that projected from national trends in period 2.
- Machinery Operators and Drivers employment declined due to a negative industry mix effect. This trend accelerated in period 2 where the actual increase in employment was 200% lower than that expected from the national share.
- Labourers employment numbers declined over both periods due to negative industry mix and regional share effects. In period 2 the actual employment performance was 5.5 times lower than if the Greater Brisbane Labour Market had followed national trends.

Shift share analysis was also applied to observe structural shifts in the distribution of employment in the Greater Brisbane Labour Market by major educational classification. The full results appear in Table 3.

Table 3 Structural change, non-school qualifications in the Greater Brisbane Labour Market, 1996 to 2006

Non-School Qualifications	1996 to 2001				2001 to 2006			
	NS	IM	RS	TS	NS	IM	RS	TS
Postgraduate diploma or graduate (postgraduate degree)	2.4	3.9	1.5	7.8	5.5	7.3	1.4	14.1
Graduate diploma or graduate certificate	2.2	-0.9	1.8	3.1	4.0	-2.1	0.5	2.5
Bachelor degree	14.2	16.1	3.5	33.8	29.3	5.3	7.8	42.4
Advanced diploma or diploma	9.5	-7.6	6.7	8.5	16.3	2.0	3.5	21.8
Certificate III/IV	16.7	14.0	1.9	32.5	32.8	12.0	10.1	30.8
Certificate I/II	3.9	-8.8	2.3	-2.7	5.3	15.0	1.7	-8.0
Certificate not further defined	0.0	-	-	-	1.3	12.4	0.2	14.0
Level of education inadequately described	1.2	2.8	0.7	4.7	2.9	-0.2	0.5	3.2
Level of education not stated	12.5	19.3	2.9	-9.7	16.7	4.4	12.7	33.9

^a Total employed includes both part-time and full-time employed.

Note: See page 31 for table definitions. Total employed persons employed measured by all person aged 15-64 level of highest non-school qualification and selected characteristics (based on usual residence). Brisbane refers to Brisbane Major Statistical Region, as data for Brisbane Statistical Division were unavailable.

Briefly, the results indicate the following:

- Postgraduate degree increased strongly in both periods, well above expected national share. These results were driven by a very strong industry mix effect

indicating a structural shift in the Greater Brisbane Labour Market into activities that support professional employment.

- Graduate Diploma or Graduate Certificate growth over both periods was in line with expected national share.
- Bachelor Degrees were well above the expected national share in both periods, driven by strong industry mix and regional share effects across both periods.
- Advanced Diploma or Diploma degrees in the first period did not grow at the same rate as the national average. This was reversed in the second period mainly through a stronger industry mix and regional share effect.
- Certificate III/IV qualifications grew in period 1 but had a small decline in period 2 due to an adverse industry mix effect in that period.
- Certificate I/II qualifications grew in period 1 but at a lower rate than the national share and actually fell in absolute numbers in period 2.
- Certificate: not described grew in absolute numbers over both periods but at a lower rate than the national share.
- No Qualifications showed fewer persons reporting no qualifications than would have been predicted by the national share.

More detailed information regarding the shift share results is contained in Appendix A. We also estimated employment distribution by major educational qualifications for Brisbane Major Statistical Region in 2011 in Appendix B.1. In particular, significant increases are estimated for people employed with a Bachelor Degree or a Certificate III/IV qualification in 2011 compared with in 2006.

3.6 Summary of structural change in Greater Brisbane Labour Market

Overall, the picture of the distribution of employment by industry, occupation and qualifications is a pronounced shift into Managerial, Professional and other service provisions in Mining, Public Administration and Safety, Health Care and Social Assistance, Education and Training, and Accommodation and Food Services. It shows underperformance and even partial withdrawal from process, trades and labouring positions.

This in turn produced a shift in the distribution of workforce qualifications from an earlier period of lagging behind the national trends to being:

- above national growth in higher level post school qualifications,
- broadly in line with national growth in diplomas and upper level Certificates; and
- lower than expected growth in lower level and technical qualifications.

The occupational employment baseline growth rates for 2012-2021 suggest Greater Brisbane will continue to develop as a professional service hub for its adjoining region. The factors supporting this view are:

- predicted high growth rates in Professionals and Technicians and Trades Workers;
- Queensland's resources boom, which will continue to draw on high skill labour residing in the greater Brisbane area; and
- increased affluence boosting consumption of high skill services.

The region need not necessarily be limited to State boundaries, although common language, law and customs make growth within Queensland and Australia easier.

4 Current views on Brisbane skills shortages

Section 2 discussed potential labour market issues for each type of skill shortages. The quantitative analysis in section 3.5 concludes that due to the tightness of the Greater Brisbane Labour Market it is likely that, to varying degrees, all four forms of skill shortage exist currently in the Greater Brisbane Labour Market, particularly Types 1 and 4.

4.1 DEEWR survey

Other published data lends support to this conclusion. The Department of Employment, Education and Workplace Relations (DEEWR) Employer Experience surveys publish employer perspectives on labour hire issues. Table 4 shows the results of a 2010 DEEWR survey of employer views on skill shortages and labour market issues in the Greater Brisbane Labour Market. Data in the table indicate that employers are experiencing most difficulty in obtaining Professionals, Managers and Technicians and Trades Workers, where unfilled vacancies in March 2010 stood at 14% and 11% of total employment needs in those areas respectively. The unfilled vacancies in Professionals and Managers took on the characteristic of Type 1 skill shortages.

Table 4 Vacancies unfilled and filled with staff lacking the desired skills/capabilities, by major occupational groups, Greater Brisbane Labour Market, March 2010

Occupations	Percentage rate of vacancies unfilled	Percentage rate of vacancies filled with workers who lacked desired skills/capabilities
Professionals and Managers	13.5%	9%
Technicians and trades workers	10.5%	13.5%
Community and personal service workers	5%	7.5%
Clerical and administrative workers	6%	10%
Machinery operators and drivers	1%	33%
Sales workers	9%	17.75%
Labourers	1%	22%
Total	6.5%	16%

Source: DEEWR, March 2010, Labour Market Conditions and Survey of Employers' Recruitment Experiences- Brisbane, presented by Bob Bunnett from Labour Market Research and Analysis Branch.

Table 4 shows that 16% of vacancies were filled by workers who lacked desired skills/capabilities. Employers were more willing (13.5% of filled vacancies) to lower expectations in filling vacancies for Technicians and Trades Workers and by 33% for

Machinery Operators and Drivers³⁰. This latter example that employers are currently addressing the quality gaps issue (Type 4 skill shortages) by easing hiring standards.

Overall Table 4 indicated that in March 2010, 22.5% of vacancies either remained unfilled or were filled with a worker who did not have the skills or capabilities that the employer was looking for. This result was also consistent with the results in DEEWR March/April 2011 Employer Experience survey, which indicated overall 23% of vacancies in the Greater Brisbane Labour Market remained unfilled (8%) or were filled with a worker who did not have the skills or capabilities that the employer was looking for (15%). Moreover, the 2011 result was in line with the result for all State Capital Cities.

The extent of the skill shortages problem can be further assessed by examining the competition for vacancies.

Table 5 Competition for vacancies by major occupational groups in 2010, Greater Brisbane Labour Market

Competition for vacancies	Average no. of applicants per vacancy	Average no. of applicants suitable per vacancy
Manager	22.7	3.2
Professionals	20.7	3.7
Technicians and Trades Workers	17.7	4.8
Community and personal service workers	10.5	2.5
Clerical and administrative workers	35.6	7.0
Machinery operators and drivers	20.7	10.7
Sales workers	14.7	4.4
Labourers	23.0	3.4
Total	19.2	4.7

Source: DEEWR, September 2010, Labour Market Conditions and Survey of Employers' Recruitment Experiences- Brisbane, presented by Bob Bunnett from Labour Market Research and Analysis Branch.

