



Sunshine Coast Business Council

Report on calculating Full Time Equivalent Employment on Sunshine Coast

September 2012

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1 Purpose

1.1 Introduction

This report provides Sunshine Coast Business Council (SCBC) with an assessment of common employment measures with particular emphasis on the use of Full Time Equivalent Employment (FTEE) as a measure of project generated employment on the Sunshine Coast.

The report:

- Reviews the rapid changes in the employment structure compared with the relatively stable employment measurement concepts and the increasing challenges posed for the traditional measures of employment;
- Defines the common definitions and measures of employment including FTEE;
- Provides data on Sunshine Coast employment measures, with reference between hours worked and FTEE;
- Outlines the conceptual base for FTEE, its use in project assessments, its applications and weaknesses;
- Explains the common ways of calculating FTEEs, as either synthetic multiplier based measures (top down) or detailed employment plans (bottom up);
- Raises the questions to ask to better define and convert FTEE into real jobs for real people, including the geographic scope of employment impact;
- Provides a preliminary conversion of project based FTEE into the likely number of people obtaining employment, and
- Converts Sunshine Coast ABS Labourforce data into full time equivalent employment.

Data tables and references are included.

2 Context

2.1 Rapid Change in Employment

The structure of the Australian economy has changed markedly in the past few decades and with it the nature of work. There are now high levels of part time, casual work and other forms of contracting and flexible work.

The Productivity Commission found that for Australia:¹

- The rise of part time employment over the past forty years represents a fundamental change in the Australian labour market.
- Part time employment has become an important component of the range of working arrangements and represents an example of the labour market's response to economic and social changes. It has been associated with increased diversity of the workforce and contributed to changes in workplace culture and attitudes towards work.
- Part time work has become an important form of employment growing from 10 per cent of total employment in 1966 to 29 percent in 2007. The prevalence of part time work has increased for both men and women and for all age groups.
- There is considerable movement into and out of part time work both as labour market conditions change and as workers move through their life cycle and their work/life priorities change.
- In 1966, part time employment accounted for 4 per cent of male employment, 24 per cent of female employment and 10 per cent of employment overall. By 2007 part time employment accounted for 15 per cent of male employment, 45 per cent of female employment, and 29 per cent of employment overall.
- The significance of part time employment varies considerably across industries. Its share of employment is highest in the service industries such as retail, accommodation, cafes and restaurants, health and community services.

¹ Productivity Commission. Part Time Employment: The Australian Experience. 2008.

- Most of the increase in the aggregate share of part time work resulted from the rising shares of part time work within industries rather than the change in employment shares between industries.
- It has been those industries with already high shares of part time employment, in the service sector, that have increased the shares of part time workers in their workforces the most.
- The geographic distribution of part time jobs appears to be linked to the concentration of different industries in different locations. In particular, part time employment tends to be most significant in coastal areas away from the capital cities – regions where industries involved in hospitality and tourism are major employers.

The relevance to the Sunshine Coast of these national trends arises from the fact that the Sunshine Coast has a high proportion of its employment in those industries that have high levels of part time work.

The ABS reports that the average number of hours worked per week has decreased over the last three decades, falling from 35.7 hours per week in 1979 to 32.8 hours per week in 2009, largely due to an increase in the proportion of people working part time.

2.2 Key Employment Measures

In contrast to the rapid change in employment conditions, the main measures of employment have not kept pace. There is increasing inconsistency between the main and course grained traditional measures (employed/unemployed; full time/part time; FTEE) and economic and employment activity.

There are different concepts of employment used by the ABS in the Census, the Labourforce Survey and in Business Surveys.

Reflecting the inconsistency between the rapid change in employment structure and the traditional concepts, the ABS has paid more attention to the more fine-grained measure of total hours worked. This concept better reflects economic activity and will be developed further by the ABS as a

major economic indicator.²

In the paper by the Australia Institute, the current state of labour market statistics is described as:³

The system of labour market statistics in Australia is in urgent need of reform. The principal measure of labour market performance, the unemployment rate, was developed in an era when the labour market was based on full-time male bread-winners. Over the last two decades, deregulation and structural change have transformed the labour market radically. Underemployment of part-time and casual workers is now a serious problem as is the burgeoning problem of overwork. Yet proper understanding of these important trends is missing from public debate and policy-making because they are not captured in the official statistics.

The issue of the changing nature and measurement of employment provides a context for converting FTEE into real jobs for real people on the Sunshine Coast.

3 Employment Measures

3.1 Census

The Census is reported on the following bases:

- Where people were counted on the night (where enumerated) which includes visitors to the Sunshine Coast but excludes people from Sunshine Coast elsewhere at Census count;
- Where people usually live (usual place of residence), which includes only people who usually live in the Sunshine Coast, and
- Where people work (includes all people working in Sunshine Coast irrespective of where they live). As the Sunshine Coast has a high level of employment self-containment, this is usually not a big issue

² ABS Labour Statistics: Concepts, Sources and Methods. The Current ABS Labour Statistics Program Cat 6102.0.55.001

³ Richard Dennis, Measuring Employment in the 21st Century. Australia Institute

for the Sunshine Coast, but the measure is subject to systematic under reporting for workers in mobile work place industries eg building and in cash based employment.

The Census records employment by hours worked and these are published on the following categories:

- None⁴
- 1-15 hours
- 16-24 hours
- 25-34 hours
- 35-39 hours
- 40 hours
- 41-48 hours
- 49 and over
- Not stated

Part Time work is defined as working less than 35 hours in all jobs during the week prior to Census Night.⁵

The Census is detailed in scope and geographical coverage, provides a benchmark framework for other ABS population and employment data but is undertaken every 5 years.

Sunshine Coast employment data from the 2011 Census is not yet available, so the 2006 results are assessed in section 4.1.

3.2 Labourforce Survey

The Labourforce Survey is the official source of Australian employment and unemployment statistics. The ABS Labourforce Survey is undertaken as a monthly sample and is based on a sample of 1 in 224 (0.45%) of the population aged 15 years and over. This means that for the Sunshine Coast the Labourforce Survey is based on a monthly sample of about 450-500 households.

⁴ Comprises employed persons who did not work any hours during the week prior to Census Night.

⁵ ABS Census Data Dictionary

In the Labourforce Survey people aged 15 and over who, during the reference week are defined as employed if they:

- Worked for one hour or more for pay, profit, commission or payment in kind, in a job or business or on a farm (comprising employees, employers and own account workers); or
- Worked for one hour or more without pay in a family business or on a farm (i.e. contributing family workers); or
- Were employees who had a job but were not at work for a period of less than 4 weeks, or
- Were employers or own account workers, who had a job, business or farm, but were not at work.

The Labourforce Survey provides the basis for monthly unemployment rates and quarterly employment data by industry. The smaller the geographical areas such as the Sunshine Coast and the more detailed the data classifications, such as industry, the greater the results will be subject to sampling error.

3.3 Hours Worked

The ABS has recorded hours worked as part of the Labourforce Survey for many years, but as a finer grained measure of economic activity it is an indicator that is likely to receive increased attention. There are three measures of hours worked: actual hours worked; usual hours worked; and aggregate monthly hours worked.

For Australia, average actual hours worked per week in all jobs have generally decreased over the past 32 years, from approximately 35.5 hours in early-1978 to approximately 33 hours in 2010. A rapid increase in hours worked occurred between mid- and end-2007, just before the economic downturn of 2008-09. Since the economic downturn there have been further falls in average hours.⁶

While the hours worked is recognised as a key fine grained indicator of

⁶ ABS. Australian Labour Market Statistics, Cat 6105.0 - Oct 2010

economic activity, the data is not yet available for regional areas.

3.4 Full Time Equivalent Employment

FTEE is a concept designed to convert the range of hours worked to a full time equivalent, that is 35 hours per week.

The most common use of FTEE is in relation to project assessments. In this context FTEE is derived from ABS national and OESR Input Output Tables for the Queensland or regional economy.