The emergence of a Type 1 skill shortage issue is shown by the low numbers of suitable applicants per job for Managers and Professionals. That is, approximately one out of seven applicants applying for a Managerial position is suitable and approximately one out of six applicants applying for a Professional position is suitable). By contrast the labour recruitment pressures are much less pronounced for Machinery Operators and Drivers (one out of two applicants is suitable) and for Clerical and Administrative Workers (one out of five applicants is suitable).

³⁰ Note in this case only 1% of vacancies remained unfilled.

Based on its survey, the recruitment experiences by employers across a number of occupation sub-major groups in the Professionals and Managers, and Technicians and Trades Workers were identified by DEEWR. The recruitment experiences in these high skilled occupations categories are summarised in Table 6.

Table 6 Recruitment conditions selected skilled occupational groups, Greater Brisbane Labour Market, 2011

Occupational Groups	>12.55% vacancies remain unfilled	>12.5% vacancies unsatisfactorily filled or unfilled	<12.5% vacancies unsatisfactorily filled or unfilled
Professionals and Managers			
- Hospitality, retail and service managers		x	
- Production managers	x		
- Advertising and marketing professionals		x	
- Registered nurses	x		
- ICT professionals	x		
- Accountants			x
Technicians and trades workers			
- Medical technicians		x	
- Automotive electricians and mechanics	x		
- Welding tradespersons		x	
- Food trades workers	x		
- Electricians		x	
- Airconditioning mechanics		x	

Note: DEEWR only obtained sufficient information to make assessment on the occupation categories listed in the table.

Source: DEEWR (2011). Survey of Recruitment Conditions in Capital Cities March/April 2011.

Vacancies are commonly unfilled for production managers, registered nurses, ICT professionals, automotive electricians and mechanics, and food trades workers.

4.2 DEEWR views

DEEWR (2011) suggested a number of skill and related labour hire problems currently existing in Brisbane.³¹ These are discussed below.

³¹ DEEWR. (2011). "Labour Market Conditions and Survey of Employer's Experiences". Presentation by Bob Bunnett from DEEWR Labour Market Research and Analysis Branch, Brisbane.

4.2.1 Unsuitability of applicants

Less than one quarter (24.4%) of job applicants in this period were regarded by employers as being suitable for the job in which they had applied. This is indicative both of skills mismatch and inadequacies with current levels of formal training.

Lack of work experience was the most common reason for applicant unsuitability, followed by insufficient technical skills or expertise. The Box below lists some nominated desired traits and qualifications in employees by employers.

Box 1 Desirable employability traits

From its survey, DEEWR reports that employers, when making employment choices concentrated on the following:

- 30% personality traits and qualities only
- 28% technical skills only
- 41% both equally important.

Among the personality traits and qualities employers wanted were:

- Communication skills
- Enthusiasm
- Motivation
- Presentation

Data source: DEEWR (2011), Survey of Employers' Recruitment Experiences, 12 months to December 2010, Brisbane presentation.

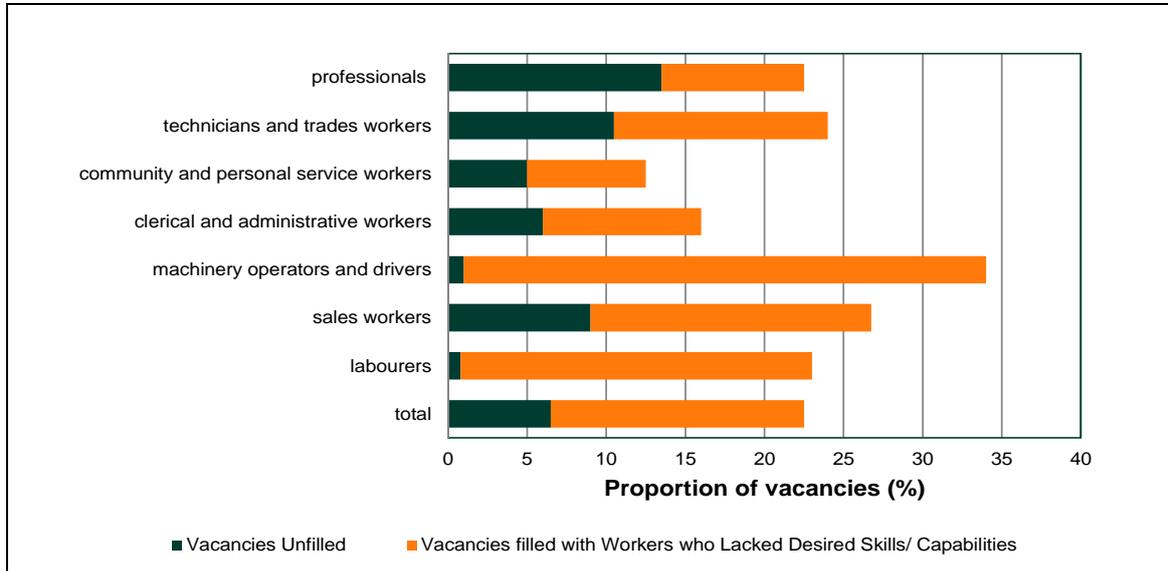
4.2.2 Basic employability skills

Over 40% of employers surveyed thought that both technical skills and experience and basic employability skills (such as personal traits and qualities) were equally important and just over 33% thought that personal traits and qualities alone were more important. Less than 23% of employers considered technical skill and experience alone to be more important.

These results indicate that in today's labour market, jobs seekers need to have both technical or job-specific skills and employability skills.

Figure 7 examines the extent which employers had to accept lower skills in filling their vacancies.

Figure 7 Proportions of vacancies unfilled and filled with staff lacking the desired skills/capabilities, Greater Brisbane Labour Market, March 2010



Data source: DEEWR, Survey of Employers' Recruitment Experiences in Capital Cities, March 2010.

These results show that:

- vacancies for Professionals and Technicians and Trades workers most commonly remained unfilled;
- the proportion of unfilled vacancies was lower for Machine Workers and Labourers, in many cases because employers commonly hired staff for these occupation categories who lacked the skills or capabilities that they were looking for;
- among Machine Operators the main skills/capabilities lacking were work experience, technical skills and motivation;
- among Labourers the main hiring issues were work experience; motivation and licensing;
- unfilled positions for Sales Workers were often for positions that required some technical knowledge, including Sales Representatives positions or Sales Assistant businesses in Hardware, Automotive and Alarm installation businesses. These are indicative of Type 3 shortages.

Overall, current vacancies indicate that 6% of total job offers remained unfilled. This compares with 8% for the all capital cities in Australia. This indicates that although the Greater Brisbane Labour Market is relatively tight it had fewer unfilled vacancies than the Australian Capital Cities' average.

4.3 Industry discussions

To draw upon local knowledge a number of persons connected with labour market and employment issues were canvassed for their views as to skill shortages currently impacting or likely to impact the Greater Brisbane Labour Market.

In brief these discussions confirmed some of the observations drawn from the labour market analysis completed in the initial part of the report.

There was broad agreement that Brisbane is increasingly becoming a hub for professional and administrative services for the rest of Queensland and near Northern New South Wales and the growth areas in employment and current skill shortages are in Management and Administration, the Professions and Technicians and trade-related areas. The growth in Health Care and Social Assistance areas, Community and Specialist services to Mining and Finance and in Community and Personal services generally was noted.

Licensed and registered occupations are where skill shortages tend to be found. Where there were no entry requirements the market tends to adjust. A key issue was matching training with labour force needs.

One interviewee noted labour shortages in lower-skill occupations of the labour market. This point emphasises the importance of general work skills to matching demand and supply of labour.

Another interviewee noted a dichotomy between employer demands for trained workers and their willingness to undertake or fund training. This highlighted a potential public finance issue and points to the fact that exclusively external provision of training may not be the best system. He noted that “in areas of emerging shortage industry were willing to highlight potential future shortages but not fund training of apprentices in advance of labour demand”.

There is potential for improvement in the quality of the information provided to those considering vocational training. This is particularly the case in delivering industry training packages developed by Skills Councils.

It was noted that the cycle for developing and delivering packages can be slower than market demand. Greater engagement with industry at both management and operational levels was seen as a practical solution. There is also a need to engage with industry leaders or early adapters. It was also noted that the market can move faster than institutional planning.

5 Baseline and business as usual employment projections by industry and occupation

5.1 Baseline estimation procedures

Economists normally predict employment growth through regression equations, the general form of which is shown below:

$$Y = X\beta + \varepsilon, \quad E[\varepsilon|X] = 0, \quad \text{Var}[\varepsilon|X] = \Omega.$$

Here β is a vector of unknown “regression coefficients” that must be estimated from the data. The composition of the X vector of explanatory variables often depends upon the availability of data with such variables as GDP (output), wages, and technology being used³². Rapach and Strauss also note that in the absence of such data, non-linear exponential or continuous growth equations often provide accurate predictions of employment growth in sub-national markets in the short to medium term³³.

With this in mind the following non-linear growth regression was fitted to employment data for the Greater Brisbane Labour Market for the period 1989-2011 in aggregate and for individual industries and occupations by 1 digit ANZSCO and ANSZIC.

$$Y = Ae^{bx}U$$

With Y is growing (or shrinking) at a constant relative rate of b ³⁴.

The equation then reverts to linear in logarithms

$$\log Y = \log A + b \log(x) + \log U$$

Where needed the equation may be modified by the addition of other variables such as productivity growth where it is known (or believed) that exogenous shifts in productivity growth will occur.

A similar type equation is used by Commonwealth Treasury in estimating predicted employment growth³⁵.

³² See, Rapach, D and Strauss, J (2008) “Forecasting US Employment Growth Using Forecast Combining Methods” *Journal of Forecasting*, 27, 75-93.

³³ See, Rapach, D and Strauss, J (2008) “Forecasting US Employment Growth Using Forecast Combining Methods” *Journal of Forecasting*, 27, 73.

³⁴ See, Baker, S “Non-Linear Regression”, Quantitative methods for Estimating Employment Growth, <http://hspm.sph.sc.edu/courses/J716/pdf/716-5 Non-linear regression.pdf>.

The value of an estimating equation is determined by its performance in making predictions. This simple model performed well in predicting total employment growth and in predicting employment in individual industries and occupations³⁶. The equation was then used to predict employment growth in total and across industries and occupations. As a cross check on the accuracy of the predictions, the annual employment growth rates were compared with predicted growth rates from other employment growth studies. These studies were undertaken by DEEWR, Deloitte Access Economics, and the National Institute of Economic and Industry Research (NIEIR).

These growth rates are list in the tables below, by industry and occupation. Our model predicts the growth rate for the Greater Brisbane Labour Market only. Whereas the growth rates predicted by DEEWR and Deloitte Access Economics are for Australia as a whole, and, the growth rates predicted by NIEIR are for the South East Queensland region.

Our model predicts that labour requirements within the Greater Brisbane Labour Market will increase at an average annual rate of 2.9%, slightly higher than the other estimates. Given expectations for the Greater Brisbane Labour Market and the widespread expectation that it will grow faster than the national rate, this estimate of growth in the Greater Brisbane Labour Market appears sound.

The growth predictions by industry are presented in Table 7.

Table 7 Growth projections of employment by industry divisions^a, 2012-2021, year on year growth rates (%)

Industry	Synergies non-linear baseline predictions	DEEWR ^b	Deloitte Access Economics ^c	NIEIR
Agriculture, forestry and fishing	-1.0	1.4	1.1	0.4
Mining	6.6	6.1	1.0	-0.4
Manufacturing	0.9	-0.6	0.0	0.5
Electricity, gas, water and waste services	2.3	3.9	-0.3	0.4
Construction	4.0	3.6	1.8	2.3
Wholesale trade	-0.3	1.1	1.2	1.0

³⁵ Australian Commonwealth Treasury (2007). 'Recent Productivity Outcomes and Australia's Potential Growth', Economic Roundup Winter 2007.

³⁶ With the exception of the occupational group "Labourers" where even the addition of additional explanatory variable was unable to achieve the high predictive power achieved in other occupations.

Industry	Synergies non-linear baseline predictions	DEEWR ^b	Deloitte Access Economics ^c	NIEIR
Retail trade	2.3	1.2	2.2	1.1
Accommodation and food services	3.7	1.2	2.3	1.1
Transport, postal and warehousing	2.2	2.5	3.1	1.6
Information media and telecommunications	3.7	1.2	2.4	0.6
Financial and insurance services	0.9	1.2	2.3	1.5
Rental, hiring and real estate services	3.9	1.9	2.8	1.1
Professional, scientific and technical services	4.9	3.3	3.1	2.1
Administrative and support services	4.6	2.4	2.7	1.7
Public administration and safety	3.4	1.1	2.8	2.7
Education and training	3.3	2.1	2.2	2.4
Health care and social assistance	4.1	4.5	2.9	3.1
Arts and recreation services	4.0	0.6	2.4	3.6
Other services	1.6	2.0	1.9	2.6
Overall	2.9	2.1	2.1	1.9

a Industries are classified according to ANZSIC 2006 divisional structure.

b Year on year growth rate predictions presented in table are based on DEEWR's 5 year Industry Employment Projections up to 2015/16 for Australia.

c Industry growth rate projected by Deloitte Access Economics are based on the assumption that Australia's economy will grow at an average rate a little above global GDP growth between 2010-2025. Annual employment growth rates presented in the table are for Australia for the period 2010-2025.

Note: Synergies non-linear year on year growth rate predictions for the period 2012-2021 applies to the Greater Brisbane Labour Market only. NIEIR year on year industry employment growth predictions for South East Queensland were obtained by adjusting the projected employed persons by industry for the period 2006-2026.

Source: (1) DEEWR (2011), Industry Employment Projections. (2) Deloitte Access Economics (2009), Economic Modelling of Skills Demand, report prepared for Skills Australia. (3) NIEIR (2008), Economic Activity and Employment Forecasts: 2006-2026.

Similarly, our predictions for occupational growth are compared to other studies in Table 8.

Table 8 Growth projections of employment by major occupational groups^a, 2012-2021, year on year growth rates (%)

Occupation	Synergies non-linear baseline predictions	DEEWR ^b	Deloitte Access Economics ^c	NIEIR
Managers	4.3	1.9	2.0	3.4

Occupation	Synergies non-linear baseline predictions	DEEWR ^b	Deloitte Access Economics ^c	NIEIR
Professionals	4.3	3.0	2.4	2.7
Technicians and trades workers	2.7	2.7	1.7	2.1
Community and personal service workers	2.3	3.7	2.3	2.1
Clerical and administrative workers	1.8	1.3	2.3	1.7
Sales workers	1.4	1.0	2.4	1.3
Machinery operators and drivers	1.4	1.7	1.9	2.0
Labourers	1.0	0.9	1.9	1.2

a Occupational major groups are classified according to ANZSCO 2006 classifications structure.

b Year on year growth rate predictions presented in table are based on DEEWR's 5 year Occupation Employment Projections up to 2015/16 for Australia.

c Occupation growth rate projected by Deloitte Access Economics are based on the assumption that Australia's economy will grow at an average rate a little above global GDP growth between 2010-2025. Annual employment growth rates presented in the table are for Australia for the period 2010-2025.

Note: Synergies non-linear year on year growth rate predictions for the period 2012-2021 applies to the Greater Brisbane Labour Market only. NIEIR year on year occupation employment growth by place of work predictions were obtained by adjusting the projected employed persons by occupation for the period 2006-2026 for South East Queensland.

Source: (1) DEEWR (2011), Employment Projections, Australian Jobs 2011. (2) Deloitte Access Economics (2009), Economic Modelling of Skills Demand, report prepared for Skills Australia. (3) NIEIR (2008), Economic Activity and Employment Forecasts: 2006-2026.