The OESR employment multipliers are based on the employment structure at 1996, and assume two people working part time are equivalent to one full time worker.

It is a simple measure, and in the case of the Queensland Input-Output Tables has not been calibrated since 1996. Since then there has been continuing change in employment structures and working arrangements.

An assessment of Input Output derived employment multipliers is provided at section 5.1.

Sometimes FTEE employment is developed from a bottom up detailed employment plan based assessment of the nature and type of employment that will be required for a particular business and operation. These are usually highly reliable.

3.5 Space Generated Employment

Generally reliable employment estimates of operational employment in particular projects can be based on floor space employment guideline ratios, such as the number of workers per m² of built area for a particular use.

These can be provided if required.

4 Sunshine Coast Employment

4.1 Census

Table 1 shows that at the 2006 Census, the Sunshine Coast had the following employment characteristics:

- In 9 industry sectors average hours exceeded 35 per week (shown in red), and were under 35 hours in 10 industry sectors (excluding Inadequately described/Not stated);
- 40.7% of the workforce were employed less than 35 hours per week, and
- With the exception of Construction and Manufacturing, the larger industries (Retail trade, Health care & social assistance, Accommodation & food services and Education & training which are shown in red) tend to have fewer hours.

Table 1 Hours Worked by Industry Sunshine Coast

Industry	Part Time Workers %	Average Weekly Hours	Size of industry sector
Agriculture, forestry & fishing	40.8%	35.3	2.5%
Mining	19.8%	42.3	0.6%
Manufacturing	24.4%	37.6	7.4%
Electricity, gas, water & waste services	20.5%	38.6	0.6%
Construction	25.4%	37.9	12.8%
Wholesale trade	29.5%	36.8	3.4%
Retail trade	51.5%	30.0	14.1%
Accommodation & food services	56.3%	29.1	9.3%
Transport, postal & warehousing	33.8%	36.4	3.5%
Information media & telecommunications	34.3%	34.5	1.4%
Financial & insurance services	33.8%	35.1	2.7%
Rental, hiring & real estate services	30.4%	36.6	2.9%
Professional, scientific & technical services	37.4%	34.6	5.1%
Administrative & support services	50.9%	30.1	3.2%
Public administration & safety	25.6%	34.8	4.5%
Education & training	46.6%	31.6	7.6%
Health care & social assistance	53.3%	30.1	11.0%
Arts & recreation services	51.1%	29.9	1.5%
Other services	38.7%	33.6	4.0%
Inadequately described/Not stated	50.4%	29.0	1.9%
Total	40.7%	33.3	100.0%

Source ABS 2006 Census

Comparable 2011 Census employment results for the Sunshine Coast will be available in October/November 2012.

4.2 Labourforce Survey

The Labourforce Survey records full time and part time workers. For the Sunshine Coast, the June 2006 part time workers comprised 33.9% of the workforce and 36.9% in June 2011. The high variability of the survey results means that considerable caution should be exercised in drawing conclusions on trends over the period.

For Sunshine Coast Labourforce data, rolling 3 month or 12 month averages are likely to remove month-by-month variations.

5 Bases for FTEE

5.1 Input Output Tables

Input-output multipliers are summary measures used for predicting the total impact on all industries in an economy, of changes in the demand for the output of any one industry. They describe average effects, not marginal effects, and thus do not take account of economies of scale, unused capacity or technological change.

The basic assumptions in input-output analysis include the following:

- There is a fixed input structure in each industry, described by fixed technological coefficients (evidence from comparisons between input-output tables for the same country over time have indicated that material input requirements tend to be stable and change but slowly; however, requirements for primary factors of production, that is labour and capital, are probably less constant);
- All products of an industry are identical or are made in fixed proportions to each other;

- Each industry exhibits constant returns to scale in production;
- Unlimited labour and capital are available at fixed prices; that is, any change in the demand for productive factors will not induce any change in their cost (in reality, constraints such as limited skilled labour or investment funds lead to competition for resources among industries, which in turn raises the prices of these scarce factors of production and of industry output generally in the face of strong demand); and
- There are no other constraints, such as the balance of payments or the actions of government, on the response of each industry to a stimulus.