In this section two estimates of employment distribution by industry and occupation are presented. The baseline projections are derived directly by applying the estimated growth equation on the basis of the growth rates shown in Table 7 and Table 8. The Business as Usual distribution is derived by holding employment distribution across industry and occupation constant (at 2011 ratios) into the future. Total employment growth is held constant for both scenarios to enable direct comparison of the predicted structural changes (and therefore potential skill shortfalls) that will occur over the period 2011-2021.

Overall, between 2012 and 2021 labour force requirements within the Greater Brisbane Labour Market are expected to grow by at an annual rate of 2.9% and lead to an additional 342,333 jobs³⁷.

The extra employment needed to satisfy this needed labour requirement by industry is shown in Table 9.

³⁷ A breakdown of this figure into the amount of people that will be required from the Greater Brisbane, intrastate, interstate, and international markets was unable to be performed at the time of the study due to lack of information on Brisbane resident population components in 2011.

Table 9 Forecasts of additional employees required for the period 2012-2021, by industry division^a, Greater Brisbane Labour Market

Industry	Persons to Employ
Agriculture, forestry and fishing	-270
Mining	10,297
Manufacturing	3,836
Electricity, gas, water and waste services	3,726
Construction	43,359
Wholesale trade	-3,221
Retail trade	23,070
Accommodation and food services	27,030
Transport, postal and warehousing	12,452
Information media and telecommunications	7,776
Financial and insurance services	1,028
Rental, hiring and real estate services	10,717
Professional, scientific and technical services	52,123
Administrative and support services	18,770
Public administration and safety	34,457
Education and training	28,013
Health care and social assistance	58,519
Arts and recreation services	6,567
Other services	4,084
Total	342,333

^a Industries are classified according to ANZSIC 2006 divisional structure.

Note: Forecasts of additional employees required by industry divisions for the Greater Brisbane Labour Market were estimated by subtracting baseline predictions of total employment by industry divisions in 2021 by total employed persons by industry divisions in May quarter 2011.

The data in Table 9 shows that all industry groups will experience an absolute growth in employment except for Agriculture, Forestry and Fishing and Wholesale Trade. The

results for these two industries are the direct result of applying the non-linear growth model to the observed employment declines in both industries as a result of productivity growth and structural change in these industries over the period 1989-2011, and, in the case of Wholesale Trade, a decentralisation of activity into the rest of Queensland.

Largest sectoral gains occur in:

- Health Care and Social Assistance (a need for approximately 59,000 more positions by 2021);
- Professional, Scientific and Technical Services (51,000 additional positions required);
- Construction (over 40,000 new positions required by 2021); and
- Accommodation and Food Services (27,000 new positions required by 2021).

More modest growth will occur in Retail Trade, Information Media and Telecommunications and Financial and Insurance Services.

In terms of occupational growth, the baseline predictions are shown in Table 10.

Table 10 Forecasts of additional employees required for the period 2012-2021, by major occupational groups^a, Greater Brisbane Labour Market

Occupations	Persons to Employ
Managers	62,403
Professionals	136,410
Technicians and trades workers	46,202
Community and personal service workers	26,937
Clerical and administrative workers	34,288
Sales workers	16,786
Machinery operators and drivers	9,681
Labourers	10,626
Total	343,333

a Occupational major groups are classified according to ANZSCO 2006 classifications structure.

Note: Forecasts of additional employees required by major occupational groups for the Greater Brisbane Labour Market were estimated by subtracting baseline predictions of total employment by major occupational groups in 2021 by total employed persons by major occupational groups in May quarter 2011. Results differ with the previous table due to rounding in the employment by industry and occupation numbers as at May Quarter 2011.

All occupational groups experience some absolute growth in numbers, with by far the largest growth in occupational job needs being in the Professionals occupations with more than a third of all new jobs predicted to be in that area. Other occupations to experience strong growth are Managers, Technicians and Trades Workers, Community and Personal Service Workers, and Clerical and Administrative Workers.

5.2 Baseline and business as usual employment estimates by industry and occupation compared

The implications of this anticipated growth for industry and occupational requirements, and the capacity for the Greater Brisbane Labour Market to absorb this expected demand, may be seen by comparing:

- the potential distribution of those jobs if the industrial and occupational distribution remained constant (Business as Usual); with
- the baseline predictions, which are based upon the observed structural changes as predicted from the employment growth equation.

Table 11 compares the Baseline predictions with the Business as Usual predictions for industry employment.³⁸

Table 11 Forecasts of employment by industry 2012-2021, Greater Brisbane Labour Market ('000)

Industry	Baseline predictions			Business as usual scenario	Structural change adjustment
	2013	2017	2021	2021	2021
Agriculture, forestry and fishing	3.8	3.6	3.7	5.3	-1.6
Mining	15.1	19.6	24.3	18.5	5.8
Manufacturing	88.3	91.5	94.8	120.0	-25.1
Electricity, gas, water and waste services	18.9	20.8	22.7	25.0	-2.3
Construction	99.5	115.9	139.4	126.5	12.8
Wholesale trade	39.8	39.3	38.8	55.4	-16.6

³⁸ Note more detail on the BAU projections by year are found in the appendix.

Industry	Baseline predictions			Business as usual scenario	Structural change adjustment
	2013	2017	2021	2021	2021
Retail trade	104.6	114.3	128.1	138.4	-10.3
Accommodation and food services	74.8	86.5	100.0	96.2	3.8
Transport, postal and warehousing	71.6	78.1	84.5	94.9	-10.5
Information media and telecommunications	21.5	24.9	28.8	27.7	1.1
Financial and insurance services	24.2	25.1	26.0	33.0	-6.9
Rental, hiring and real estate services	27.8	32.4	37.7	35.6	2.1
Professional, scientific and technical services	101.7	123.2	149.1	127.9	21.3
Administrative and support services	39.6	47.4	56.8	50.1	6.7
Public administration and safety	76.9	91.3	108.5	97.5	10.9
Education and training	89.5	101.9	116.0	116.0	0.0
Health care and social assistance	142.5	167.3	196.5	181.9	14.6
Arts and recreation services	16.5	19.3	22.6	21.1	1.5
Other services	35.4	37.7	40.1	47.5	-7.4
Overall	1092.0	1240.0	1418.3	1418.3	0.0

a Industries are classified according to ANZSIC 2006 divisional structure.

The negative signs in the structural adjustment column do not imply job losses but rather shifts in the relative importance of industries as employing units. For example, although employment in Manufacturing will grow it will not do so at a rate sufficient to maintain “Business as Usual”. The jobs not created in Manufacturing will be made up by gains in other industries. This reflects the continuing structural shift of the economy into service based industries.

In that vein, industries with a negative entry in the column “structural change adjustment” experience a relative decline in their sectoral importance as an employer while those with a positive number experience a relative increase in importance.

This provides the picture of significant structural shift in the Greater Brisbane Labour Market with gains in relative shares predicted for Mining, Construction, Accommodation and Food Services, Professional, Scientific and Technical Services, Health Care and Social Assistance and Public Administration and Safety. Information

Media and Telecommunications and Education and Training remain relatively constant in importance, while former growth sectors such as Retail Trade and Wholesale Trade decline in relative importance, as does Manufacturing.

Similarly in terms of occupational jobs distribution, while all occupational categories grow in terms of absolute job numbers, considerable shifts in relative importance occurred. This is shown in Table 12.

Table 12 Forecasts of employment by major occupations^a ('000) 2012-2021 Greater Brisbane Labour Market ('000)

Occupation	Baseline predictions			Business as usual scenario	Structural change adjustment
	2013	2017	2021	2021	2021
Managers	129.2	152.9	180.9	156.3	24.6
Professionals	285.9	337.4	398.7	346.0	52.7
Technicians and trades workers	152.0	170.0	189.8	189.7	0.1
Community and personal service workers	112.1	122.5	133.9	141.1	-7.2
Clerical and administrative workers	180.1	193.4	207.7	228.7	-21.1
Sales workers	114.2	120.7	127.6	146.2	-18.6
Machinery operators and drivers	65.8	69.6	73.6	84.3	-10.7
Labourers	97.7	101.8	106.1	126.0	-19.9
Overall	1136.9	1268.3	1418.3	1418.3	0.0

^a Occupational major groups are classified according to ANZSCO 2006 classifications structure.

The results in Table 12 show significant structural shifts in occupational distribution with a strong swing towards managerial and professional jobs, trades and technicians holding their relative share and all other occupational groups declining in importance.

6 Ability of the Greater Brisbane Labour Market to cope with project baseline skill needs

This section examines the capacity of the Greater Brisbane Labour Market to adequately deal with the projected skill needs to 2021. It starts with the principle that perfect labour force balance is unlikely ever to occur. In skilled occupations in particular, training durations are often well in excess of demand shifts with short term “absolute” skill shortages being a result. The relevant overall policy response in an environment as dynamic as labour force needs is to build work capacity among the resident labour force that allows workers to move between industries and occupations, reinforced by a capacity to respond to short term vacancies by wage adjustment flexibility or through in-migration.

6.1 Analysis

The report has found that the Greater Brisbane Labour Market is likely to experience significant growth in labour requirements with total employment rising on average at 2.9% per annum over the period 2012-2021. This projected growth will occur throughout all of the broad occupational groupings but will be greatest among Managers, Professionals, Technicians and Trades Workers, Community and Personal Service Workers, Clerical and Administrative Workers, and Sales workers. Growth will be lowest among Machinery Operators and Drivers and Labourers.

This pattern of occupational change is mirrored in a shift in relative importance of employment by industry. Previous expanding industries, and ones which soaked up a significant amount of the “non-standard” employment that characterised much of employment growth over the last decade, such as Retail Trade and Wholesale Trade will diminish in relative importance (compared to 2011), as will Manufacturing, Financial and Insurance Services, and Transport, Postal and Warehousing. Employment in these industries will grow slower compared to other industries between 2012-2021.

Industries such as Information Media and Telecommunications and Education and Training will maintain their relative share of employment (but not their required skills distributions). Growth is expected to be in Health Care and Social Assistance, Professional, Scientific and Technical Services, Accommodation and Food Services and Mining and Mining related services (where significant growth is expected, albeit from a small base).

The pattern of structural change within industrial and occupational employment over this period has implications for the existing workforce as well as those who will enter the labour market over the next decade. Existing workers may need to cross industry

boundaries and enter new occupations or sub-occupations and up-skill to retain employment. New entrants to the labour market will be less likely to find entry level jobs in Retail and Wholesale Trade or Manufacturing. Employment as a labourer, machine operator or driver or sales worker will be less plentiful in a relative sense than previously.

All of these conclusions fit in well with the overall picture of Brisbane continuing to develop as a professional service hub for its adjoining region. It also suggests a further emphasis of workplace qualifications both as a result of genuine upgrading of job skill standards and through the inevitable march of “qualification creep” as workers use human capital to battle for the more desirable jobs.

The Australian Bureau of Statistics predicts population growth of between a lower limit of 1.16% to 2.02% for Brisbane over the long term 2006-2056³⁹. Allowing for workforce aging and increased participation by youth in education, the effective domestic labour force growth will be less than the 2.9% employment growth in the Greater Brisbane Labour Market. This in turn will reverse the slight excess labour supply that we have observed in the Greater Brisbane Labour Market since 2008 and usher in a return to excess demand conditions. In terms of overall labour supply there will be a need to attract workers from intra-state, inter-state and overseas.

The constraint here is that such inward migration will need to be in higher skilled areas of Management, Professionals and Para-Professionals⁴⁰, Trades and Technicians at a time that economists expect the Mining boom to be causing shortages in these areas across Australia.

This in turn places the emphasis back on domestically produced skills, both formal and in-house, to satisfy a significant amount of the expected increase in labour requirements.

In the projections of job growth by occupation, the main occupational demand over the period 2012 to 2021 was predicted to be: Managers (62,000 persons); Professionals (136,000 persons); Technicians and Trades Workers (46,000 persons); Community and Personnel Services (26,000 persons); Clerical and Administrative Workers (34,000 persons); Sales Workers (16,000 persons); Machinery Operators and Drivers (9,000 persons); and Labourers (10,000 persons).

³⁹ The 3% was estimated by applying growth equation to the series B predictions (2006-2026) in the “Population Projections, Australia 2006-2101; Australian Bureau of Statistics, cat 3222.00, <http://www.abs.gov.au/ausstats/abs@.nsf/mf/3222.0>

⁴⁰ In the ANZSCO broad categories these tend to be picked up either in the professional sub category or in Technicians or Tradesmen

The issue here is that, just as the demand for higher level academic and technical education increases, the projected rate of increase in graduate and diploma numbers is tipped to flat line. Table 13 presents an analysis of the output of rate of growth in educational qualifications in Queensland over the period 2006-2011. It can be seen that over this period, relatively high annual rates of increases in student completions existed, with Postgraduate and Graduate qualifications for example growing at 4.9% per annum. Column 3 indicates the level of student completions to 2021 if these rates were to continue. If this was to be the case a significant proportion of the predicted skill needs might be able to be supplied domestically.

Table 13 Summary of trends in non-school qualifications for the period 2012-2021, Queensland

Non-school qualifications	Growth rate 2006-2011	Forecast of graduating numbers between 2012-2021 using past trend from 2006-2011	Likely graduating numbers between 2012-2021 according to university intakes
Postgraduate diploma or graduate (postgraduate degree)	4.9 %	41,000	19,000
Graduate diploma or graduate certificate	2.18 %	13,000	11,600
Bachelor degree	3.34 %	168,000	88,200
Advanced diploma or diploma	4.39%	128,000	38,000
Certificate III/IV	5.39 %	126,000	36,500
Certificate I/II	-2.41 %	-25,000	-16,000

Note: Results were derived from shift share analysis using historical data from ABS Cat No. 6227.0. In addition, graduating numbers for the period 2012-2021 estimated in column 3 and 4 includes both domestic and international students.

However, graduation rates of this magnitude are unlikely to be achieved because of a predicted slowdown in student admissions. The Australian Council for Education Research predicts a slowing of domestic student demand in Australia as a consequence of population aging and the real cost of education⁴¹. Recent projections of university intake indicate a flattening of student enrolment growth to rates well below those experienced in 2011.

For example, the University of Queensland predicts an overall rate of increase in domestic student enrolment of 1.4% in 2012⁴². This rate of intake will flow through into a subsequent reduced growth in graduate output across Universities and Vocational Education and Training (VET) institutions.

⁴¹ Borooah, V., J, Mangan. (2007). 'Education, Occupational Class, and Unemployment in the Regions of the United Kingdom, Education Economics, February 2007, 16 (4): 351-370.

⁴² See "Victoria University takes the first big hit" Australian Higher Education supplement 19/1/2011. Offsetting this is the decision by some regional universities in Australia to over enroll in the light of the recommendations of the Bradley Commission. These over-enrollments are likely to occur at the Bachelor degree level.

Column 4 of Table 13 shows that, under an annual growth rate of 2%, the numbers produced in each category would be significantly reduced. Under this scenario the educational needs of the projected growth in labour requirements for the Greater Brisbane Labour Market will not be met from domestic student completions. The Managers, Professionals and Technicians and Trades occupations would be at most threat of being under-supplied with the requisite skill base.

In these circumstances the only viable policies would be to influence domestic participation (later retirements, re-entry in to the market from those on carer duty) and the attraction of skilled migration.

The position on student intake and output from VET is less well researched but assigning expected University completion rates to the Certificate III/IV produces a number of new completers by 2021 significantly below expected employment needs.