These assumptions are accepted in most impact assessments, but are unlikely to be realised in fact.

The Input/Output tables produce the following multipliers:

- Output multipliers which is the total value of production by all industries of the economy required to satisfy one extra dollar's worth of final demand for that industry's output;
- Income multipliers are the total value of income from wages, salaries and supplements required to satisfy a dollar's worth of final demand for the output of that industry, and
- Employment multipliers are the employment that would result from the additional economic activity, generally described as the additional direct and indirect jobs (FTEE) resulting from an extra \$1 million of output

Most project based employment estimates are based on models of the Australian and Queensland (or regional) economies that seek to show the relationships between the inputs and outputs of industries and from these are derived employment estimates based on employment multipliers.

The Queensland and Queensland regional input –output tables are based on the structure of the economy in 1996 and the relationships between the industry sectors, productivity relationships and sectoral and assumed geographic inflows and leakages at that time.

The smaller the geographic area, such as a region in Queensland, the greater are the unknowns concerning regional gains and leakages.

The OESR regional input output model that encompasses the Sunshine Coast covers all South East Queensland, less Brisbane, so are not specific to the Sunshine Coast.

Some local government areas, such as the Gold Coast have developed their own regional input output model.

5.2 Employment Multipliers

Dividing an estimate of employment by the expenditure on final demand provides a ratio of employment to final demand. This represents the *average* employment supported by each dollar of final demand expenditure.

The project based employment estimates are generally expressed as construction related where a given level of initial investment drives subsequent direct and flow on employment.

The employment multipliers are expressed as FTEE, and for the OESR Queensland and regional models are based on the assumption that two part time workers are equivalent to one full time worker.

To convert the OESR multipliers to current day levels requires the following adjustments:

- Deflate original values (number of workers per million dollars) to current money values, and
- Adjust for productivity changes.

The OESR has produced a worked example of the methodology.⁷ For example in 1996/97 one million of construction expenditure accounted for 13.9 jobs in Queensland, but due to inflation since then, a million dollars of expenditure in 2011/12 would generate 8.0 jobs.

⁷ OESR. Employment supported by final demand for construction services. Technical Note. June 2011.

In addition to making adjustments for price changes between 1996-97 and 2011-12, the employment ratio should be adjusted for observed and projected labour productivity changes during the period. As an improvement in labour productivity implies that industry uses less labour per unit of output, estimates of the employment ratio need to be adjusted accordingly. Taking productivity into account as well the million dollars of expenditure in 2011/12 would generate 6.7 jobs.

5.3 Issues

The OESR advise that when reporting employment based on Input Output analysis and employment multipliers:⁸

- The employment impact estimated using the Input Output methodology should be expressed as the average number of FTE jobs *supported* by \$1 million of final demand for construction services, rather than jobs generated;
- For construction expenditure over multiple years, employment estimates should be either calculated for each year and stated separately, or stated as an average over the number of years. It is *not* appropriate to sum employment estimates over multiple years. For example, if it was estimated that final demand for construction services supported 6,700 jobs in each year for two years, the employment impact should be stated as “6,700 FTE jobs supported for two years” as opposed to “13,400 FTE jobs supported”.
- The estimate of the employment to final demand ratio is not suitable for use in economic impact analysis or in cost benefit analysis.

The OESR cautions that Input/Output models provide average not marginal results, but the fact is that most project assessments are undertaken on new and hence marginal additions to the economy and purport to show the impacts of these new projects on new or marginal employment.

A key issue for the SCBC is where the jobs that are supported by a project are located. Unless there is a specific model for the Sunshine Coast, then models cannot identify whether the jobs will be located in the Sunshine

⁸ OESR. Employment supported by final demand for construction services. Technical Note. June 2011.

Coast. The results from generic employment multipliers need to be complemented by other measures such as employment plans for the specific project or floorspace to employment ratios and common sense. This applies to “flow on” employment impacts.