The other unresolved issue is that of course selection and appropriate training. In our predictions of job needs to 2021, it was noted that the Greater Brisbane Labour Market had a different occupational mix requirement in comparison to the National averages suggested by the HILDA concordance (refer to Appendix C). In particular the pattern of demand for specialist managers in Greater Brisbane Labour Market gave more prominence to managers in construction, production, distribution health management and hospitality management than is the case nationally. As well, the pattern of demand for professionals in the Greater Brisbane Labour Market gave more emphasis to design, engineering, science and training, health professionals and business and human resource professionals.

Within the technician and trades occupations the Greater Brisbane Labour Market is more in tune with national needs in automotive and engineering trades, construction trades, electro technology and telecommunications, food trade and skilled animal and horticultural workers but industry groups are questioning the efficacy of training, particularly at the Certificate III/IV level to produce the skills required to service new technology in these areas.

Underscoring employment projections for Technicians and Trade persons and for specialist and project managers in Manufacturing, Mining and Mining related services, Construction and Engineering is the environment of the mining boom. As mining show signs of recovery from the GFC with 58 new mining projects currently being proposed and 9 projects currently under construction⁴³, it can be expected that skills demand from mining will flow on to other sectors of the economy.

⁴³ Yvonne Williams (2011). Manager, Research and Development, Mining Industry Skills Centre.

Manufacturing Skills Queensland is in agreement with the conclusions of this study in terms of the numbers of expected job increases in the relevant Manufacturing areas (and the decline in demand for labouring jobs)⁴⁴. They stress the changing skill needs within the Manufacturing Industry and the pressures faced by the industry in moving to a higher skill, higher value adding manufacturing sector. They cite a number of examples where industry trends will lead to a substitution of higher skill for lower skilled employment and in doing so slow the absolute rate of growth in industry employment to the levels predicted in this report.

Specifically, Manufacturing Skills Queensland foreshadows the need for a major switch by local manufacturers to digital and network enabled technology. These also see some equity issues between the three years, AQF Certificate III in Engineering and other Certificate III courses such as Business which only take one year to complete. This they argue is discouraging apprenticeship attraction in an important and expanding area of local manufacturing.

They put the case for the Certificate III in Engineering to be raised to a Diploma level (still of three year duration) with emphasis on digital and network technology. Similarly they cite the recent Commonwealth decision to remove the employer subsidy from Certificate II qualifications as further evidence that lower skill positions are disappearing from Manufacturing in Queensland and point to new trends in network technology driven machine shops operating on reduced numbers but more highly trained staff.

Their principal concern is the high number (approximately 50%) of current manufacturing employees without any formal qualifications. As a result they see a potential shakeout of current employees as the skill level required to operate newer technology comes into production leaving scarcity both in the availability of low skill jobs and a shortage of needed skills in the newly created jobs.

Digital technology and the ability of the workplace to successfully adapt is a common concern across industry groups. One interviewee, while agreeing with the thrust of our job growth predictions, feels that Queensland is ill adapted to capitalise on digital technology and the development of on-line business activity. Queensland does not have an advisory body for ICT or Electronic Business services, preferring to deal with these issues under the electro-technology industry body. This has consequences for two potential growth areas; higher level ICT in the post NBN (National Broadband Network) era including on-line sales capability and in Financial Services, particularly risk management of insurance and superannuation.

⁴⁴ Interview with Erik Salonen, General Manager Manufacturing Skill Queensland, 05/09/2011.

One solution suggested was the creation of new Certificate III/IV qualifications to train workers in the interface of design (creative arts) and ICT. In the printing industry it was suggested that a new Certificate IV or Diploma in digital and web-based printing should emerge to cater for the emergence of niche market printing markets.

The skills message seems to be penetrating the market in Queensland. The November 2010 Escan National Survey reports:

- 78% of businesses surveyed in Queensland had digital literacy as a priority;
- strategic planning in Queensland had increased from 35% of businesses in Queensland (2004) to 60% (2011) although this was still lower than the 80% result for Australia as a whole; and
- 72% of surveyed businesses in Queensland supported a culture of learning.

The report also predicts a shortage in personal services. Hairdressing is a perennial area of “shortage” although we feel that this is more a wages and institutional problem than a labour shortage problem.

There is also predicted growth (and potentially unmet demand) for a range of personal and other service providers such as carers and aides, hospitality workers, sports and personal service workers and a significant increase in the need for clerical and administrative workers. The issues in filling the predicted job growth relates not just to the numbers of persons undertaking training but the type of training including length and mode of delivery.

6.2 Conclusions

In summary the issues facing the Greater Brisbane Labour Market may be summarised based on several key issues, including:

- (a) issues relating to adequate labour supply in total;
- (b) issues relating to the desired skill mix of the predicted growth in jobs, including the adequacy of education and training;
- (c) displacement issues, with some workers running the risk of structural displacement; and
- (d) institutional arrangements regarding wage flexibility and in-migration of labour.

The first three issues are expanded upon in more detail below. Institutional arrangements are discussed in the next section as this has implications for policy.

6.2.1 Issues relating to labour supply adequacy

This issue will be demographically determined. Based on projected population increases, and assuming relatively unchanged participation, education and retirement decisions, we feel that the projected increase in employment is not able to be serviced by expected increases in domestic labour supply and that the Greater Brisbane Labour Market is entering a period of absolute labour shortage.

Labour supply can be varied in the short-term by inducing workers back into the labour force (increasing participation), working existing workers more intensively or with greater capital backing or by inward migration.

A period of excess labour demand has undesirable implications for the skill base of a labour market by forcing employers to lower hiring standards (evidence of which is already being presented in Brisbane) but also acts as a disincentive for trainees and students to complete courses in the face of plentiful job offers. The high rate of VET module completers rather than apprenticeship completers is evidence of this effect.

The other undesirable effect is the localised wage inflation that may often occur.

6.2.2 Issues relating to the desired skills mix of the predicted growth in jobs

This issue relates to servicing the skill needs of the expected job growth. In a technological age, ten years is a long period. This report has predicted a significant slant towards higher skill level jobs, the skill needs of which we need to be serviced by formal education and in-house training. Our initial observations, based on concurring skills level to job growth is that local Universities and VET institutions will not produce sufficient graduates to satisfy requirements. This conclusion is based upon the current (and predicted) decline in student intake.

The VET sector is harder to predict but industry discussions point to some concern over the current mix of Certificate III/IV offerings to meet industry needs in emerging digital and network technology based industries. There is also a belief that Certificate I/II qualifications are becoming increasingly inadequate as a base training level for modern industry. Moreover, VET may need to pick up some of the load from the Universities in terms of business and professional training.

6.2.3 Displacement issues

This predicted workforce displacement comes from two sources. The first is a structural shakeout from a re-ordering of the relative importance of industries and occupations as sources of employment. While no occupation or industry will decline absolutely by 2021, the relative importance of some industries, especially as providers

of entry level jobs, will decline. New entrants to the labour market and those returning to it will find skill conditions of entry changing and will face a new industry mix.

The shift-share analysis conducted in the report showed that industry mix conditions in Greater Brisbane Labour Market had already undergone significant changes with a move towards professional, managerial and service activities and away from process work and manufacturing. Connected with this structural shift will be a re-ordering of needed skills within occupations and industries. This may place pressure on existing workers to up-skill or face displacement. It is a well-established principle that flows in the labour market (movements between employment, unemployment and non-participation) are much greater than movements in stocks of the labour market (number of persons in any one state at a period in time).

7 Policy implications

The implications of the findings from the report, reinforced by industry discussions, is that this pattern of job creation and destruction will intensify over the period 2012-2021, driven by needed adjustments in the average skill level of employees.

Issues with institutional arrangements primarily relate to wage flexibility and in-migration of labour. In many ways these are national rather than local issues but local employers will face wages issues driven by our predicted overall shortage of labour across the board and by competition for labour between industries. Since 2010 the number of industrial disputes has risen in Australia compared to the earlier decade and wage inflation remains the chief concern of the Reserve Bank of Australia.

The major difficulty of localised wage inflation within the context of this report is the fact that it disrupts efficient labour force distribution, with workers being drawn to occupations and locations on the basis of income not productivity and because it reduces the actual number of job offers as wage costs exceed expectations. The best means of countering these effects in a localised labour market is to ensure an increase in the supply of suitable labour, either through increased output of educational institutions, attracting workers with skills back into the workforce or creating the environment and infrastructure to attract inward migration.

A study of this nature must of necessity operate at a relatively high level, with general rather than specific recommendations. In answering the question will the Greater Brisbane Labour Market cope with the expected labour and skill demands over the period 2012-2021 the answer is yes all labour markets cope, either in an efficient way with adequately skilled workers being distributed to areas of maximum productivity or in a haphazard way with employers lowering standards or offering uneconomic wages to attract workers.

In the period 1989-2011, the Greater Brisbane Labour Market coped, but with strong evidence of skills constraints, in skill shortages Type 1, Type 2 and Type 4. This occurred in particular as the Greater Brisbane economy shifted towards becoming a major service provider for the rest of Queensland and parts of northern New South Wales. It was aided in this by mild excess labour supply.

Based on the feedback received in the industry consultations, we consider that this trend will continue but without excess labour supply. We have highlighted where we believe the job growth will come, by occupation and industry. These predictions suggest a shift to upper level educational/skill requirements and a downgrading in the value of lower level AQF categories such as Certificate I/II as the ability of these qualifications to gain entry level positions in traditional industries will diminish.

The ability to service the new educational/skill requirements will not be assisted by a notable slowdown in the projected intake of some Universities. This will place greater emphasis on VET provision both in terms of pathways to further study as well as its ability to cope with the new emphasis on digital and other ICT related technology that industry experts predict will be needed in Manufacturing and Construction. Indeed it could be argued that VET will become an increasingly important vehicle not just for new workers but in the retraining of existing workers.

In summary our high level recommendations are;

1. Active moves to stop excess labour demand pressures emerging by an active policy of retaining skilled workers in the workforce, particularly in health related areas where a significant number of trained persons have left the industry.
2. Increase efforts to attract inward migration including addressing issues relating to housing and infrastructure.
3. Place emphasis on bridging course to retrain and up-skill workers who may be caught up in the structural change issues discussed in this report.
4. Assist the predicted structural changes to occur rather than attempting to resist change by supporting non-performing industries.
5. Educationally, plan for a greater role for VET in the provision of less traditional areas such as Arts, Media and ICT and strengthen the capacity of VET as a pathway to further education in line with the recommendations of the Bradley Report to increase tertiary access to disadvantaged groups.
6. Examine institutional and legislative arrangements that reduce the ability of workers to fill higher level skill jobs, not as a means of diluting skills but as a means of fast tracking the creation of suitable labour.

Finally, there is a need to increase labour market intelligence gathering. In undertaking this report it was found that, while a number of agencies provided useful information in an aggregate level, very little industry or enterprise level work is currently undertaken.

A Shift share results

A.1 Structural change on employment

Table A.1 Structural change in total employment by industry divisions^a from May 1989 to May 2011, Greater Brisbane Labour Market

Industry	May 1989 to May 1999	May 2000 to May 2011
Agriculture, forestry and fishing	1.518	-1.354
Mining	1.787	5.320
Manufacturing	18.472	5.710
Electricity, gas, water and waste services	0.270	9.783
Construction	9.083	-2.245
Wholesale	2.623	0.564
Retail trade	3.669	-3.993
Accommodation and food services	0.785	10.315
Transport, postal and warehousing	4.990	13.900
Information media and telecommunications	2.467	-0.605
Financial and insurance services	-0.739	-6.135
Rental, hiring and real estate services	-2.806	5.586
Professional, scientific and technical services	-3.521	8.358
Administrative and support services	0.898	3.304
Public administration and safety	13.587	3.549
Education and training	9.494	14.315
Health care and social assistance	13.402	-2.398
Arts and recreation services	3.007	-0.159
Other services	-0.013	-2.449

a Total Employment includes both part-time and full-time employment.

Note: Brisbane refers to Brisbane Major Statistical Region, as data for Brisbane Statistical Division were unavailable. Industries are classified according to ANZSIC (2006).

A.2 Vacancy by occupations

Table A.2 Shift share results on vacancy by occupations^a from May 2006 to May 2011, Queensland

ANZSCO Code	Occupations with Vacancy	May 2006 to May 2008				May 2009 to May 2011			
		NS	IM	RS	TS	NS	IM	RS	TS
1	MANAGERS	1.713	0.684	0.995	3.392	1.323	-0.180	-0.151	0.991
11	Chief executives, managing directors & legislators	0.038	0.048	0.007	0.094	0.043	-0.002	-0.024	0.016
12	Farmers and farm managers	0.011	0.005	-0.007	0.009	0.006	-0.003	0.010	0.013
14	Hospitality, retail and service managers	0.364	0.012	0.120	0.496	0.310	-0.050	-0.123	0.136
1A	Corporate managers	0.594	0.102	0.374	1.070	0.414	0.179	0.027	0.620
1B	Construction, production and distribution managers	0.554	0.784	0.410	1.748	0.457	-0.347	0.018	0.128
1C	Health, education, ICT and other managers	0.132	-0.111	-0.078	-0.058	0.081	-0.040	0.013	0.053
2	PROFESSIONALS	4.328	1.255	2.404	7.987	3.217	-0.150	0.792	3.859
21	Arts and media professionals	0.073	0.004	-0.005	0.072	0.067	-0.068	-0.021	-0.021
24	Education professionals	0.073	0.018	0.001	0.091	0.076	-0.149	0.030	-0.044
26	ICT professionals	0.686	-0.139	-0.009	0.538	0.407	0.018	0.310	0.736
27	Legal, social and welfare professionals	0.439	0.313	0.001	0.753	0.344	-0.307	0.000	0.037
2A	Business, finance and human resource professionals	1.247	-0.478	0.010	0.779	0.772	-0.177	-0.083	0.511
2B	Information professionals	0.099	0.020	0.000	0.119	0.073	0.020	0.092	0.184
2C	Sales, marketing & public relations professionals	0.157	0.002	0.135	0.294	0.110	0.131	-0.064	0.177
2D	Transport and design professionals, and architects	0.229	0.586	0.320	1.135	0.124	0.145	-0.061	0.208
2 E	Engineers	0.818	1.680	0.752	3.250	0.589	0.463	0.514	1.565
2 F	Science professionals and veterinarians	0.091	0.299	0.155	0.545	0.131	0.342	-0.026	0.446
2 G	Health diagnostic and therapy professionals	0.132	0.099	0.112	0.342	0.182	-0.160	-0.007	0.015