6 Conversions of FTEE

To convert the Employment Multiplier generated FTEE to the likely number of jobs created, the following calculation was undertaken.

1. Determine average hours worked for those working full time, that is 35 hours per week or more.
2. Determine average hours worked for those working part time, that is less than 35 hours per week.
3. Compare these patterns with the Full Time Equivalent, based on 100 workers, either working the FTE (35 hours per week) or the average hours worked in the Sunshine Coast in 2006.

Table 2 provides the basis for determination of 1 and 2 above and Tables 3 and 4 provide the comparison.

**Table 2 Average Hours Full and Part time Workers
Sunshine Coast 2006**

	Part Time (under 35 hours)	Full time (35 hours and over)
Hours	833,335	3,047,001
Workers	47,381	69,127
Weighted Average	17.6	44.1

Source 2006 Census

A feature of the hours worked of full time employment for the Sunshine Coast is that this is higher than the national average influenced mainly by the fact that there are more self employed on the Sunshine Coast and self employed work longer hours.

Table 3 provides the conversion in terms of total hours, taking 100 FTEE Workers working 35 hours per week and 100 workers based on the Sunshine Coast experience in 2006.

Table 3 Conversion of FTEE

	Workers	Average hours worked	Total hours
FTEE	100.0	35.0	3.500
SC Full time	59.4	44.1	2.620
SC part time	40.6	17.6	715
SC Total	100.0	33.3	3.335
Conversion factor			1.05

Source 2006 Census

Based on the Sunshine Coast average employment pattern in 2006, one full time equivalent worker will generate 1.05 times the equivalent hours or inversely on average at the 2006 Census, one Sunshine Coast employed person (full and part time combined) worked the equivalent of 95.3% of a FTE.

The application of the FTE factor to Sunshine Coast employment from the ABS June 2012 Labourforce Survey is shown in Table 4.

Table 4 Conversion of FTEE Sunshine Coast June 2012

	Employment
Sunshine Coast Employed (1)	156,300
FTE Conversion Factor (2)	95.3%
Sunshine Coast FTE Employment	148,900

Source (1) ABS Labour Force Status by Labour Force Region. Not Seasonally Adjusted. June Quarter 2012.
(2), Table 3 above.

The FTE conversion factor should be recalibrated when the 2011 Census results for employment become available in October/November 2012.

7 Conclusions

Assessing FTEE is compounded by issues about the adequacy of traditional ABS employment concepts and measures applied to an increasingly flexible workforce.

Employment Multipliers

Input/Output based employment multipliers provide a quick and easy assessment of employment supported by a project. The assessments are based on:

- Outdated information of the structure of the economy;
- Assumptions that are unlikely to be realised;
- Results that hardly ever test the validity of the forecasts against outcomes, and
- Most significantly do not identify the location of supported employment.

Given the issues with the basis of the employment multipliers, the actual conversion of FTEE to real jobs for real people is 1.05. That is 105 jobs would be the result for every 100 FTE employees. However the issue remains the proportion of these that will be located in the Sunshine Coast.

Used with extreme caution, Input/Output based employment multipliers and resulting FTEE can provide a rough but useful guide to the employment that can be supported by a project. The significant weakness is that the assessments taken alone, and without a specific and accurate Sunshine Coast Input Output model, are unlikely to be able to specify where the supported jobs will be located.

The use of Input/Output based employment multipliers and resulting FTEE would be enhanced by further drilling down and also other independent information, such as project based workforce plans, and floorspace/employment ratios.

A sceptical commonsense questioning of project based FTEE is recommended. It is also imperative that the proponents of the projects and the associated FTEE employment forecasts be challenged on the issue of where the jobs will be located and what proportion will be in the Sunshine Coast.

Converting ABS Labour force data to FTE Employment

To convert Sunshine Coast quarterly ABS Labour force data to FTE employment, multiply by 0.953.

The FTE conversion factor should be recalibrated when the 2011 Census results for employment become available.