ANZSCO Code	Occupations with Vacancy	May 2006 to May 2008				May 2009 to May 2011			
		NS	IM	RS	TS	NS	IM	RS	TS
2 H	Medical practitioners and nurses	0.270	0.042	-0.054	0.258	0.341	-0.276	-0.020	0.045
3	TECHNICIANS AND TRADES WORKERS	2.734	1.180	0.501	4.416	1.637	0.796	0.358	2.791
31	Engineering, ICT and science technicians	0.620	1.200	1.187	3.006	0.407	0.498	-0.172	0.732
32	Automotive and engineering trades	0.695	-0.095	0.044	0.644	0.358	0.515	0.383	1.255
33	Construction trades	0.339	0.166	-0.153	0.352	0.166	-0.070	0.076	0.171
34	Electrotechnology and telecommunications trades	0.324	-0.154	-0.067	0.103	0.168	0.039	0.140	0.347
35	Food trades	0.442	-0.120	-0.209	0.113	0.327	-0.042	-0.139	0.147
36	Skilled animal and horticultural workers	0.099	0.009	-0.109	-0.001	0.061	0.006	0.031	0.097
3 A	Hairdressers, printing, clothing and wood trades	0.169	-0.053	-0.071	0.045	0.121	-0.070	0.020	0.071
3 B	Jewellers, arts and other trades workers	0.054	0.040	0.002	0.097	0.046	-0.050	0.001	-0.003
4	COMMUNITY and PERSONAL SERVICE WORKERS	1.188	-0.261	-0.249	0.677	0.867	-0.109	-0.109	0.649
41	Health and welfare support workers	0.065	0.016	0.007	0.088	0.067	-0.028	0.029	0.067
42	Carers and aides	0.326	0.049	0.013	0.388	0.304	0.051	-0.127	0.228
43	Hospitality workers	0.519	-0.285	-0.166	0.068	0.324	-0.118	-0.041	0.164
44	Protective service workers	0.097	-0.041	-0.053	0.003	0.061	-0.042	0.013	0.032
45	Sports, travel and personal service workers	0.183	-0.052	-0.011	0.120	0.110	0.011	0.033	0.154
5	CLERICAL AND ADMINISTRATIVE WORKERS	3.630	-0.383	0.552	3.800	1.779	0.974	-0.208	2.544
55	Numerical clerks	0.879	-0.233	0.427	1.073	0.379	0.082	0.138	0.598
56	Clerical and office support workers, couriers	0.120	0.001	0.019	0.140	0.093	0.087	-0.115	0.064
59	Other clerical and administrative workers	0.397	0.014	-0.137	0.275	0.221	0.156	-0.012	0.365
5 A	Office managers, administrators and secretaries	0.577	0.193	0.545	1.314	0.281	0.270	0.058	0.609
5 B	General-inquiry clerks, call centre, receptionists	1.693	-0.355	-0.329	1.010	0.818	0.414	-0.320	0.912
6	SALES WORKERS	1.897	-0.792	0.397	1.501	1.403	-1.074	-0.139	0.189
61	Sales representatives and agents	0.569	0.014	0.257	0.839	0.493	-0.616	-0.128	-0.250

ANZSCO Code	Occupations with Vacancy	May 2006 to May 2008				May 2009 to May 2011			
		NS	IM	RS	TS	NS	IM	RS	TS
62	Sales assistants and salespersons	1.149	-0.581	-0.022	0.546	0.747	-0.295	-0.015	0.436
63	Sales support workers	0.183	-0.218	0.142	0.107	0.162	-0.152	0.017	0.027
7	MACHINERY OPERATORS AND DRIVERS	1.199	-0.085	0.330	1.443	0.676	0.477	0.220	1.373
71	Machine and Stationary Plant Operators	0.235	0.079	0.051	0.365	0.158	0.113	0.035	0.306
72	Mobile Plant Operators	0.238	0.088	0.093	0.419	0.152	0.142	0.092	0.387
7 A	Drivers and Storepersons	0.730	-0.251	0.169	0.648	0.366	0.225	0.085	0.676
8	LABOURERS	2.928	-2.300	-0.087	0.541	1.364	-0.780	-0.003	0.582
81	Cleaners and Laundry Workers	0.485	-0.218	-0.097	0.171	0.302	-0.194	0.002	0.110
82	Construction and mining labourers	0.226	-0.111	-0.103	0.012	0.118	-0.079	-0.002	0.037
83	Factory process workers	0.358	-0.306	0.021	0.072	0.165	0.028	-0.093	0.101
84	Farm, forestry and garden workers	0.262	-0.322	-0.008	-0.068	0.119	-0.160	0.077	0.035
85	Food preparation assistants	0.238	-0.227	-0.101	-0.090	0.123	-0.041	-0.068	0.014
89	Other Labourers	1.363	-1.094	0.145	0.414	0.537	-0.348	0.091	0.280

^a The seasonally adjusted monthly Internet Vacancy Index (IVI) published by DEEWR were used as a measure for vacancy by occupations. The monthly IVI is based on counts of online vacancies newly lodged on SEEK, My Career, Career One and Australian JobSearch during the month. IVI vacancies are coded by DEEWR to occupations based on the ANZSCO.

Note: See page 31 for table definitions. Trended monthly IVI were also available from DEEWR. However, in order to examine structural change seasonally adjusted monthly data were considered more appropriate to. Monthly IVI have been manipulated to yearly IVI for the purpose of shift share calculations.

A.3 Total persons unemployed

Table A.3 Shift share results on total unemployment (weeks) by industry divisions^a from May 1995 to May 2011, Queensland

Industry (ANZSIC 1993)	May 1995 to May 2000				Industry (ANZSIC 2006)	May 2001 to May 2011			
	NS	IM	RS	TS		NS	IM	RS	TS
Agriculture, Forestry and Fishing	-3.294	-0.506	-0.200	-4.000	Agriculture, Forestry and Fishing	-1.807	0.426	-8.619	-10.000
Mining	-5.028	-2.222	-6.750	-14.000	Mining	-0.623	-3.544	1.167	-3.000
Manufacturing	-3.294	2.468	4.826	4.000	Manufacturing	-1.184	0.184	1.000	0.000
Electricity, Gas and water supply	-	-	-	-	Electricity, Gas, Water and Waste services	-0.997	-0.781	6.778	5.000
Construction	-3.987	-2.453	9.440	3.000	Construction	-1.309	1.309	-4.000	-4.000
Wholesale trade	-5.374	-2.376	-8.250	-16.000	Wholesale	-1.059	1.909	-9.850	-9.000
Retail trade	-3.121	2.338	5.783	5.000	Retail trade	-1.184	2.134	4.050	5.000
Accommodation, Cafes and Restaurants	-2.947	1.158	-1.211	-3.000	Accommodation and Food Services	-1.433	-0.867	-4.700	-7.000
Transport and storage	-4.161	-6.598	-4.241	-15.000	Transport, Postal and Warehousing	-1.184	-2.816	-4.000	-8.000
Communication Services	-7.628	-0.833	-13.538	-22.000	Information Media and Telecommunications	-1.558	1.558	-15.000	-15.000
Finance and Insurance	-6.241	-4.425	-3.333	-14.000	Financial and Insurance services	-1.309	-7.441	-6.250	-15.000
Property and Business Services	-4.334	1.556	3.778	1.000	Rental, Hiring and Real Estate Services	-1.620	8.120	8.500	15.000
					Professional, Scientific and Technical Services	-1.745	-3.505	-10.750	-16.000
					Administrative and support services	-1.059	-2.520	-0.421	-4.000
Government Administration and Defence	-3.121	-0.341	9.462	6.000	Public administration and safety	-1.807	-5.443	-9.750	-17.000
Education	-4.161	-0.639	5.800	1.000	Education and training	-0.997	-0.003	5.000	4.000
Health and community services	-3.641	-3.919	1.560	-6.000	Health care and social assistance	-1.184	-1.051	4.235	2.000
Cultural and recreational	-3.987	7.821	4.167	8.000	Arts and recreation services	-0.997	9.530	-19.533	-11.000

May 1995 to May 2000					May 2001 to May 2011				
Industry (ANZSIC 1993)	NS	IM	RS	TS	Industry (ANZSIC 2006)	NS	IM	RS	TS
services									
Personal and other services	-3.121	4.068	-7.947	-7.000	Other services	-0.810	1.623	-4.813	-4.000

a Total unemployed persons by industry for the period May 1995 to May 2000 are based on average duration of unemployment (weeks) stated by unemployed persons since last full-time job and industry of last full-time job. Total unemployed persons by industry for the period May 2001 to May 2011 are based on average duration of unemployment (weeks) stated by unemployed persons since last job and industry of last job. Monthly data have been manipulated to yearly data for the purpose of shift share calculations. Results are based on data sourced from ABS Cat No. 6204.0.55.001.

Note: See page 31 for table definitions.

Table A.4 Shift share results on total unemployment (weeks) by major occupational groups^a from May 1997 to May 2011, Queensland

Occupation (ASCO 1997)	May 1997 to May 2000		May 2001 to May 2011
	NS	IM	